EFOMP

The European Federation of Organisations for Medical Physics Newsletter

European Medical Physics News

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Cover page photograph: Early-career Medical Physicists who took part in the "Race for the Cure" in Athens.

Editorial

This Winter 2020 issue of European Medical Physics News marks the end of a memorable year. COVID-19 still dominates the news and our lives, with a second wave hitting all European countries (and beyond), albeit now with a bright light at the end of the tunnel in the form of effective vaccines, now awaiting regulatory approval. But 2020 has not all been bad news! We have celebrated 40 years of EFOMP, as highlighted in the Autumn issue of EMP News. And, despite the pandemic (indeed, because of it), medical physicists have been getting together more and more via online platforms. No doubt a positive legacy of COVID will be our familiarity with online meeting tools and a willingness to make use of them. Nevertheless, we are all very much looking forward to being able to meet again in person, including at ECMP 2020 in Turin, in June 2021.

On the subject of medical physicists getting together, the main theme of this issue of our Newsletter is "Early-Career Medical Physics activities and training". A few National Member Organisations have introduced dedicated early-career sections, and interest in forming and developing these is expanding, which can only be a good thing. Even where specific early-career sections do not yet exist, there is a very clear enthusiasm among early-career medical physicists to organise professional, public-engagement, fund-raising and other diverse activities, as described in the nine articles devoted to early-career and training activities within this issue.

Among the articles you will find the final President's Message, from outgoing EFOMP President Dr. Marco Brambilla, which he has entitled "EFOMP: per aspera ad astra" – meaning (in case, like me, you need a translation), "EFOMP: through adversity to the stars" – which is very appropriate in these times. I am sure you will join me in congratulating Marco on his many achievements over the last three years. Under his expert leadership, EFOMP has seen a very significant rise in its scope and influence and is all set for more stellar things to come when Paddy Gilligan takes over the reins in January.

The Winter newsletter contains a number of regular features, including a medical physics book review, and an overview of recent papers published in Physica Medica, by the journal's Editor-in-Chief, Paolo Russo. The Medical Physicists' Hobbies section is focussed on food and drink this time, with articles about organic goat's cheese production in Serbia and craft beer brewing in Malta. Articles from EFOMP Company Members are always appreciated by our readership; this time you can find highly informative articles from ten Company Members. This issue also includes a diverse mix of contributions, covering meeting reports, medical physics practice and research, as well as reports of activities around the International Day of Medical Physics, which took place on 7th November.

Last but certainly not least, in this issue we also report the results of the 5th EFOMP Photo Contest and of the EFOMP 40th-birthday Haiku Contest. I am sure you will agree that these demonstrate that Medical Physicists are extremely talented when it comes to cultural, as well as scientific activities!

I hope you will enjoy reading this issue of European Medical Physics News!

David Lurie and the Editorial Team
(pubcommittee@efomp.org)
November 2020

We welcome articles on any topic connected with Medical Physics in Europe, so if you have an article to submit, or an idea for an article, please contact us at pubcommittee@efomp.org Article submission information can be found here.

David Lurie holds a Chair in Biomedical Physics at the University of Aberdeen, UK, where he has researched and taught MRI Physics since 1983. His research group works on the technology, methods and applications of low-field MRI. He was awarded the Academic Gold Medal of IPEM in 2017. He is Chair of the Communications and Publications Committee of EFOMP and Vice-Chair of the Course Accreditation Committee of IPEM.

Communications and Publications Committee

To contact the Committee, send an email to pubcommittee@efomp.org.

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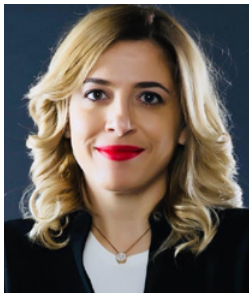

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President's Message – "EFOMP: *per aspera ad astra*"

EFOMP President Dr. Marco Brambilla writes his final message for EMP News, before he hands over the reins in January. (Note added by Editor: For non Latin speakers (like me), Marco's title means "Through hardship to the stars", which is somehow very appropriate in these times.)

My presidency is coming to an end and it is time to take stock of the road travelled to date together in EFOMP.

It is custom for a newly elected president to write an editorial to communicate his plans and vision which I did beginning of 2018 in Physica Medica and, when my friend and colleague Prof. David Lurie asked me to write this last "message in a bottle" as EFOMP President, it was natural for me to look at it to see what was done and what was left to be done.

In 2018 I was planning to have a leadership meeting with all the 34 NMOs to discuss their needs and strengthen the relationship with EFOMP. I met Czechia, Cyprus, Austria, Poland, France, Denmark and Sweden, Croatia, Greece, Spain, Ireland, The Netherlands, Germany, Romania, Lithuania and Belgium. Unfortunately, the pandemic prevented me to complete this task. But I must admit that this was by far the most rewarding experience in those three years. Everywhere I had the privilege of being admitted in living communities of colleagues who warmly hosted me and always made me feel at home.

I was also underlining the need of introducing some form of Individual membership and, starting from this year, this in now a reality with 500 individual associate members in EFOMP. This should only be seen as a starting point for the future, since I believe that many colleagues (also from outside Europe) will take the opportunity, by becoming IAMs, to have access to the educational material archived in the e-Learning platform of EFOMP and to be in closer contact with our community.

The European Congress of Medical Physics is now an established meeting for our community. I was honoured of being the President of the 2nd successful ECMP held in Copenhagen in 2018 and I am still confident that we will be able to meet in person at the 3rd ECMP to be held in Torino next year. If this will eventually be possible, I am sure that the 3rd ECMP will be an even greater success.

The ESMPE is one of the most dynamic entities in the field of Education and Training of MPEs. It has now a statute, a Chair, a Board and in December this year we are going to experiment with the first online edition of the school. The ESMPE coupled with the ongoing process of creating an e-Learning platform will be one of the most powerful assets of EFOMP in the coming years.

Our journal – Physica Medica – is now the official publication of six NMOs. Under the wonderful direction of the current Editor-in-Chief its impact factor has been steadily increasing and all the promises of further growth are now in the hands of the newly appointed EiC and of the editorial board.

The relationships with our sister organisations are excellent. And we also established new Memoranda of Understanding and new relationships with other organisations. Also, the number of Company Members increased from a few units to more than 20, ensuring a close contact with the world of manufacturers.

We established several active Working Groups to develop protocols, standards and Policy statements. The process of selection of members of the WGs is publicly transparent and ensure that the best energies are selected for the specific tasks. I am confident that the completion of their works and the publication of their protocols will significantly increase the professional and scientific profile of our organisation.

Last but not least, our organisation is in a good financial position. During those three years the budget almost doubled due to an increased number of activities and we can now fund our WGs, the establishment of a real e-Learning platform, the schools and the website.

When you take stock, it is also time of acknowledgments: I could have done nothing without the enthusiastic support and competence of the board of officers. And which matters most, I could not have done it with amusement as I did.

Dr. Marco Brambilla
President of EFOMP
Head of Medical Physics Department, University Hospital of Novara, Italy

1980 - 2020

EFOMP

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EJMP ANNOUNCEMENTS

Professor Iuliana Toma-Dasu appointed as new Editor-in-Chief of Physica Medica (EJMP)

EFOMP, AIFM and the whole Editorial team of Physica Medica – European Journal of Medical Physics (EJMP), are delighted to announce that Iuliana Toma-Dasu will be the new Editor-in-Chief, starting in January 2021 when Paolo Russo will step-down from his role after 8 years.

EJMP is devoted to serving the European and International community of medical physicists by publishing rigorously peer-reviewed, timely and innovative research articles in Medical Physics.

EJMP also provides an international forum for publication on topics of Education and training and Professional issues in Medical Physics.

We thank Paolo for his dedicated work at EJMP over the last eight years and extend our welcome to Iuliana in her new role.

Marco Brambilla, President of EFOMP
Michele Stasi, President of AIFM

Professor Iuliana Toma-Dasu

- Head of Medical Radiation Physics, Department of Physics, Stockholm University, Stockholm, Sweden
- Medical Radiation Physics Group Research Leader, Department of Oncology and Pathology, Karolinska Institutet, Stockholm, Sweden
- MSc in Physics, “Alexandru Ioan Cuza” University, Iasi, Romania
- MSc in Medical Radiation Physics, Umeå University, Sweden
- PhD in Medical Radiation Physics, Umeå University, Sweden
- Board Certified Hospital Physicist in Sweden.

Her research covers: Treatment planning, optimisation and evaluation, Functional imaging applied in radiotherapy, Radiobiological modelling, Particle therapy with protons and light ions, Risk assessment following radiotherapy. For Education aspects, her activity is in the coordination of the academic and professional education in Medical Radiation Physics.

EFOMP

aifm
ASSOCIAZIONE ITALIANA DI FISICA MEDICA

EJMP ANNOUNCEMENTS

Physica Medica (EJMP) – Upcoming Focus Issues

Physica Medica's Editor-in-Chief informs the readership about four Focus Issues of the Journal

125 Years of X-rays

On the 8th of November 1895, the German physicist Wilhelm Conrad Roentgen discovered X-rays, and on the 28th of December, 1895, he published a comprehensive report of his findings. Physica Medica - European Journal of Medical Physics (EJMP) is publishing in November 2020 a Focus Issue "125 Years of X-rays" dedicated to celebrate the 125 years from Roentgen's discovery of X-rays, a fundamental step which gave rise to fundamental diagnostic and therapeutic applications in medicine. The Focus Issue includes invited articles from leading scientists in medical physics, highlighting important achievements, recent advances and present challenges for medical physics, related to the use of X-rays. The Guest Editors are Alberto Del Guerra (Honorary Editor), Fridtjof Nuesslin (Past Editor-in-Chief) and Paolo Russo (Editor-in-Chief).

Applications of Artificial Intelligence

EJMP will publish in March 2021 a Focus Issue containing invited papers focusing on the various aspects of medical physics for applications of Artificial Intelligence methods to diagnostic and therapy. A group of Guest Editors nominated by the Editor-in-Chief, led by dr. Federica Zanca (Leuven, Belgium), have been invited to send their manuscript for the peer-review process. The Focus Issue will contain fully reviewed regular papers.

New Developments in MRI

EJMP will publish in June 2021 a Focus Issue on "New developments in MRI: system characterization, technical advances and radiotherapy applications", which will contain invited contributions. The Guest Editors will be Lorenzo N. Mazzoni (Pistoia, Italy), Michael Bock (Freiburg, Germany), Ives Levesque (Montreal, Canada), David J. Lurie (Aberdeen, Scotland, UK) and Giuseppe Palma (Naples, Italy). Deadline for submissions: 31 January 2021

ECMP 2020 Highlights

EJMP will publish in 2022 a Focus Issue containing selected papers from contributions to ECMP 2020 (European Congress of Medical Physics, 16-19 June 2021, Torino, Italy). Soon after the Conference, contributing authors, selected by a group of Guest Editors nominated by the Editor-in-Chief, will be invited to send electronically their manuscript, via the EJMP website, for the peer-review process according to the strict evaluation rules of EJMP. There will be no page charges for this Focus Issue which will contain fully reviewed regular papers (not Proceedings papers). Authors might wish to select the Open Access option and corresponding publication fee. Deadline for submission of invited contributions: 31 October 2021.

Paolo Russo
is Editor-in-Chief of Physica Medica (2013-2020), the official scientific journal of EFOMP.

EFOMP COMPANY MEMBER ARTICLE

Varian: Intelligent Cancer Care – The Future of Personalized Treatment

Why Intelligence Matters
With newly diagnosed cases expected to nearly double by 2030 worldwide, cancer may be on the rise, but survivorship is also increasing due to growing elderly populations, earlier diagnosis and enhanced treatments.

A new, advanced, more intelligent level of care matters now more than ever. Cancer care that's streamlined, comprehensive, fully-integrated, and makes care more accessible—bringing people, technology, and data together to inspire the next generation of healthcare delivery.

With new technologies and advancements, Intelligent Cancer Care is our attempt to continually broaden the scope of our advances so that doctors and their patients receive what they need to successfully fight cancer. Our approach to Intelligent Cancer Care™ rests on three pillars: 1) personalized treatment, 2) access to enhanced standards of care, and 3) use of evidence-based insights in clinical decision-making. A focus on these pillars has led to solutions that can:

- Automate routine or repetitive tasks in the cancer care workflow through the use of smart algorithms, machine learning, and artificial intelligence (AI),
- Facilitate collaboration across sites and specialties, and
- Adapt to new information in a learning system that continues to improve.

Personalized Treatment
No two cancer patients are the same. So their treatments should not be the same. With Intelligent Cancer Care, we're forging a new, smarter path to personalized cancer treatment—enabling cross-functional collaboration between care teams and helping deliver a level of personally-tailored care that follows patients along their entire cancer journey.

Access to Advanced Care
We envision a world where every cancer patient has direct access to the highest quality treatment plans, clinical expertise, and advanced, proven technologies available—no matter where they live. Intelligent Cancer Care is helping us tap into the skills and resources we need to empower you to enhance outcomes and touch more patients in every corner of the globe.

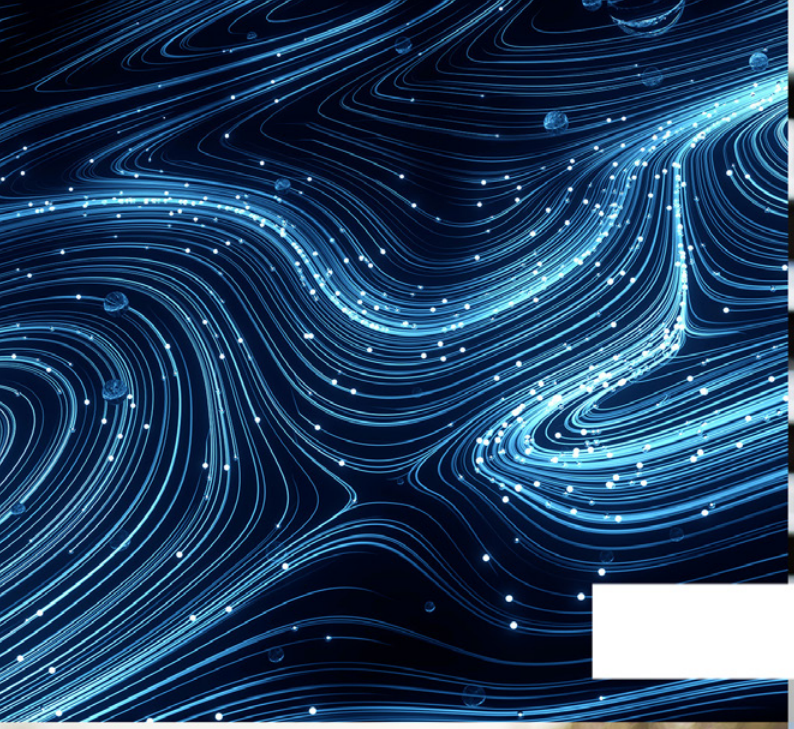
At Varian, we are working towards enabling a world without fear of cancer, where high-quality cancer care—personalized for each patient and optimized according to the evolving global standard of care—is available everywhere. In that world, technology connects clinicians and patients into a learning system that is fuelled by information, driven by collaboration and accelerated by artificial intelligence (AI) to improve outcomes.

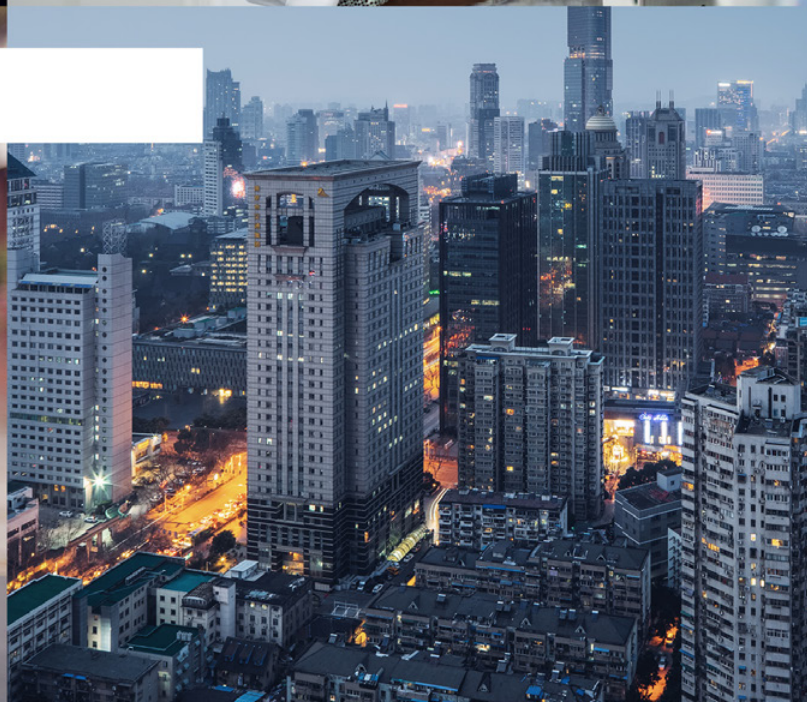
Data-Driven Insights
Intelligent Cancer Care enables us to pull data from varied sources and locations into an engine of intelligence. An engine that allows clinical teams to make faster, accurate, and more confident data-driven decisions—time and time again.

At Varian, for over 70 years, we've been committed to creating simpler, fully integrated, and more intelligent ways for clinical teams to fight cancer. As a global leader in developing and delivering multidisciplinary cancer care solutions, our strategy is to put cancer patients at the centre of our thinking as we work to build an ecosystem of intelligent products and services designed to help clinicians solve the biggest challenges facing the world's cancer-fighting community.

For more information, visit www.varian.com and follow @VarianMedSys on Twitter.

Dee Khuntia, MD, FASTRO, Senior Vice President and Chief Medical Officer, Varian
Deepak "Dee" Khuntia, M.D., is responsible for leading Varian's Medical Affairs programme. He works closely with the Varian product, regulatory, business development, and innovation teams to provide clinical and scientific guidance in all areas of clinical risk and opportunities, safety reviews, adverse experience reporting, product life cycle reviews, clinical protocol design, mergers and acquisitions, and strategy. Dr. Khuntia joined Varian in 2013. He holds a medical degree from the University of Illinois College of Medicine, and completed his radiation oncology residency at the Cleveland Clinic Foundation





Intelligent Cancer Care™

Cancer touches us all in one way or another. That's why every effort put into the fight must tear down the walls separating patient from progress with more intelligent ideas and answers. **Intelligent Cancer Care**™ is building shorter paths from research to remission. Bridging the distance between Manhattan and Mozambique. Driving a direct link from high tech to high impact. And resolutely facing today's unique challenges by connecting us all through more intelligent solutions, data, and insights to deliver advanced care—ultimately helping us realize our vision of a world without fear of cancer.

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EARLY CAREER AND TRAINING ARTICLE

What does the Polish Society of Medical Physics do for young medical physicists in Poland?

Polish Medical Physicists describe early-career activities in Poland.

The Student Scientific Association KERMA, organisers of the "Physics for a Medic" conference.

This year, the Polish Society of Medical Physics (PSMP) celebrates its 55th birthday. Our Society was founded in 1965, three years after the formation of the International Organization for Medical Physics. In the late 1980s, PSMP became a member of the European Federation of Organisations for Medical Physics.

Activities of the PSMP led to the development of a post-graduate programme in Medical Physics which launched in 2002 and is regulated at government level. The programme was updated in 2019 and covers the full scope of physics in medicine. Whilst active amongst the medical physicist community, PSPM does not have a separate section for young medical physicists. What it does, however, is hold a number of events dedicated to that age group at different levels of its organisation.

The first event is the **Autumn School of Medical Physics**, the flagship project of the PSMP. The School was founded in the late 1980s on the initiative of young physicists from the Oncology Centre in Bydgoszcz. The first meeting was held as a workshop in spring 1992. It focused, among other subjects, on Alfard, the first Polish treatment planning system which revolutionised radiotherapy in Poland at that time. The participants decided to meet regularly and chose autumn as the best time to do so - hence the Autumn School. Currently, the School is organised every two years and plays an important role in the medical physicist community in Poland by integrating the MP community and providing an opportunity to exchange experiences. The main topics include radiotherapy, x-ray diagnostics and nuclear medicine.

Another event is the **Silesian Seminars on Medical Physics** organised by the regional branch of the Society in cooperation with the University of Silesia. The Seminars, having the status of a national conference, were first established in 2012 and have been held continually ever since twice a year in the same venue in the Beskid mountains. The programme of the event covers the full scope of medical physics and includes a young physicist session focused on one specific aspect of MP where students have an opportunity to present their MSc or PhD theses to be assessed and scored in the Best Student Paper Contest.

The PSMP also acts as a partner for many events organised by universities, scientific centres and hospitals, including, in particular, Physics for a Medic and the Young Scientific Forum. **Physics for a Medic** is a national conference held annually since 2012 at the AGH University of Science and Technology in Kraków (AGH-UST) by the Student Scientific Association KERMA. The Conference is aimed at students of Medical Physics, Biomedical Engineering and related fields of study. Participants have the opportunity to both attend lectures by members of the scientific community and high-class specialists and to take part in hands-on workshops whose theme changes every year. The conference attracts a large number of students, e.g. almost 200 students from 20 Polish universities participated in the last edition.

The **Young Scientist Forum** has been organised since 2001 at the Greater Poland Cancer Centre in Poznań. The Forum is designed as a scientific contest. Every year, about 15 speakers present their projects in radiobiology, medical physics and clinical radiotherapy to an international competition committee. Awards are given to the top three. The Forum is held in English; therefore, young colleagues from other countries are welcome to take part. So far, seven (!) young physicists have won the highest distinction.

These are, of course, just a few of the events directed at young medical physicists in Poland. For further information, please see the PSMP website (www.ptfm.org).

Joanna Chwiej, PhD, DSc, is Associate Prof. at AGH - University of Science and Technology in Krakow, where she is Head of the Atomic and Molecular Bio-Spectroscopy Group, Department of Medical Physics and Biophysics.
Aleksandra Jung, PhD, DSc, works at AGH - University of Science and Technology in Krakow, where she is Adjunct in the Department of Medical Physics and Biophysics.
Responsible for the conference "Physics for a Medic".

Armand Cholewka, PhD, DSc, is Chairman of the Silesian branch of the PSMP. He is Associate Prof. at University of Silesia in Katowice and Head of the Biomedical Engineering Research Group. He is Vice-Director of Institute of Biomedical Engineering and President of the Polish Society of Thermal Diagnostics in Medicine.
Responsible for the Silesian Seminars on Medical Physics.

Janusz Winiecki, PhD, is Assistant Prof. at Collegium Medicum, Nicolaus Copernicus University in Torun. He is Head of the Medical Physics Department, Prof. Franciszek Ukaszczyk Oncology Center in Bydgoszcz.

Responsible for the Autumn School of Physics in Medicine.

Tomasz Piotrowski, PhD, DSc, is Vice-president of the Polish Society of Medical Physics. He is Associate Prof. at Poznan University of Medical Sciences and Chief of the Medical Physics Department, Greater Poland Cancer Centre.
Responsible for the Young Scientists Forum.

EARLY CAREER AND TRAINING ARTICLE

The Young Medical Physicist group of the German Society of Medical Physics

Sarah Stefanowicz, spokesperson of the jMP, describes early-career activities in Germany.

Representatives of the young Medical Physicists group of DGMP at the annual DGMP meeting.

The working group Young Medical Physics (jMP) was founded in 2016 to enhance the representation of young Medical Physicists within the German Society of Medical Physics (DGMP). The jMP leadership team consists of 10 members who are Medical Physicists working in the clinic as well as doctoral candidates and Masters students from all over Germany.

Since the idea of forming a jMP group was conceived, we have established several aims, projects and events in our German community. Primarily, we work closely with the DGMP board to represent young members and link interests between the existing society, its members and the next generation of Medical Physicists. Another important part of our work is the regular provision of information about how to become a Medical Physicist and what the occupational profile of a (clinical) Medical Physicist and the career opportunities are. To distribute these general facts about Medical Physics we use our homepage (www.jmp.dgmp.de) and social media such as Facebook and Instagram. These activities not only introduce medical physics to the youth but also generally raise awareness and interest for our versatile field.

We aim to create a network for students and young peers in hospitals, science and industry. We use a Facebook group where questions can be asked and discussed and collaborators can be found. In September 2019 we initiated a mentoring programme together with our umbrella association DGMP (sponsored by ELEKTA) to connect students or young professionals with senior professionals. In our own network we collaborate with national young associations to organise joint events. Training of certified Medical Physicists working in clinics is also important to us. A survey in 2019 examined the strengths and weaknesses of the German training for certification as a Medical Physicist.

Apart from our regular activities, we offer a session track at the DGMP annual congress which is proving more and more popular with students, doctoral candidates and young professionals. As well as organising a career session and discussion panel, we add varying topics to the common scientific programme and thus show the numerous possibilities for research, clinical work and work in industry. Together with a social programme consisting of a get-together, a sightseeing tour and a quiz, we give the community several networking opportunities, opportunities to exchange experiences and to develop new ideas and future visions. For the 50th anniversary celebrations of the DGMP at the annual meeting in 2019, we organised a science slam as a special event, where Medical Physics topics were presented in a multifaceted way – from thoughtful to funny. It was a great success for all!

In terms of our plans for the future, one project entails a training programme for young professionals from young professionals. The next is to collaborate with other international young associations in the field of Medical Physics, radiooncology, nuclear medicine and related fields. We would therefore appreciate seeing young Medical Physics groups being set up in all of EFOMP NMOs. Looking back, it was hard work to turn the idea of a young association into an established working group, having its own programme. However, in the long term, the existing society, its members and the next generation may benefit from such a concept. Together we can create new visions and aims and, thus, shape the future of Medical Physics and Medical Physicists.

Sarah Stefanowicz is a one of the founding members of the jMP and represents the working group as spokesperson. She obtained her master's degree in physics at the University of Heidelberg. She is currently working as a Medical Physicist at the Klinikum recht der Isar of the Technical University of Munich. In addition, she is finishing her PhD thesis on improving image-guided proton therapy for pancreatic cancer patients at the University hospital of Dresden of the Technical University of Dresden.

EFOMP COMPANY MEMBER ARTICLE

PTW: Supporting Medical Physics Education in Bangladesh

Since the 1990s, various German organizations have promoted medical physics education in Bangladesh. PTW, a global leader in high-precision dosimetry solutions for radiation therapy, diagnostic radiology and metrology, has been supporting the medical physics community in this South Asian country: through training, dosimetry equipment and donations – most recently the earnings from a calendar sale.

Supported by PTW India: Hands-on workshop on small field dosimetry at the SCMPCR training center in Dhaka, Bangladesh, October 2 – 4, 2019 (Photo credit: SCMPCR Bangladesh).

Bangladesh is the native country of one of the authors of this text, Professor Golam Abu Zakaria, who has lived in Germany since 1972. Almost from the beginning he has initiated projects to help improve medical care in Bangladesh, particularly in the fields of medical physics and dosimetry. With much success: In 2021 the "Asia-Oceania Congress on Medical Physics" will be taking place in this South Asian country for the first time. PTW, too, has contributed – the dosimetry company has been supporting the development of a professional medical physics infrastructure in Bangladesh for many years.

Donations and Dosimetry Equipment from PTW

Experts from PTW's "The Dosimetry School" travel regularly to Bangladesh where they hold seminars and lead workshops for students and practitioners. The Dosimetry School, which was founded by PTW in 2014, is a global education initiative aiming to enhance the understanding and practice of clinical dosimetry. Speakers and trainers often bring along the dosimetry hardware required for the course participants to practise in their suitcases. Additionally, PTW supports medical physics in Bangla-

desh with donations, last in 2020: The popular PTW calendar with pictures of the Black Forest was this time not given as a freebie, but sold for a good cause throughout PTW's sales and distribution network. Several thousand Euros were raised from this campaign, all of which were donated to the South Asia Center for Medical Physics and Cancer Research (SCMPCR) in Bangladesh.

The Aim: Advancing Medical Physics and Radiation Oncology

SCMPCR, which was founded in 2018, is a seminar centre in Dhaka, Bangladesh. It offers courses in medical physics, dosimetry and radiation oncology three times a year, and in addition also provides advice and information on cancer and preventative care. The centre was formed as result of a cooperation between German and Bangladeshi institutions, which has been ongoing since the 1990s: Heidelberg University, the German Cancer Research Center (DKFZ), and the work group "Medical Physics in Developing Countries" of the German Society of Medical Physics (DGMP) have been working together with institutions from Bangladesh since 1996 in developing medical physics in this region. Since 2014 the Medical Faculty Mannheim of Heidelberg University has been collaborating with Gono Bishwabidyalay University in Savar (Dhaka), supported by the German Academic Exchange Service (DAAD), in an on-going project. The aim of this project is to train students, to create an exchange between German and Bengali practitioners and to improve the quality of medical physics in Bangladesh through training and workshops. However, the SCMPCR receives no funding from the state. This makes donations, such as those from PTW, important in order to cover the maintenance and investment costs of SCMPCR.

Medical Physicists in the Whole Region Benefit

SCMPCR achieved the development of an infrastructure in Bangladesh, which makes it possible to offer medical physics training locally. The organization has changed over the years: At the beginning, students and practitioners were flown from Bangladesh to Germany for training. Over the last few years, however, more German experts travel to Bangladesh and teach on site, which is cheaper and more sustainable. Every year, the cost for medical physics and dosimetry seminars, accommodation and return travel to and from Bangladesh can be covered for 27 participants from different South Asian countries.

In previous years, the Asia-Oceania Congress on Medical Physics was organized by Australia, Malaysia, Thailand or Japan. The fact that in 2021 Bangladesh has been chosen to be the host for the first time, is an acknowledgement of the work of many individuals and the commitment of institutions such as PTW.

For more information on the SCMPCR, its aims and initiatives, visit https://scmpcr.org/.

Prof. Dr. Golam Abu Zakaria

Golam Abu Zakaria was professor of Biomedical Engineering and is founding chairman of the South Asia Center for Medical Physics and Cancer Research (SCMPCR) in Bangladesh. Since 2018 he has been nominated as Chairman of the Accreditation Committee II of IMPCB and as Deputy Chairman of the Accreditation Committee of IOMP.

Dr. Frank W. Hensley

Frank W. Hensley, Ph.D., entered into medical physics in 1978 at the Institute of Medical Radiation Physics and Radiation Biology at Essen University Hospital, Germany. Between 1990 and 2014 he worked as a medical physicist in the Department of Radiation Therapy and Radiation Oncology at Heidelberg University Hospital, Germany.

Volker Steil

Volker Steil works as a medical physicist at the University Hospital Mannheim, Germany. Since 2014 he is coordinator of two DAAD projects between Gono Bishwabidyalay University in Savar, Bangladesh, and the Heidelberg University, Medical Faculty Mannheim, Germany. He is head of the Medical Physics and Radiation Protection Unit at University Hospital Mannheim.

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EARLY CAREER AND TRAINING ARTICLE

European Radiation Research Society Young Investigator Award winners from Greece

Erato Stylianou-Markidou and Efi Koutsouveli introduce two Greek Scientists who won the Young Investigator Award (YIA) in July 2020

The European Radiation Research Society (ERRS) was founded in 1959 with the aim of promoting radiation research. This year the ERRS council awarded 25 young investigators for their contribution to the field of radiation research. The awardees had the opportunity to participate in the 45th ERRS 2020 meeting which was held as a virtual conference broadcast from Lund, Sweden on 13th - 17th of September.

The Young Investigators Awards (YIA) were granted to 3 young scientists doing their Post Doctorates and 22 PhD students. Among the awardees there were 2 Medical Physicists from Greece who are members of the Hellenic Association of Medical Physicists (HAMP): Martha Habibi and Aggeliki Nikolakopoulou.

Both young female Greek scientists are doing their Post-doctoral research at the Medical school of the University of Athens and at the National Centre of Scientific Research "Demokritos" in the field of Radiobiology, in Athens, Greece. Martha Habibi was born in Athens, Greece in 1989. She studied physics at the National Technical University of Athens and continued on to pursue her Master's degree in Medical Physics - Radiophysics at the University of Athens. She completed her practical training as a clinical medical physicist in Radiotherapy, Nuclear Medicine and Radiology and participated in several radiobiological courses. She is currently a PhD student at the Medical School of Athens. With almost 6 years of experience in experimental research in the field of radiation biology at the National Centre of Scientific Research "Demokritos', she extensively studied the effect of low dose ionising radiation doses at the molecular and cytogenetic level. Her study ''The use of cytogenetic and molecular endpoints as biomarkers of low dose exposure in interventional cardiology'' was the one for which she was awarded the Young Investigator Award (YIA) by the European Radiation Research Society.

Aggeliki Nikolakopoulou, the second Greek awardee, was born in Kalamata, Greece in 1988. Her strong interest in physics led her to receive a Bachelor's degree in Physics from the University of Athens. She then completed her Master's Degree in Medical Physics at the Medical School of the University of Athens. Aggeliki is currently a PhD student at the National Centre for scientific research 'Demokritos' where she is receiving specialised academic and research training in the fields of radiobiology, radiation protection, nuclear medicine and radiation therapy. Her project "G2/M checkpoint abrogation with selective inhibitors results in chromosome break repair defects in RPE and 82-6 hTERT cells" which took place in the University of Duisburg-Essen was the one for which she was awarded the YIA this year. Her current project is "Development and validation of radiation cytogenetic assays to predict individual radio sensitivity and optimize personalized radiation therapy".

As Medical Physicists we would like to congratulate our young colleagues for their success and wish them well as they continue their research careers with enthusiasm and hard work. Martha and Aggeliki's recognition may inspire female students to choose science, technology, engineering and mathematics (STEM) fields in higher education and pursue a career in physics related topics.

EARLY CAREER AND TRAINING ARTICLE

Erato Stylianou Markidou is a Medical Physicist at the Bank of Cyprus Oncology Centre, Nicosia, Cyprus, where she works on radiation therapy treatment planning and quality assurance and commissioning of radiotherapy and diagnostic equipment. She obtained her bachelor's degree in Physics from the University of Cyprus in 2001 and graduated from Wright State University, OH, USA in 2003 with Master of Science in Medical Physics, with honours. She has recently received the EACMPE in Radiation Oncology (European Attestation Certificate to those who have reached the Medical Physics Expert status). She is the past president of CAMPBE. She is currently the president of BRF (Biomedical Research Foundation) and a member of the Cypriot Medical Physics Registry Council. She has been a member of EFOMP's Communications and Publications Committee for the last two years.

Efi Koutsouveli works as a Medical Physics Expert in the Medical Physics department of Hygeia Hospital, Athens, Greece. Her professional focus is on radiotherapy units (external radiotherapy & brachytherapy). Her special interest is in Hospital Quality Management Systems and Oncology Information Systems. She is currently the Treasurer of the Hellenic Association of Medical Physicists (HAMP) and EFOMP's Internet Manager and Assistant Secretary General. In 2019, she received the IOMP-IDMP award for promoting medical physics to a larger audience.

EARLY CAREER AND TRAINING ARTICLE

Early Careers Special Interest Group of the Irish Association of Physicists in Medicine.

Dean McCarthy describes early-career activities in Ireland.

Members of the EC-SIG at a networking event (pre-COVID). Left to right: Aine Matthews, Laura Sinclair, Michael O'Neill, Dean McCarthy, Ronan Coleman, Keith Davey, Caroline Lannon, David Caldwell, Niamh McArdle, Clare Corbally, Nina McWilliams, Daniel Cannon.

Over the course of 2018-2019 increased investment in the Irish health care sector led to a string of Medical Physicist positions being created at both Junior and Senior levels. The result was a domino effect of staff changes, promotions and new appointments. At the start of 2020 there was hardly a Medical Physics Department in the country that had not welcomed a new physicist or two onto its team. Of particular note was the sheer number of newly appointed Trainee and Junior Physicists around the country in both Diagnostic and Radiotherapy roles. To give some general context, the Irish Association of Physicists in Medicine (IAPM) had 195 registered members in 2018, 223 in 2019, and 261 in 2020.

The question of training for the above physicists presented something of a challenge for the Medical Physics community. Unlike some, and just like many other, EU countries at present Ireland lacks an official training scheme for physicists on the Diagnostic or Nuclear Medicine pathways, although our CAMPEP accredited training scheme for Radiotherapy physicists is well recognised. Yet even so, not every new entrant into a Radiotherapy role had completed such a scheme.

It was recognised also by these early career physicists that it would be extremely difficult for individual hospitals and our senior colleagues to provide sufficient training in every aspect of a physicist's role. Not every hospital has the same facilities and specialities. The challenge this presents for future MPE recognition becomes a factor and it is in this context that the Early Careers – Special Interest Group (EC-SIG) of the IAPM developed.

The EC-SIG provides a forum for those of us newly appointed Trainee and Junior physicists, from which we can network amongst ourselves, share our knowledge, and our

experiences. In doing so we support each other's development. Where it is found that certain gaps in the available training might emerge the EC-SIG proactively seeks avenues through which training in these areas is provided for all members. By taking an active role in the directing of our own training and development we reduce the burden on individual institutions and our workplace colleagues to provide training in each and every aspect of our respective roles. The training may be provided by peers who have already gained a level of experience, by our more senior colleagues, vendors and so on.

In October 2019, the EC-SIG held its first big event, a one day coding workshop to promote the development of coding skills in Python and MATLAB that was kindly sponsored by Microsoft. More recently the EC-SIG commenced the development of a nationwide project attempting to automate the distribution of monthly OSL and TLD dose reports to their wearers, based on code developed at University Hospital Galway. Members of the EC-SIG are in active engagement with Irish College of Physicists in Medicine (ICPM) (the Irish college of MPEs) providing feedback on the ongoing development of the curriculum and core competencies that transcribe the components of RP174 into the Irish framework.

Coming soon, in December 2020 the EC-SIG will host its first online event titled "A Series of Unusual Events". Five early career physicists will give short 10 minute presentations via WebEx to their peers on a set of rare situations that they feel contributed meaningfully to their learning and which may not be encountered again all too often, if not once in a lifetime. What do you do if you encounter a Plutonium Pacemaker? A two part workshop on Nuclear Medicine Dosimetry is also in the early stages of development for late January and early February.

Dr. Dean McCarthy is a Medical Physicist at the Mater Misericordiae University Hospital, Dublin. A graduate of Experimental Physics with Astrophysics, he completed his PhD in Middle Atmospheric Physics while becoming an Assistant Lecturer at Maynooth University. He undertook an MSc in Medical Physics at Universität Heidelberg, Germany. He is a council member of the IAPM serving as the EC-SIG coordinator.

EFOMP COMPANY MEMBER ARTICLE

Accuray: Synchrony® for the Radixact® System – seamless adaption to target and patient motion in real-time during treatment delivery

Almost two decades ago, Accuray revolutionized tumour and patient motion management with Synchrony® real-time motion synchronization technology. Synchrony is a suite of technologies that allows seamless adaption to target and patient motion in real-time during treatment delivery available for the CyberKnife® S7™ and now the Radixact® System.

On the Radixact System a kV source and detector panel are mounted on the gantry, 90° apart from the linac and MVCT detector and works in conjunction with an optical camera system. Radixact Synchrony® Fiducial Tracking™ and Synchrony® Lung Tracking™ use x-ray images that are acquired every few seconds during gantry rotation to determine the location of the target during treatment delivery. For targets that move with respiration, Respiratory Modelling enables correlation of internal target positions visible in the x-ray images with LED marker v continuously detected by the camera. The result of this correlation is a model that is constantly updated to determine target position in three dimensions. Motion synchronization is performed by continuously updating jaw positions and MLC leaf patterns to repoint the treatment beam to the known position of the target.

Clinical Implementation

Extensive end to end performance testing data published by the early adopters of Synchrony with the Radixact System have demonstrated accuracy well within the given technical specifications of <1.5mm for tracking accuracy and of <3%, 3mm for dose accuracy (Chen et al. 2020).

Lung tumours have presented an optimal patient population for clinical implementation by early adopters of Synchrony with the Radixact system. first Synchrony treatments utilizing fiducial free lung tracking with respiratory modelling with non-restricted, free breathing has shown the feasibility of adopting of a non-ITV approach for selected lung tumours that move with respiration.

Minimal additional time is added to the treatment planning process with the selection of optimal default angles for acquiring kV radiographs and preparation of a pre-treatment simulation plan.

The Synchrony Simulation feature is used to run through the Scan/Register/Treat workflow with the treatment beam disabled. The gantry, couch, MLC, and jaws move as planned for the TomoHelical™ treatment delivery with pre-treatment CTrue™(MVCT) imaging and in treatment kV radiograph acquisition capabilities.

The Città della Salute e della Scienza, University Hospital in Turin, Italy was the first site in Europe to treat using Synchrony® for Radixact. Among the first patient treatments were an 84-year-old male, stage I NSCLC in the right upper lobe, and a 71-year-old female with oligoprogressive lung metastases in the right upper lobe. The prescription dose was 50 Gy in 5 fractions and the GTV to PTV margin was 3 mm with a tumour motion between 5 to 7 mm.

In the words of Paolo Brossi, Head Radiation Therapy Technologist: “We were able to build the respiratory model in less than one minute for both patients and were positively impressed to verify (on 2D radiographs) Synchrony’s capability to follow and predict exactly target movement (well visualized). The patient breathed freely throughout, and the system followed. The jaws and MLC leaves rapidly adapted to target motion. We have to remark on the system’s fast reaction when sudden change happened. A few times during treatment one of the patient’s breathing cycle changed however we were able to easily rebuild the model and continue treating. The total in room time for these first treatments was 24mins.”

Adding Synchrony to their Radixact System allows radiation oncologists to expand access to high-precision, ultra-hypofractionated radiation therapy to more patients.

Information was provided by the clinical team Città della Salute e della Scienza di Torino University.

Additional Reading:

Accuray, “Preliminary Experience with the RadixactHelvetica Neue System with Synchrony®”, European Medical Physics News, Autumn 2020, p55.

Chen GP, Tai A, Keiper TD, et al. “Technical Note: Comprehensive performance tests of the first clinical real-time motion tracking and compensation system using MLC and jaws”, Med Phys. 2020 doi: 10.1002/mp.14171

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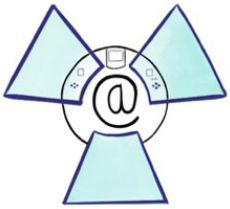
Price A, Chen J, Chao E, et al. “Compensation of intrafractional motion for lung stereotactic body radiotherapy (SBRT) on helical TomoTherapy”, Biomed. Phys. Eng. Express 2019; 5:025043

Article written by **Susan Reid**, TomoTherapy® Radixact® Product Manager, EIMEA, Accuray

EARLY CAREER AND TRAINING ARTICLE

Early-career medical physics activities in Spain: the "Grupo CT"



The Grupo CT (Computed Tomography) of SEFM (Spanish Society of Medical Physics) was born in June 2018 with the vision to serve as a link between junior Spanish medical physicists and SEFM, as we noticed there was a bridge to create. Our group consists of 5 to 7 medical physicists, all in training or working as junior specialists (at most 3 years of experience as a specialist), with the aim of increasing our presence in the field of Medical Physics.

Our approach involves boosting our visibility in social media, a key resource in this age. To achieve this, we are active in the three most prominent social platforms: Facebook, Twitter, and Instagram. Under the username Grupoct we post news, the vicissitudes of our day to day, and any other interesting information about Medical Physics. We also hold presentations at universities throughout the country to promote the role we play in the medical field and the opportunities it presents to young researchers, which allows us to be closer to the population and to show the important work that is accomplished in hospitals.

The head physicist of University Hospital Quirónsalud, Madrid (Juan Castro) usually organises one or two yearly meetings in Madrid, where everyone is invited to perform a presentation with the latest developments in their hospitals or personal projects. In these events, they encourage in-training medical physicists to contribute as much as possible, as this is the perfect opportunity to take their first steps in the field. However, we have realised that senior physicist's submissions far exceeded those of the young.

With this in mind, this year we have arranged the first virtual seminar for trainees and junior medical physicists, which will take place online on November 27th. This decision of making it online fulfils a double purpose: to proceed with the meeting under the current worldwide situation as well as to promote the participation among those colleagues that could not commute to Madrid for this type of event.

So far, we have received a total of 35 submissions about Radiotherapy, Nuclear Physics and Radiation Protection, which in turn will be divided into poster or oral presentations. We will reward the two best oral communications and the best e-poster with a free registration for the next Spanish Medical Physics National Congress. The SEFM-SEPR common congress, hosted every two years in a different city, is a greatly anticipated event by the Spanish medical physics community, making it an ideal reward.

Taking a look at the first results, we are very pleased with the level of participation and with the submissions received. The undeniable influence of social media among young people and the support of the SEFM have made possible the high numbers of communications received.

Also, the large number of registrations indicates a strong acceptance of the event, encouraging us to think about future editions. As a junior group it has been incredibly rewarding to make this seminar a reality, and we hope it will be the first of many!

The Grupo CT, although relatively young, is proud to be meeting the objectives proposed each year. Residents are increasingly aware of the importance of SEFM, and the Grupo CT serves the SEFM to listen and attend to the needs of young medical physicists. We hope this good harmony will last for many years and that together we will continue to improve the excellent quality of the Spanish Society of Medical Physicists.

David Hernandez Gonzalez works as a Medical Physicist in the University Hospital of Princesa (Madrid) since 2018. He studied physics in the University of Salamanca where he obtained his BSc. His professional interests involve clinical dosimetry, QA and Brachytherapy.

Maddalen Alonso Etxarri has been a Medical Physicist since 2018. She obtained her Physics degree from the University of Basque Country. She currently works as a Medical Physicist in the University Hospital of Donostia in Basque Country, Spain. Her professional interest is in clinical dosimetry and radiobiology.

Teresa Valdivielso currently works as a Medical Physicist in the Consorci Sanitary of Terrassa in Barcelona, Spain. She developed a keen interest in Oncology research since she studied her BSc in Physics. Nowadays, her professional interest is focused on statistics and data analysis in Radiotherapy.

Beatriz Chover has been a Medical Physicist since 2020. She obtained her Physics degree from the University of Valencia. She currently works as a Medical Physicist in the Virgen del Consuelo Hospital in Valencia, Spain. Her professional interest is in clinical and physical dosimetry.

Rocío Estrada is in her third year of training at the Complejo Hospitalario de Navarra (Pamplona, Spain). She obtained BSc in Physics at University of Granada in 2015, and MSc in Medical Physics at University of Valencia in 2018. Currently, her work is focused on Radiation Protection in Medical Imaging, although she is also passionate about Radiotherapy and HDR/LDR Brachytherapy.

Rodrigo Astudillo is currently doing his third year of residence in the Hospital Universitario Marqués de Valdecilla in Santander, Spain. He obtained his Physics degree from the Universidad Autonoma de Madrid in 2016. QA, LDR Brachytherapy and Stereotactical Radiotherapy are among his professional interest.

Roser Fayos-Sola is finishing her training years as a medical physicist in the University Hospital of Princesa (Madrid). She obtained her Physics degree from the University of Valencia, where she is currently pursuing a Master's Degree in medical physics. Her professional interest are clinical dosimetry and radiobiology.

EARLY CAREER AND TRAINING ARTICLE

The young medical physicist section of the French Society of Medical Physics (SFPM)

Brian Baron describes early-career activities in France

The young medical physicist section of the French Society for Medical Physics (SFPM) was created in 2011. Its objective is to draw together medical physicists who are going to start or are just starting their career. This section allows its members to share and discuss common concerns on scientific aspects or on the practice of the profession. The members of the section are physicists with less than 3 years of experience in the clinical field (radiotherapy and / or medical imaging). Medical physics residents in their first and second years of clinical training (DQPRM), Master's degree or PhD students in the field of medical physics are also encouraged to participate in the section meetings and projects and take part in the SFPM projects.

The young medical physicist section is included in the matters of the SFPM since its coordinator is an invited member of the board of SFPM. As part of SFPM, the section benefits from its scientific, professional and financial support.

The section has several missions, for example (but not exhaustive) to keep the following up-to-date:

- A survey of all job offers published during the year in France. The results are transmitted to the SFPM board. These results help the SFPM in the discussion with French authorities to adapt the number of students trained in medical physics to the actual needs;
- A newsletter listing the yearly activities in medical physics, thereby setting up an information channel between physicists in France. This newsletter also lists the PhD thesis defended during the year, as well as an interview with physicists on a theme that varies each year;
- A contemporary guide for helping last year's residents with their job seeking. The guide includes the average salaries registered in France and some guidelines on how to prepare for a job interview.

The section also currently manages three projects with the below aims:

- To obtain information and guidance about the possibilities of employment abroad for French medical physicists;
- To create a support group within the section allowing students who wish to consider the profession of medical physicist to contact young physicists to answer their questions/doubts;
- To develop links with young medical specialities in order to carry out scientific journeys devoted to medical physics.

Brian Baron, coordinator of the young medical physicist section, for the board of SFPM

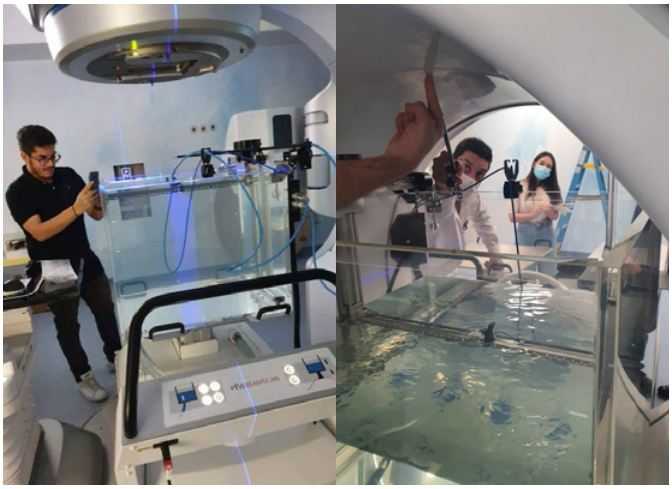
Brian Baron is a medical physicist at the Institute Curie. He graduated last year from the same Institute. Since June he has acted as coordinator of the young physicist section for the French Society for Medical Physics (SFPM). During his residency, he was the representative of the 2017-2019 class for both the "young physicist section of the SFPM" and the "policy committee of the Institut des Sciences et Techniques Nucléaires". An invitation to present about daily imaging for VMAT breast radiotherapy at the 58th Scientific Congress of the SFPM was his first appearance in his early career and led the way for what is to come.

EARLY CAREER AND TRAINING ARTICLE

Early-Career Medical Physicists in Greece

Resident Medical Physicists Michalis Psarras and Despoina Stasinou describe early-career activities in Greece.

To acquire the role of a certified medical physicist, a two-year Master's programme in Medical Physics is mandatory, followed by a one-year residency program delivered by an accredited medical institution and a licensing examination. Medical physicists can gain further expertise and get involved with research by applying for an academic or industrial PhD programme.



Early-career medical physicists participating in Commissioning procedures

Moreover, students and early professionals in Medical Physics are given the opportunity to get involved in the current affairs related to the field and enhance their knowledge, through a series of National, European and International workshops, congresses, courses and events that are organized in Greece, in the fields of ionizing and non-ionizing radiation.

Hospitals in collaboration with the Hellenic Association of Medical Physics (HAMP) in Greece are actively contributing in introducing early-career medical physicists into the Medical Physics world. They often hold educational seminars, with an open invitation for Medical Physicists, students and Physicians, inviting renowned colleagues to provide information about state-of-the-art technology and newly advanced modalities, as well as the methods of their clinical application. Related consequent discussions between the attendees of different professions, improve the neophytes' academic knowledge and skills. Furthermore, when it is possible, early career MPs are given access to the acceptance tests of the most technologically up-to-date machines, which help them to enrich their clinical experience and practically apply their knowledge of the field.

Through HAMP, young Medical Physicists not only attend but also participate in the organization of workshops and seminars. They provide their help by welcoming the participants, giving information about the venues and cities or by giving away certificates to the attendees.

Except for the educational events, young Medical Physicists participate in a wide range of social activities that focus on apprising the community about the implementation of radiation in Health Sciences. Such demonstrations include edifying visits from school pupils into medical institutions. Early career MPs could not miss out on various Science

School pupils' visit to "Attikon" University Hospital.

Presenting Medical Physics at Athens Science Festival

Festivals, organized in numerous cities in Greece, such as the ones held in Athens and Patras, where they perform experiments and distribute flyers to the public, related to radiation, triggering their interest to learn more about the field.

dition, on this day senior Medical Physicists are honoured and awarded for their contribution in the field, serving as an example for younger Medical Physicists and motivating them with their work.

Early-career Medical Physicists who took part in the "Race for the Cure" in Athens.

For the sake of informing people about cancer, young Medical Physicists in Greece participate every year in the "Race for the Cure" to support women and men with breast cancer. In the same sense, philanthropic events, such as Christmas Bazaars, have been held by Medical Physicists, where young members of the community have helped with the preparation of hand-made gifts and the organization of the bazaar.

A noteworthy national event that is organized every year, is dedicated to the International Day of Medical Physics (7th of November). The Hellenic Association of Medical Physics considers this occasion a great opportunity to increase awareness of the public regarding the profession. In ad-

These last months, due to the COVID-19 virus, most of the above-mentioned educational and social organizations were either postponed or cancelled. In the case of the seminars and the congresses, the majority of them were held via webinars. However, young colleagues were able to contribute in the recent HAMP board elections by ensuring that the COVID-19 protective measures were taken at the polling location. We hope that in the next year the community will return to normality and early-career Medical Physicists will have the chance to participate in more activities.

Michalis Psarras, MSc.

Michalis Psarras is a resident Medical Physicist at "Attikon" University Hospital in Athens, Greece. He obtained his Bachelor's degree in Physics in 2016, from University of Crete, Heraklion, Greece. He holds a Master's degree in Medical Physics since 2018 from National and Kapodistrian University of Athens, Greece. Also, he is member of Hellenic Association of Medical Physicists (HAMP).

Despoina Stasinou, MSc.

Despoina Stasinou is a resident Medical Physicist at "Attikon" University Hospital in Athens, Greece. She obtained her Bachelor's degree in Physics in 2018, from University of Patras, Greece and went on to study for her Master's degree in Medical Physics, from National and Kapodistrian University of Athens, from which she graduated in 2020. She is member of Hellenic Association of Medical Physicists (HAMP).

EFOMP COMPANY MEMBER ARTICLE

Qaelum: Advanced "toolkit" for quality optimization in mammography

Breast cancer is the most frequent cancer among women and accounts for about 25% of all cancer cases and 15% of all cancer deaths [1]. Especially in the European Union, it accounts for 29% of female cancer [2]. Mammography is the basic imaging examination used to detect changes in the breast tissue, diagnose and manage patients with breast disorders. It is performed to both asymptomatic (screening mammography) and symptomatic patients (diagnostic mammography). Screening mammography is of particular interest in terms of radiation protection as asymptomatic individuals are exposed to radiation. Thus, optimized protocols are of crucial importance in mammography. One of the main advantages of a dose management system is that it offers a broad and direct overview of the radiological settings and practice [1]. Parameters affecting the quality of the examination can be easily evaluated and optimization can be initiated based on facts.

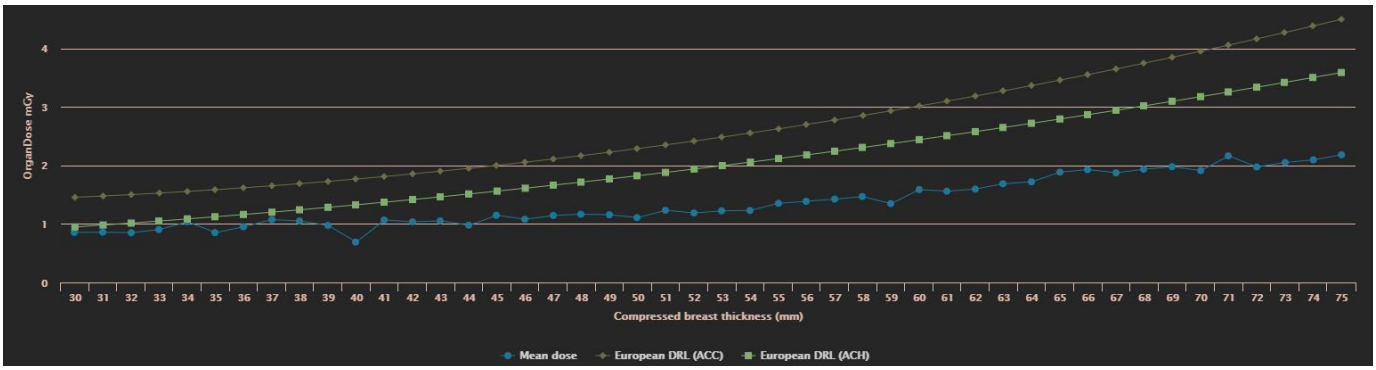


Figure 1: Comparison of mean MGD for screening mammography (y-axis, measured in mGy) with European DRL for different breast thicknesses (hospital mean MGD values are displayed as blue dots, while achievable and acceptable European MGD values are shown with green squares and brown rhombuses, respectively).

Diagnostic reference levels (DRL) have proven to be a practical tool widely used for patient dose optimization [3]. The latest ICRP publication on the use of DRLs in medical imaging recommends the Mean Glandular Dose (MGD) as the DRL quantity to reflect the influence of different anode/filter combinations and breast thicknesses on radiation dose, which is not possible with other quantities (entrance surface air kerma free-in-air or entrance skin dose) [3]. DOSE by Qaelum (DOSE) allows for exposure analysis taking into account the breast thickness and the reference values. We identified that local values were much lower than the reference ones (Figure 1), and thus, we defined new, local levels for diagnostic and screening examinations in order to better optimize exposure [1].

Alongside the analysis of separate radiological units, DOSE provides advanced comparison of MGD on our three different centres (figure 2). The number of screening examinations performed during the last two months was 267, 47 and 162 for the three centres respectively. Besides the wider distribution of doses that was noticed on 2 devices, it was observed that a number of patients received particularly high doses. By investigating these dose outliers further, we confirmed that they were associated with bigger breast thicknesses, so no correction actions were required.

It is also interesting to note that the difference of dose distribution between the devices could be attributed to the different filtration used. Indeed, the mammography unit installed in centre 2 is of older generation and lacks a filter installed in the other two. All these details could be found through the dose management system.

Estimating the dose in radiological practice is of major importance as it is linked to the radiation risk, yet not the

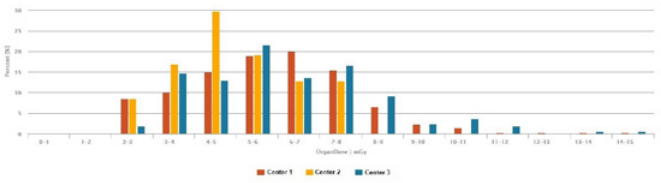


Figure 2: MGD comparison among three centres (screenshot from DOSE software by Qaelum, using the white background).

only parameter to evaluate. Specific to mammography, the compression applied to the breast has a direct impact on both image quality and dose.

Radiographers need special training to correctly position the patient and apply the necessary compression that allows optimal image quality and exposure parameters.

This data is analysed in DOSE and can also be exported if needed. Figure 2 shows the applied compression force versus breast thickness. The general guideline followed in our hospital is to apply a compression force of 100 N [1]. In centre 1, radiographers applied significantly higher compression force (110 N) than the other two (93 N and 97 N) (p-value<0.001, figure 3). Although there were no complaints for image quality, the findings were presented and discussed with the radiographers to optimize their practice.

Another interesting finding is the number of images included in each exam. When talking about a mammography examination, it is usually considered having 4 images (bilateral craniocaudal and mediolateral oblique view images of left and right breast), which is not always the case (figure 4). DOSE allows a more thorough analysis to identify how many images are performed per examination as well as tracking the examinations that contain more images than usual. Rejected images may signify that radiographers need training, but often, clinical conditions such as big breast size require more than one images, which was confirmed in our case.

DOSE is used as quality control tool for monitoring patient exposure under real conditions, checking compliance with DRL and detecting erroneous practice. Its integration to our institution allows us to have comprehensive overview and analysis of a significant amount of data for the performed radiological examinations.

To find out more about DOSE – Qaelum patient radiation dose management, please visit https://qaelum.com/

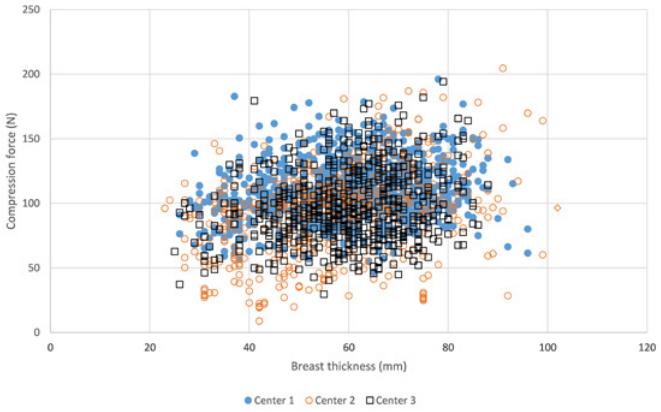


Figure 3: Compression force with breast thickness in 3 centres (Excel figure based on data exported from DOSE).

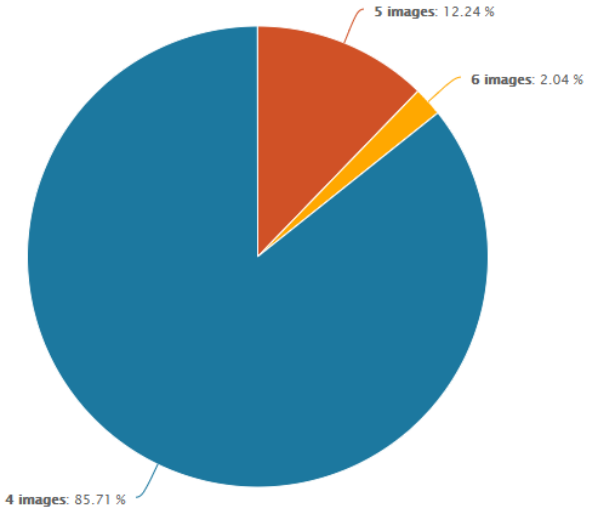


Figure 4: Number of images acquired for screening mammography (screenshot from DOSE software by Qaelum, using the white background).

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Dr. Elina Samara works as a medical physicist in radiology and radiation protection in the Valais Hospital, Sion (Switzerland). Her research interests include interventional radiology and population dose. In addition to her position in the hospital, she is engaged in the UNSCEAR Expert Group on Medical Exposure and participates in working groups of the Swiss Society of Radiobiology and Medical Physics.

EARLY CAREER AND TRAINING ARTICLE

Training & activities of early-career medical physicists in the Netherlands

Bas Meyer Viol describes medical physics training under the auspices of KLIFOP, which he chairs.

The first years as a medical physicist might be one of the most defining of your career. Therefore, I would like to show you how we start off our medical physics careers in the Netherlands.

In the Netherlands we have an extensive four-year post-master programme in which you are trained to become a medical physicist. During this programme you have the opportunity to develop yourself while working in the hospital. At the start you make a personal training plan with the help of your supervisor. In this plan you describe what you want to learn in the coming four years. This plan includes the courses you want to take, the research you want to do, the projects you want to participate in, and the internships you want to do. You also describe how you want to develop your personal skills (CanMEDS). After four years, if everything went well, you become a registered medical physicist and apply for a job, not necessarily in the hospital(s) in which you did the training.

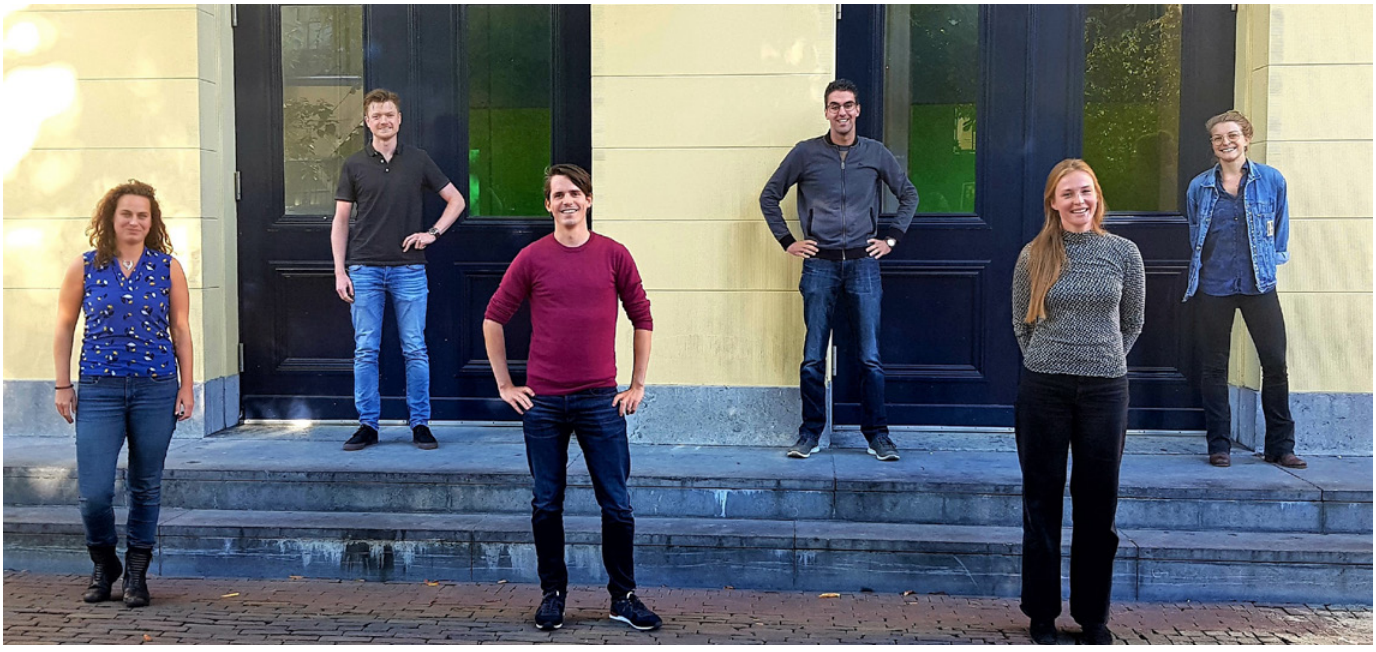
For education purposes the country is divided into six regions. Within your region you do internships in other hospitals and come together regularly with other young medical physicists for a regional education programme. In this regional education programme both experienced and young physicists give talks on their topics of expertise.

Everyone in the training programme is a member of the association for young medical physicists, called KLIFOP (in Dutch, KLInisch Fysici in OPleiding). In fact, you stay a member until two years after finishing the programme. The KLIFOP has two goals: first of all, we want to bring young medical physicists together to create a strong social network within the Netherlands; secondly, KLIFOP is the voice of the young physicists and represents them in different boards and committees.

To show you how we achieve our goals I would like to give you some of our best examples:

KLIFOP day
Each year a committee organises the KLIFOP day. During this day we all come together for talks, workshops and a social event. Last year the evening started with the still famous Salsa workshop. This day is one of the best ways to get to know your fellow colleagues across the country. It is also a great opportunity to get to listen to interesting international speakers.

Discussion Meetings
Of course, every physicist likes to discuss! Therefore,



The Board members of KLIFOP.

Young physicists coming together for a day of talks, workshops and drinks during KLIFOP day.

twice a year we organise discussion afternoons, in which we come together to discuss a relevant topic. In the past years we've had a wide variety of topics, ranging from the curriculum of the training programme, to sustainability in medical devices. At the end of the afternoon we have drinks together!

Company Visits

Every once in a while we have a look on the inside of companies and organisations. The last company visit we went to was Philips Healthcare. Here we had talks about the physics incorporated in the different medical devices. These visits are a great way to get to know the different companies and organisations, that are likely to play a role in the rest of your career.

Boards and Committees

The young physicists are represented in a variety of boards and committees of medical physicists. This way our voice is heard throughout the country. One example is the education committee, in which gaps in our education are identified and filled. This year we identified the gaps in soft skills. As a result last month we organised a training session entitled "convincing others".

With these examples, I hope we have inspired young physicists in Europe to unite, because we believe this is one of the best ways to start your career!

Bas Meyer Viol is the Chair of KLIFOP, the Dutch association for young medical physicists. He holds a Master's degree in both Physics and Earth Sciences. After his studies he worked on developing medical devices for Philips. Currently he is a medical physics resident in the radiology and nuclear medicine department in the UMC Utrecht. His main interest is in the quantification and dosimetry in nuclear medicine physics.

EARLY CAREER AND TRAINING ARTICLE

Attracting, developing and retaining new talents to careers in the nuclear fields

The support and organisation of education, networking and mobility are essential in fostering new talent. Here, Csilla Pesznyak, Leon Cizelj and Gabriel Pavel write about the European Nuclear Education Network its ENEN+ project and some of its recent activities.

The ENEN organization

The European Nuclear Education Network (ENEN) is an international non-profit organization (aisbl) established under Belgian law. The main purpose of the ENEN Association is the preservation and further development of expertise in the nuclear fields through supporting and organizing higher education and training in Europe.

Following a tradition of more than 17 years, the main objective of ENEN can be realized through the co-operation between universities, research organizations, regulatory bodies, the nuclear industry and any other organizations involved in the application of nuclear science and ionising radiation. These stakeholders provide academic and professional education and training in the nuclear fields and/or commit themselves to support the ENEN Association. They have a firmly established tradition of relations with some of the members in the fields of education, research and training, and are based in the European Union or in one of its associated or candidate member countries. The ENEN has 62 European universities as full members, 8 international organizations and 9 partner institutions which are the IAEA, ENS, I2EN, UNENE, WNU, FUS, WFSJNUG, NUG and the OECD-NEA.

The ENEN+ project

ENEN has been involved in several European and international projects; for example, the MEET-CINCH, CORONA II, NUSHARE, PETRUS III, ENEN RU II, EUJEP-2, ELINDER - EC JRC, ANNETT, SARENA, ARIEL and the best-known project is the ENEN+. The ENEN (the European Nuclear Education Network) Association, through the ENEN+ project co-funded by the EURATOM research and training Work Programme 2016 – 2017 – 1 (#755576) of the European Commission (H2020), provides mobility grants for learners, who would like to improve their knowledge, skills and competitiveness for career opportunities in the nuclear fields. With a duration of 4 years and starting from 2017, the ENEN+ 1,000,000 EUR mobility fund has supported up to now more than 600 young nuclear talents to accumulate together more than 60 person-years of mobility.

The primary aim of the ENEN+ project is to substantially contribute to the revival of the interest of young generations in careers of the nuclear sector.

This is to be achieved by pursuing the following main objectives:

- **Attracting** new talents to careers in nuclear.
- **Developing** the attracted talents beyond academic curricula.
- **Increasing** the retention of attracted talents in nuclear careers.
- **Involving** the nuclear stakeholders within the EU and beyond.
- **Sustaining** the revived interest for nuclear careers.

The ENEN+ consortium focuses on the learners and careers in the following nuclear disciplines: nuclear reactor engineering and safety, waste management and geological disposal, radiation protection and medical applications.

More information can be found on the project webpage: https://plus.enen.eu/

The First European Nuclear Competition for Secondary School Pupils

ENEN+ project organized the First European Nuclear Competition for Secondary School Pupils during 2019 as part of its project to revive the interest of young generations in the nuclear sector. Teams had to have two pupil members and one teacher. The task of the participants was to compose a 3-minute video on one or more of the four nuclear disciplines. The best 15 videos can be found on the following YouTube link:
https://www.youtube.com/playlist?list=PLN2vKTq3FKF_UPH5900xi2fcdKyGSbAII

The fifteen winner teams travelled to Budapest, Hungary on 1-5 July 2019 where they presented their project live at the First European Nuclear Competition and Summer School (Figure 1).

Figure 1: Participants of the First European Nuclear Competition and ENEN Science Camp

This video summarizes some of the activities carried out during the Summer School: https://plus.enen.eu/news_and_novelties/. The jury only decided on the three identical prizes and the most artistic work, since the most popular video was selected by the public based on the number of their YouTube likes. Everyone had an equal chance to collect these, as the videos were posted at the same time and voting was possible for the same period of time. The winners received a cash prize and a medal, as shown in Figure 2.

Figure 2: The medal for the winner of the best video project

The ENEN BSc Summer School

Within the frame of the ENEN+ project, a BSc Summer School was organized in 2019 which was dedicated to undergraduate students informing them about the nuclear fields. Participants were introduced to the multi-disciplinary present and future challenges of the four core nuclear topics: nuclear energy, medical application, nuclear waste management and radiation protection. More than 70 BSc students applied for the ENEN BSc Summer School and 45 BSc students could attend from ten different European countries (Italy, Spain, Lithuania, Malta, Poland, Ukraine, Serbia, Russia, Romania and Hungary). The programme consisted of lectures on all nuclear fields, informed students about each nuclear profession; furthermore, it provided opportunities to visit nuclear facilities such as research centres, nuclear power plants and medical facilities and to assist to some practical activities in nuclear labs and training centres (Figure 3.).

Figure 3: Experimental work for medical physics and radiation protection

The video of the ENEN BSc Summer School can be found under the following link: https://www.youtube.com/watch?v=tMv4oICxLkY

The ENEN PhD Event & Prize

The ENEN PhD Event & Prize is an action of the European Nuclear Education Network to support Research and Science in the Nuclear fields by promoting the works of young scientists and researchers who start their career after finishing their PhD. It takes place on a yearly basis in the framework of the international congress in the field of Nuclear science. The ENEN PhD Event consists of up to 12 PhD presentations nominated by ENEN Members and selected by the ENEN PhD Prize Jury. The event is divided into several sessions according to the different subjects. The participants make a presentation of their research work for 25 minutes followed by 5 minutes of questions and discussion in a competitive but friendly environment.

This year's competition will be the 14th and for the first time we are forced to hold it online. For the finalists, PhD researchers, the ENEN Association supports travel expenses as well as registration fee of the conference where the PhD event is hosted. For the 3 ENEN PhD prizes, ENEN Association grants 1000€ to the winners to cover the expenses to attend an international conference and present the result of his/her research work.

Conclusions

The ENEN+ project proposes cost-effective actions to attract, develop and retain new talents in nuclear professions. The project aims to reach out to secondary school pupils, students at various stages of the nuclear higher education, postdocs and candidates for nuclearization.

The ENEN+ project is looking forward to organizing all of its abovementioned events (Nuclear Competition for Secondary School Pupils, the ENEN BSc Summer School and the PhD Event& Prize action) during the summer of 2021, depending on the COVID-19 pandemic situation.

Career guidance with mobility support exceeding 1,000,000 EUR is envisioned. The project focuses on nuclear learners in nuclear reactor engineering and safety, waste management and geological disposal, radiation protection and medical applications. The integration of further nuclear disciplines and sustainability of the ENEN+ accomplishments beyond the project life will be given due attention. This project is a contribution of the ENEN Association, supported by the European Commission, to the common strategic goal of all nuclear stakeholders: to preserve, maintain and further develop the valuable nuclear knowledge for present and future generations.

Csilla Pesznyak

Associate professor, Budapest University of Technology and Economics. Head of Radiation Protection Service, National Institute of Oncology, Hungary. Vice president of ENEN aisbl. President, Health Physics Section, Roland Eötvös Physical Society. Board member, Hungarian Society of Medical Physics.

Leon Cizelj

Head of Reactor Engineering Division, Jožef Stefan Institute, Slovenia. Responsible for the strategic and operational leadership of research, postgraduate education, technical and scientific support to the Slovenian nuclear regulatory body division. Professor of Nuclear Engineering, University of Ljubljana, Slovenia. Past president of ENEN aisbl.

Gabriel Pavel

Has been Executive Director of the European Nuclear Education Network for two years. He has completed 2 E&T projects and has 6 projects under implementation.

Experience: 16y in the nuclear sector. University Politehnica of Bucharest, Romania (16y); Lecturer on nuclear engineering, radiation protection, non-power applications of ionizing radiation. 5 E&T projects and 24 projects with industry.

PARTNER ORGANISATION ARTICLE

EFOMP – EUTEMPE joint webinars: We keep educating!

Danielle Dobbe-Kalkman writes about the recently-started EFOMP-EUTEMPE "didactic webinar series"

In 2012, the EUropean Teaching and Education for Medical Physics Experts in Radiology (EUTEMPE-RX) project was launched to develop expert training and education in the field of diagnostic and interventional radiology. Since then the EUTEMPE partners have worked together to develop courses on different topics (e.g. radiation biology, Monte Carlo simulations, anthropomorphic phantoms, among others). The objective of the EUTEMPE project is to provide education and training in order for medical physicists to achieve EQF level 8, which is the highest level of the standards in the European Qualifications Framework for lifelong learning.

All EUTEMPE modules were developed as blended courses, meaning that they have a preparation phase completed via online learning, and onsite training, mostly at the institution of the module leader.

See the EUTEMPE web site for more information: http://eutempe-net.eu

Every summer, delegates from the twelve partners of the EUTEMPE consortium meet to discuss how to maintain and improve the continuity and quality of the modules. For the first time in the brief history of EUTEMPE, this summer the annual meeting took place online, as is the case for so many other gatherings this year. It was clear from the beginning that the most urgent question to answer during the meeting was: What are we going to do, since it is not now possible to offer our modules as usual?

However, EUTEMPE wouldn't be EUTEMPE if we would let the corona virus suppress our mission to help medical physicists grow and learn! As a result, the idea arose to develop a series of educational webinars and masterclasses, in collaboration with EFOMP. Even though we realized that there is a wide range of webinars already available, we believed that EUTEMPE has something extra to offer, and that our contributions would be a valuable addition to the existing landscape of online sessions.

With the invaluable practical help of EFOMP, we have successfully presented the first two webinars and masterclasses of the series, and we are very happy with the large turnout and enthusiastic response from the participants.

All webinars and masterclasses are recorded and will be made available online on the EFOMP e-learning platform.

Screenshot from the first EFOMP-EUTEMPE webinar, with presenter Danielle Dobbe-Kalkman and panel members Ruben van Engen, David Lurie and Paddy Gilligan

The first webinar took place on 13th October and was entitled "Telling ain't Teaching". At first sight, the topic was perhaps not an obvious choice, but we believed in the need to cover education itself as a topic. Apparently, our fellow medical physicists agreed, since there was a lot of interest in the webinar and its follow-up masterclass!

The second webinar, "Building robust QC protocols for the assessment of medical x-ray imaging systems" was presented by EUTEMPE coordinator Hilde Bosmans and her colleague Nicholas Marshall, and also drew a lot of participants.

We are looking forward to the upcoming webinars and masterclasses on Mammography (December), Leadership (January) and Personnel Dosimetry (February), which will be delivered by our experts, Ruben van Engen & Ioannis Sechopoulos, Carmel Caruana, and Markus Borowski, respectively.

We are looking forward to meeting you all online! Remarks, ideas, suggestions, or feedback are always welcome (webinars@efomp.org)..

Danielle Dobbe-Kalkman
Danielle is Senior Learning Specialist at LRCB, the Dutch Expert Centre for Screening, and educational expert in the EUTEMPE consortium.

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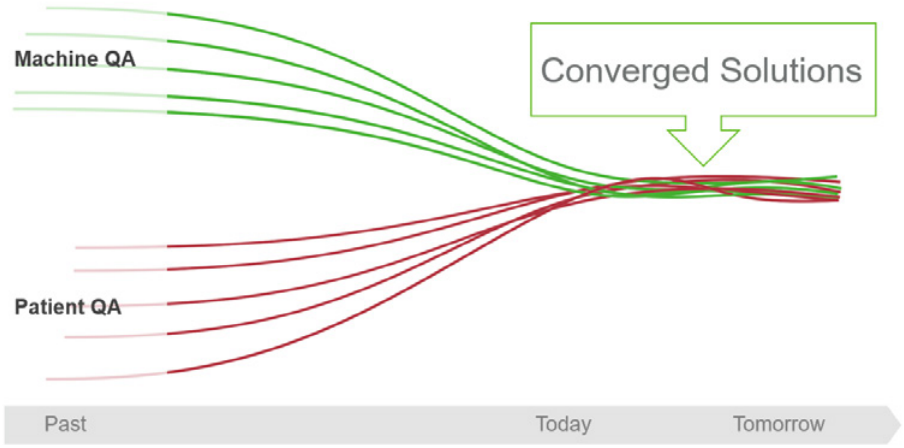
EFOMP COMPANY MEMBER ARTICLE

IBA Dosimetry: Innovating and Evolving Quality Assurance

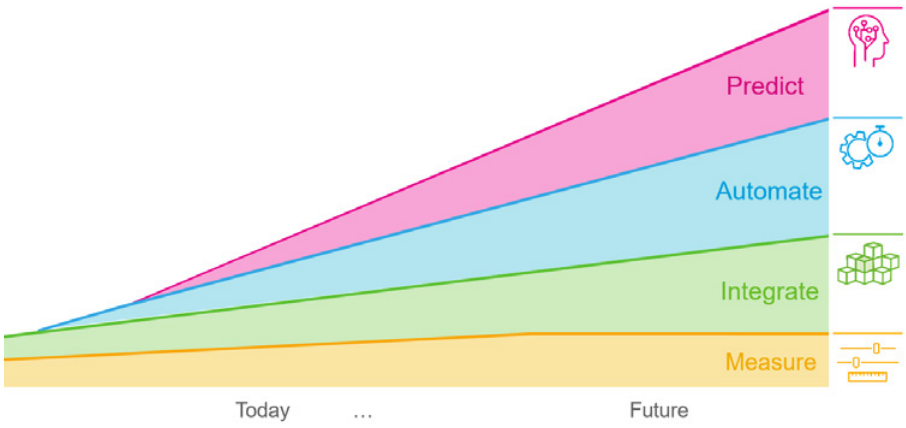
For 50 years, IBA Dosimetry has been offering Quality Assurance (QA) solutions that maximize efficiency and patient safety for Radiation Therapy, Proton Therapy, and Medical Imaging. Through this experience, we understand the unique pains Medical Physicists are facing. It is recognized that QA can be time consuming and complex, and executing high-quality QA on a short timeline with minimal resources is an everyday challenge. We need to evolve QA from where it is today. What does the future hold? Let's have a look at how IBA Dosimetry is leading the evolution of QA.

Today, QA applications for validating the Linac and for checking the patient specific plan and treatment are separate, with little or no connectivity. Does this separation always make sense? Doesn't a patient QA result provide valuable insights about the machine behaviour beyond standardized machine QA tests? The smart combination of results and insights from **both patient QA and machine QA** will unlock the potential of real risk-based QA in Radiation Therapy. For an all-embracing solution, both strings need to converge, allowing better outcomes and faster results.

At IBA Dosimetry, innovative and evolved QA solutions are based on 4 pillars: **Measure, Integrate, Automate, and Predict**.



The smart combination of data and insights from both machine QA and patient QA enables more meaningful analysis and better-quality results.



The innovation roadmap of IBA Dosimetry is defined based on four pillars that will significantly reduce QA times and further streamline the medical physics workload and improve the quality of QA.

Measure: Measuring physical properties is an important method to validate the quality of radiation delivery. However, we believe that the amount of physical QA measurements can and will decrease over time, allowing more efficient workflows. Taking less measurements will require even higher accuracy for the few remaining measurements, and we will need to provide alternatives that compensate for fewer data points. myQA® Daily is a recent example of how IBA Dosimetry has advanced measurement-based QA by bringing higher accuracy and faster workflows.

Integrate: QA integration goes beyond exchanging data or connecting devices. Integration allows for a seamless user experience across devices, modalities and systems, and provides the base for automation. IBA Dosimetry developed the first solution that integrates patient QA and machine QA on a single platform, the myQA Platform. This approach drastically reduces QA time while increasing precision.

Automate: Automation of repetitive tasks helps the Medical Physicist to focus on what really matters and provides confidence and peace of mind. An example of smart automation of QA is the SMARTSCAN™ solution that enables automated and guided beam commissioning and annual QA. SMARTSCAN™ defines the most efficient scan-

ning queues, automates repetitive tasks, and consistently checks the quality and plausibility of your scans. Consequently, SMARTSCAN™ automation ensures you have the best possible data quality in the shortest time.

Predict: QA workflows can be significantly shortened by reducing the amount of physical measurements needed. The combination of computational power, reliable simulation, and the use of artificial intelligence builds the foundation for predictive QA. IBA Dosimetry offers two clinically used products featuring a Monte Carlo dose engine. Both the SciMoCa™ dose engine for all major Linac based Radiation Therapy and the dedicated Monte Carlo dose engine for Proton Therapy with myQA® iON enable highest specificity and sensitivity for detecting the real dosimetric issues and errors.

In addition, we are committed to ensuring I**ndependent QA**, as in many cases an independent check will provide essential insights and will help the Medical Physicist in making safer and more reliable decisions.

At IBA Dosimetry, we shape the future of QA in the pursuit to advance patient safety. We are convinced that our innovations bring the accuracy and efficiency of QA to a new level and will significantly reduce QA times and further streamline the medical physics workload. We invite you to discover details of our roadmap to innovate and evolve QA at https://www.iba-dosimetry.com/about-iba-dosimetry/innovations-qa/

Andreas Lämmerzahl, Executive Director R&D at IBA Dosimetry, started his professional career after a study in Business Information at Dresden Technical University. He has a track of more than 20 years of successful Management, Technical Leadership & International Consulting in R&D for Medical Devices, Pharma Industries, Publishing & Directories Business.

COVID-19 PRACTICE

Meeting medical equipment demand during COVID-19 Crisis

Dr. Mani Manivannan is Head of a large Medical Physics department in the UK. Here he provides an overview of how the unprecedented demands for medical equipment were met during the "first wave" of COVID-19 infections in Spring 2020.

A typical ITU bed in our hospital's expanded care area for COVID patients.

It is nearly a year since COVID-19 started. This article is a review on how the world reacted to the demand for medical equipment to support patients needing monitoring and treatment. There is little published evidence due to many changes in the management of COVID patients. In general, 81% of COVID positive patients will have mild symptoms and can manage the disease themselves. 19% will require hospital admission, in which 14% will have severe symptoms (treated in wards) and 5% critical symptoms (treated in Intensive Care Units ICU, in some countries known as Critical Care Units). COVID patients with respiratory failure will require either invasive ventilation using a ventilator or non-invasive ventilation using CPAP machines which provide additional oxygen through a face mask. In the ICU, severely ill patients with multi-organ failure will also require multiple infusion pumps for delivery of various drugs. In addition, patients will need to be monitored for vital signs such as blood oxygenation (using a finger pulse oximeter) and blood pressure. ICUs also have access to resuscitation equipment such as defibrillators in case of heart failure.

Due to global demand, the ventilator market is expected to increase from $1.1 billion in 2019 to $5.2 billion in 2020. This large increase in demand does not truly represent the actual need to support patients in ICU, but is mainly due to "panic" buying and stockpiling by many health institutions. While the main specialised medical ventilator companies such Drager, Hamilton, Philips etc. increased their capacity, many non-medical equipment companies such as General Motors, Ford, Tesla, Airbus & Dyson tried to develop various types of ventilators (such as a transport ventilator in ambulances). The UK Government cancelled its provisional order of 10,000 ventilators to Dyson. Many products

never reached the market due to strict medical regulations and long approval processes. In the UK before the pandemic, the National Health Service (NHS) had about 8000 ventilators. The NHS estimated the demand to be 30,000 initially, but this number was later cut down to 18,000. Hospitals around the world are still waiting for ventilators to be delivered due to long lead times of 4 to 20 weeks.

Patients with severe symptoms are sometimes cared for in High Dependency Units (HDU) or in specialist wards. To separate the COVID and Non-COVID patients, most health institutions will manage the patients in "Red (COVID patients)" and "Green (non-COVID patients)" areas. All these areas are equipped with non-invasive ventilators that are able to provide additional oxygen to patients.

All areas must have some sort of oxygen supply (either piped or bottles). Health institutions must make sure that they do not "run out of" oxygen in case of increased demand. Developed countries in America and Europe have established oxygen supply (cryogenic tanks, vaporisers, piping throughout buildings and controls), whereas developing countries are struggling to find sufficient oxygen to care for their critically ill patients. A hospital in London almost ran out of oxygen as they were treating many patients either with ventilators or CPAP machines.

While waiting for new additional ventilators to arrive, health institutions acted innovatively and used anaesthetic machines as ventilators during the COVID crisis, as there was a reduced demand on operating theatres (most planned surgeries, non-urgent or non-cancer, were postponed). In our own institution in the West of Scotland, we increased capacity by 150% over the weekend by making use of anaesthetic machines as ventilators. In Scotland, the physical ICU bed capacity was increased by 400% to more than 700 beds in May 2020. Fortunately, this maximum capacity was never reached.

Each ICU bed is equipped with up to 7 infusion pumps. The global infusion pump demand is growing at a significant rate due to the outbreak of COVID-19 and is expected to grow from $1.87 billion in 2019 to $2.27 billion in 2020 at a compound annual growth rate of 21%. This is due to high demand and controversial "stock piling" of pumps to prepare for the worst-case scenario, which has left the world with a shortage of pumps.

ICUs will use "high end" multi-parameter patient monitors (costing about £12,000). As COVID started affecting small towns in the developing world, there was an increased demand for medium (£4000 to £2000) and low-end patient monitors (£150 to £1000). Leading players such as Philips trebled their production capacity in Germany and China. Technological giants such as Google, Apple and Amazon are tapping into remote patient monitoring (RPM) and patient data collection using smartphones and wearable technology devices. This seems to be the obvious choice as it avoids unnecessary visits by any non-COVID patients to attend an acute hospital. By 2023, the RPM market is expected to be about $30 billion dollars.

The global non-contact infrared thermometer market is expected to grow from $11.43 million in 2019 to $17.82 million in 2020 at a compound annual growth rate of 56%. With new demand for these devices at various screening locations, the global demand will reach to $3.2 Billion by 2027. Health institutions use ear thermometers as a standard compared to the forehead thermometers that are used in screening centres. Major ear thermometer manufacturers such as Braun have seen increased demand for these devices and are struggling to meet the demand. Current waiting times are about 4 to 10 weeks for these simple but essential devices.

Training for users of equipment has been a big issue during the COVID 19 pandemic. Complex medical equipment requires careful user settings and control to optimise the care. Ventilators used in ICU are very complex pieces of equipment and if used incorrectly, can cause damage instead of helping the critical patients to recover. Long term use and standardisation of equipment is essential for life-saving equipment, but with a shortage of standardised equipment, many healthcare staff are under enormous pressure to use the equipment given to them by their employer or government. The idea of "see one", "use one" and "teach one" may not be the ideal way forward!

As current guidelines, strategies and protocols are changing every month (as more data is available from the various cohorts of patients across the world), medical engineers across the world will make a big difference in managing the care of COVID patients and reduce mortality. Doctors and nurses are on the spotlight as heroes, but medical engineers and physicists are working very hard in the background as "unsung" heroes!

Dr. Ayyakkannu (Mani) Manivannan is the Head of Medical Physics at NHS Ayrshire & Arran, Scotland, UK. After finishing a Master's degree in Electronics in India, he moved to Aberdeen for his PhD in Medical Imaging. He built a scanning laser ophthalmoscope that was used to image both human and animal eyes, as well as providing laser safety advice to clinical users of lasers. Dr. Manivannan is EFOMP's Treasurer.

Physica Medica: Editor's Choice

In this regular feature, Prof. Paolo Russo, Editor-in-Chief of Physica Medica – European Journal of Medical Physics, gives his choice of recently-published articles

For this Winter issue of EMP News I selected the following four articles published in Physica Medica (EJMP) in the last October 2020 and December 2020 issues, which attracted my attention.

Mandan M. Rehani and Michael Hauptmann **Estimates of the number of patients with high cumulative doses through recurrent CT exams in 35 OECD countries**
Phys. Med. 2020;76:173-76
https://doi.org/10.1016/j.ejmp.2020.07.014
https://www.physicamedica.com/article/S1120-1797(20)30174-5/abstract

The authors present a survey of cumulative effective doses and consequent estimates in a large world population of patients in 35 OECD (Organization for Economic Co-operation and Development) countries, who underwent recurrent computed tomography diagnostic exams in the course of 5 years. They estimate a significant faction of patients receiving a cumulative effective dose higher than or equal to 100 mSv, considered as a "high" dose alert level. There is interest without doubt in such observations, patient radiation safety being of concern for health professionals, including medical physicists and physicians. A very interesting reading with some unexpected news.

Françoise Malchair et al. **Review of skin dose calculation software in interventional cardiology**
Phys. Med. 2020;80:75-83
https://doi.org/10.1016/j.ejmp.2020.09.023
https://www.physicamedica.com/article/S1120-1797(20)30239-8/fulltext#%20

The authors conclude their work as follows: "… work remains to be done before an accurate and reliable skin dose mapping is available for all patients": wasn't it enough for motivating the interest in this very recent article? They reviewed critically 22 software codes available for skin dose estimates in interventional cardiology, a topic recently addressed in an EJMP article (see DOI:https://doi.org/10.1016/j.ejmp.2020.03.008). The readers may find an evaluation of as many as 12 software codes for skin dose calculation. I am sure we will see more articles on this topic in the near future, in EJMP. The article is Open Access for download from the EJMP website.

Simon Jolly et al. **Technical challenges for FLASH proton therapy**
Phys. Med. 2020;78:71-82
https://doi.org/10.1016/j.ejmp.2020.08.005
https://www.physicamedica.com/article/S1120-1797(20)30196-4/fulltext

Flash radiotherapy is a hot topic in the field of innovative treatments in radiation oncology, where the "flash" action refers to a delivery of ultra-fast dose rates in excess of 40 Gy/s in a fraction of a second. Reportedly, in animal studies, this permits normal tissue tolerance levels above the levels of conventional

radiotherapy, with high tumour control probability. Photons as well as electrons and proton beams have been tested so far. This article – out of the the Focus Issue on "Optimization of Medical Accelerators ", Guest Editors: M. Durante, C. Graeff and C. Welsch – illustrates the intrinsic technical difficulties in flash proton therapy, whereby proton accelerators are required to produce a beam current one order of magnitude higher, and to scan the pencil beam at a speed two orders of magnitude higher, than presently available. The reader can learn about the status of the efforts of the accelerator and medical physicists communities in this challenging task. The article is Open Access for download from the EJMP website.

Tanya Kairn et al. **Monte Carlo calculations of radiotherapy dose in "homogeneous" anatomy**
Phys. Med. 2020;78:156-165
https://doi.org/10.1016/j.ejmp.2020.09.019
https://www.physicamedica.com/article/S1120-1797(20)30235-0/fulltext

I started being interested in this work after reading its highlights: "There are hundreds of papers on Monte Carlo verification of radiotherapy dose for heterogeneous anatomy (lung, head, neck). By contrast, publications on Monte Carlo calculations of radiotherapy dose for "homogeneous" pelvic anatomy are rare". As the reader of this EMP News section might have been realized, I consider novelty and innovation content as a key feature for a successful scientific paper. And the strength of the conclusions are encouraging as well: "Results showed that planned treatment doses for pelvic anatomy can be unexpectedly complex…". This is enough for exciting my interest in reading further this paper, and for you?

In concluding this article, I would like to draw the readers' attention on the ongoing publication in EJMP of a **Focus Issue dedicated to celebrating the 125-year anniversary of the discovery of X-rays** by W. C. Roentgen on the 8th November 1895: here is the list of articles already published (others, to come). All articles are free to download for one year!

Fridtjof Nüsslin **Wilhelm Conrad Röntgen: The scientist and his discovery**
https://www.physicamedica.com/article/S1120-1797(20)30253-2/fulltext

Jim Malone **X-rays for medical imaging: Radiation protection, governance and ethics over 125 years**
https://www.physicamedica.com/article/S1120-1797(20)30228-3/fulltext

Ioannis A. Tsalafoutas et al. **Radiation dose monitoring in computed tomography: Status, options and limitations**
https://www.physicamedica.com/article/S1120-1797(20)30213-1/fulltext

Virginia Tsapaki **Radiation dose optimization in diagnostic and interventional radiology: Current issues and future perspectives**
https://www.physicamedica.com/article/S1120-1797(20)30233-7/fulltext

Sam Bayat et al. **Functional lung imaging with synchrotron radiation: Methods and preclinical applications**
https://www.physicamedica.com/article/S1120-1797(20)30243-X/fulltext

L. Heck and J. Herzen **Recent advances in X-ray imaging of breast tissue: From two- to three-dimensional imaging**
https://www.physicamedica.com/article/S1120-1797(20)30268-4/fulltext

Bernhard Schmidt and Thomas Flohr **Principles and applications of dual source CT**
https://www.physicamedica.com/article/S1120-1797(20)30257-X/fulltext

Madan M. Rehani and David Nacouzzi **Higher patient doses through X-ray imaging procedures**
https://www.physicamedica.com/article/S1120-1797(20)30260-X/fulltext

Colin J. Martin, John D. Harrison and Madan M. Rehani. **Effective dose from radiation exposure in medicine: Past, present and future**
https://www.physicamedica.com/article/S1120-1797(20)30263-5/fulltext

Atsushi Momose **X-ray phase imaging reaching clinical uses**
https://www.physicamedica.com/article/S1120-1797(20)30277-5/fulltext

Dylan Y. Breitkreuz et al. **External beam radiation therapy with kilovoltage x-rays**
https://www.physicamedica.com/article/S1120-1797(20)30275-1/fulltext

Ramandeep Singh et al. **Artificial intelligence in image reconstruction: The change is here**
https://www.physicamedica.com/article/S1120-1797(20)30286-6/fulltext

Thomas Flohr et al.
Photon-counting CT review
https://www.physicamedica.com/article/S1120-1797(20)30273-8/fulltext

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BOOK REVIEW

Leadership and Challenges in Medical Physics: A Strategic and Robust Approach

"Leadership and Challenges in Medical Physics: A Strategic and Robust Approach" by Carmel J. Caruana, IOP Publishing 2020. Online ISBN: 978-0-7503-1395-7; Print ISBN: 978-0-7503-1396-4; https://doi.org/10.1088/978-0-7503-1395-7. https://iopscience.iop.org/book/978-0-7503-1395-7

For this book, our book-review editor Markus Buchgeister commissioned two reviews from Medical Physicist colleagues. We are publishing the "tandem review" here.

Review by Dr. Daniella Schmitt, Göttingen, Germany

This book is published in the IPEM-IOP series in Physics and Engineering in Medicine and Biology. It encourages the reader to re-think the role of medical physicists in modern health care systems.

It is based on the EUTEMPE Modul MPE01 course, organized by the author since 2015. While this course focusses on medical physicists in diagnostic and interventional imaging, the current book uses a more general approach for medical physicists in all radiation-related disciplines.

The book is organized in ten chapters, as follows:

The first chapter introduces the concept of leadership, its significance and character, especially in differentiation to management. In the second chapter a short summary of all parts belonging to strategic planning is given, these are first e.g. values, mission, vision and analysis tools to characterize the current situation and future aims and secondly the instruments to formulate and conduct an action plan to reach the strategic objectives.

Chapters three to six describe in detail the four parts of a SWOT analysis (strengths – weaknesses – opportunities – threats) in a medical physics environment. The core competences and critical weaknesses of a typical medical physicist and his/her position in a health care system are described in a very self-critical way.

Different leadership styles are described in chapter seven, while organizational psychology and politics are shortly summarized in chapters eight and nine.

Chapter ten deals with negotiating types and tactics for medical physics leaders.

Additional to the tight writing of many chapters, much information is given through a list of references or suggestions for further readings at the end of each chapter. As this book originates from a course, there are many small "reflection/discussion points" all over the chapters, which can be used for single-reader reflection, too.

The core point in the book is the motivation to change the view that medical physicists often have of themselves. This can lead to a different sense of the influence medical physicists could have on the decisions in a hospital and in national and international committees, arising from their unique knowledge combining patient care and technology and general analytical skills. According

to that, it is demanded to integrate the strategies and skills described in the book in the curricula of medical physics education programmes.

It is an invitation to think self-confidently about one's own possibilities on future enhancement in patient care, for example in widening the perspective on other physical agents than ionizing radiation and other technology driven medical disciplines like audiology, where legal requirements for the participation of medical physicists in patient care don't exist in the vast majority of countries.

In the reviewer's opinion, in some parts, the author exaggerates the hostility and fighting character in the organizational structure of health care organizations to make his points clearer, but this, on the other hand, can help to identify milder forms of the discussed problems in the reader's environment.

Altogether, this book can be very helpful, especially for young medical physicists on the way to a leading position, while it is also always worthwhile to reflect on one's own style of leadership and professional role in later years of experience.

Review by Nils Wegner, Stuttgart, Germany

For a person like me, who is more than ten years in the position of leading a Medical Physics department, it was very interesting to read this book. It is well structured and includes learning objectives and exercises (reflection / discussion points) comparable to a textbook. Almost all aspects of leadership in our professional environment, even those I never have thought about before, are covered. In addition, some general aspects of the role and the challenges of Medical Physics nowadays are discussed.

The demand to differentiate between leadership and management is right, but in reality, there will be very often only one person to cover both roles. In my opinion, this is not always a bad solution. I totally agree that leadership should always have the mission of Medical Physics in mind: Improvement of the service given to the patients.

The methodology needed for strategic planning can serve as a "cookbook". Even for people who lead (or cook) more intuitively, many helpful tools are provided. It is always worth to think about Values, Mission and Vision of the team from time to time. I am not sure how many colleagues have set up such strategic planning in the past, but I think it could help to cope with the future challenges for Medical Physics teams.

Competences, weaknesses, opportunities and threats in regard to the Medical Physics profession are very important and really worth to look at, but some of the statements in the book tend to be either glorified or exaggerated. In my opinion, they do not always reflect the whole bandwidth within Europe´s Medical Physics teams regarding size, structure, funding, responsibilities etc.
Leadership is very much about leadership style and psychology. The statements in the book match with the experience of the reviewer. Many examples are given in the book. They can help to get familiar with the topic, but in my own experience, they remain sometimes the most challenging ones in daily practise.

Politics is very important but very difficult to teach. As stated in the chapter, there are so many different players, situations and rules that the book can only give the basics for the political business related to Medical Physics leadership. The daily routine trains much and my advice, not only in regard to politics, is to start early with preparing future leaders.

As Daniela Schmitt stated, the book is very helpful to reflect on one's own way of leadership, which even a team leader with long term experience should think about from time to time. And for those younger colleagues who have a leadership career in mind, it provides an outlook to all the things they may have to deal with. If both try to keep the extensive content in mind we could gain substantial improvements in leadership in the Medical Physics field and in promoting our profession, not only in the healthcare environment. In the foreword, the author stated that he hopes "…to provoke much needed discussion and debate…". Yes, I think it´s time to do so.

Dr. Daniela Schmitt is the head of physics in the department of radiotherapy and radiation oncology at University Medical Center Göttingen, Georg August University, Germany since 2020. Before her change to Göttingen, she gained experience in research and clinical radiotherapy in Heidelberg in the German Cancer Research Center (DKFZ) and the University Hospital. Her main research interests are stereotactic radiotherapy and management of intrafraction motion. Daniela Schmitt is an elected board member of the German Society of Medical Physics (DGMP) from 2021 on.

Nils Wegner received his Diploma in Biomedical Engineering and Medical Physics from the Technical University of Ilmenau, Germany. This was followed by a postgraduate internship in the Department of Radiation Oncology, Western General Hospital, University of Edinburgh, UK. In 1996 he moved to Stuttgart, Germany where he became a resident in Medical Physics and in 2009 Head of Radiation Oncology Physics. The main focus of his work lies in dosimetry, QA, R&V-systems, workflow optimization and risk management. He is a member of scientific societies in the field of Medical Physics and Radiation Oncology and holds the accreditation for the training of Medical Physics by the German Association of Medical Physics (DGMP).

EFOMP COMPANY MEMBER ARTICLE

RTI: Predicting the future – RTI Detector Development with Monte Carlo Simulations

Since 1981, RTI has provided solutions for non-invasive x-ray quality assurance (QA) measurements and continues to deliver reliable results to ensure patient safety within most common clinical modalities such as radiography, mammography, CT, dental and fluoroscopy.

Research and development is an important branch of RTI's mission. Future products are developed in a way that combines empirical knowledge, acquired through the company's history, and Monte Carlo simulations for a more detailed understanding of the physical processes behind solid-state sensors used for x-ray QA.

Building the bridge between Monte Carlo and x-ray QA
The physical principles of non-invasive QA measurements lie in the interaction of radiation with matter. With the help of detectors, a signal can be extracted from the x-ray beam which is further analyzed in terms of radiation parameters such as air kerma, kVp, HVL and many more.

A single x-ray exposure results in a chain of energy transfer events which leads to the deposition of dose within the medium. All related basic interaction mechanisms are well known and depend on the probabilistic nature of the energy transport between x-ray photons and the interacting medium.

Clinical x-rays exhibit a complex spectrum of energies and many event chains should be considered for a fully analytic description of one exposure and a large number of random processes would have to be included and repeated for millions of particles.

Here, Monte Carlo (MC) methods can be utilized to increase RTI's expertise in the field of x-ray QA.

MC simulations use repeated random sampling to predict the outcome of deterministic processes and complex systems, with many coupled degrees of freedom, can be modelled. They are well suited to compute the energy transport of a particle based on probability distributions and make it possible to record all possible interactions, until the initial particle is absorbed and related event chains are terminated.

Confirming the presence: MC model of Cobia
To confirm that MC methods are a helpful tool for RTI's present and future work, a model description of the Cobia is evaluated with PENELOPE, a Fortran-based MC code for simulating particle transport. To run the computation, an input file is defined. Required parameters include particle energy or spectrum, geometric specification of the interacting media and boundary conditions, such as material properties and interacting probabilities, as well as intended output data.

The following output examples are of specific interest when evaluating RTI detectors:

- Results of computing pulse height spectra offer the possibility to follow spectral changes upon attenuation and lead to a deeper understanding of material choices (Figure 1.)

- Calculation of energy deposition can be used to estimate the sensor signal and related QA parameters like dose and HVL (Figure 2.)

RTI has found that MC simulations manage to calculate signal ratios of typical Cobia measurements. They are also a useful tool for R&D projects regarding maintenance and future product development. MC methods provide opportunities for testing detector configurations, performing detailed attenuation studies, and computing x-ray spectra when clinical systems are unavailable. Development time and cost decrease, knowledge increases and resources are saved.

Of course, validation continues to be necessary but the advantages of using MC methods in early R&D studies are obvious and RTI will continue to use modern methods to provide modern QA Solutions.

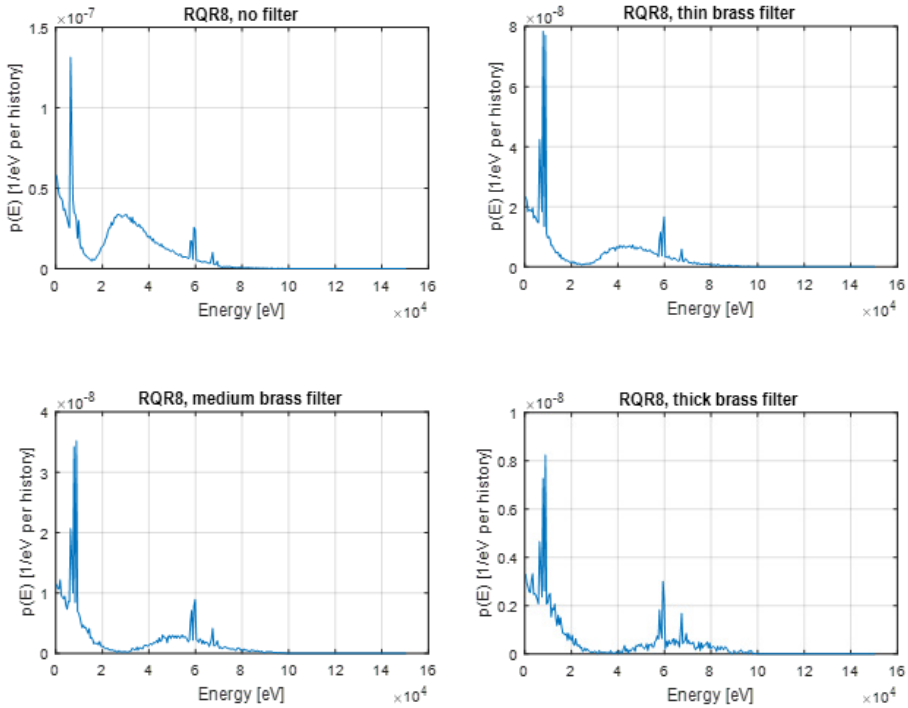


Figure 1: Pulse Height Spectra for the 4 diode rings of the Cobia detector after passing different filtrations of brass. The shape of the energy spectrum changes depending on attenuation of the primary radiation. Soft radiation, i.e. low energetic photons, is absorbed by the filter with increasing thickness of brass (top to bottom). The total intensity decreases with the fraction of characteristic x-rays increasing, cf. beam hardening.

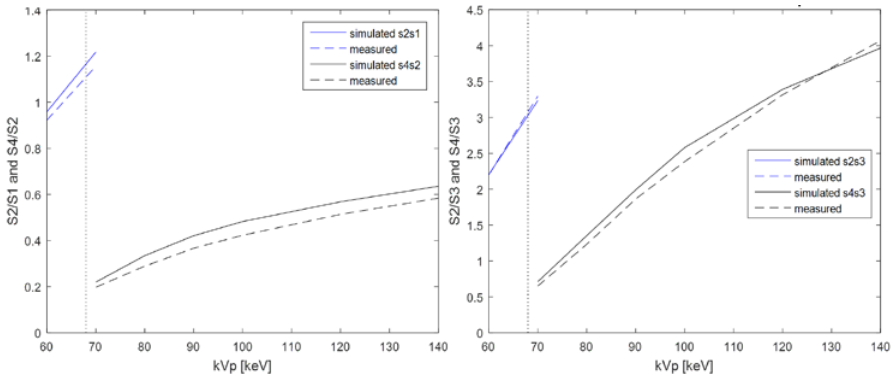


Figure 2: Cobia measurements are performed at different settings of kVp. The measured signal ratios used for the kV/TF algorithm are presented by dotted lines. Comparison is made to simulated signal ratios, represented by solid lines, with ratios being calculated from the MC simulation of energy deposition within the diode rings (S1-S4). RQR spectra for MC input files are comparable to kVp settings.

Dr. Petty Cartemo has been an R&D physicist at RTI Headquarters, Mölndal, Sweden, since 2016. She works with the development of mathematical models for the measurement of QA relevant parameters, sensor development as well as calibration methods. Petty has a doctoral degree in Nuclear Engineering and is specialized on experimental techniques within radiation protection and nuclear safety.

MEETING REPORT

Online ECR 2020 presenting Physics in Medical Imaging

Mika Kortesniemi, Chair of the Physics in Medical Imaging Subcommittee of ECR 2020, reports on the Physics sessions at this year's online European Congress of Radiology.

This year we have seen our key events postponed, cancelled or virtualised as the pandemic has swept through the world. On writing this article for the newsletter, there is no guarantee on how the next year will look – the outlook remains uncertain. In March this year, just around a week before its planned launch, the ECR 2020 was postponed and subsequently restructured into a virtual online ECR with thousands of participants. Like everyone, we are adjusting and adapting…

The main ECR week in mid-July has been followed by a series of Highlight Weeks where Physics in Medical Imaging related sessions have been presented, mostly covering the original programme. Following physics presentations on the MRI and CT related streams during the main ECR week the physics-related talks were delivered on the Highlight Weeks under the topics of Physics in Medical Imaging, Eurosafe Imaging, Artificial Intelligence, Professional Issues and Interventional & Emergency Imaging topics. Overall, these sum up to 22 sessions with invited talks including Refresher Courses, New Horizons session, EFOMP Workshops, joint sessions and other topical sessions.

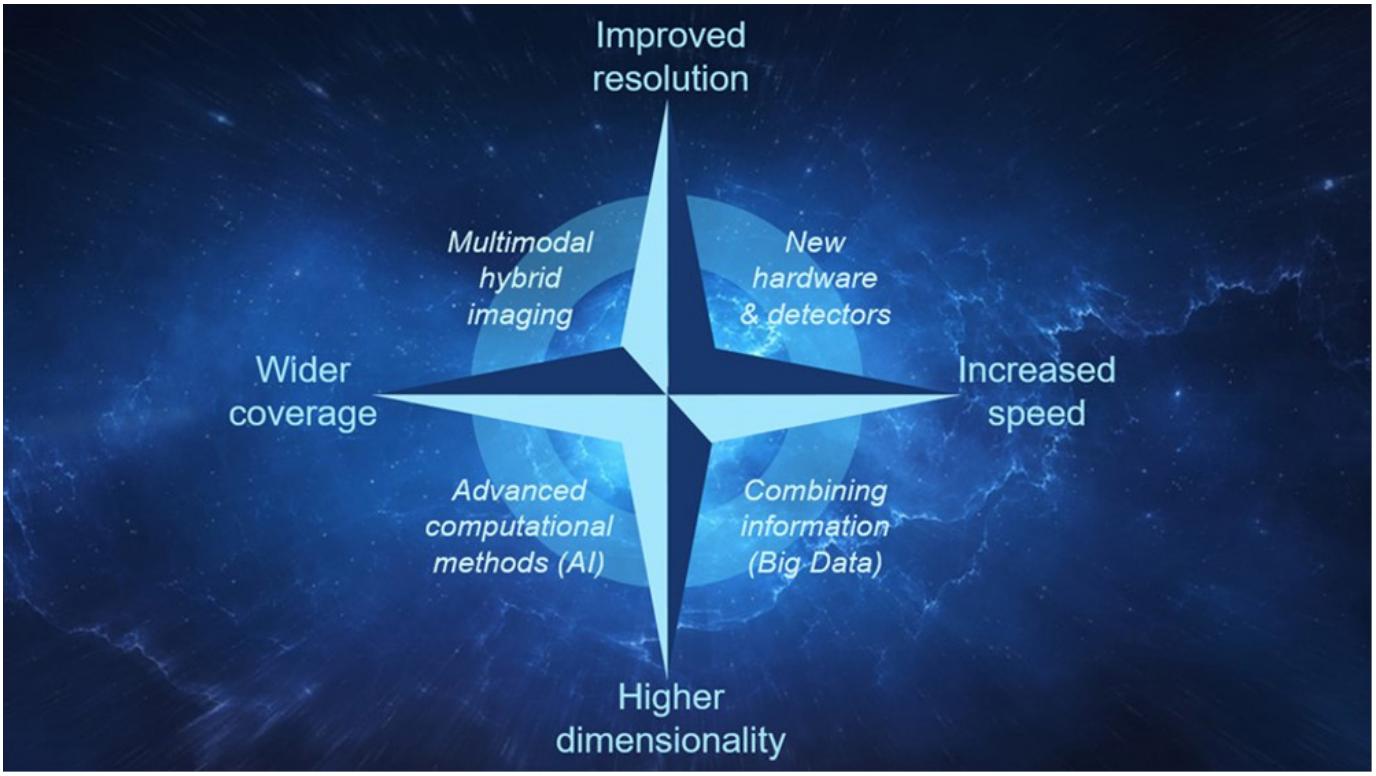
The Physics Highlight Week in November included live discussion between experts from Europe and US focusing on safety and quality in medical imaging and optimization (see the screenshot). The chat box functionality enabled the online ECR participants to interact with the presenters, encouraging discussion and Q/A on

Screenshot of Physics in Medical Imaging online panel discussion session (10th November 2020), with (clockwise from top left) Mika Kortesniemi (FI, Chair), Elly Castellano (UK), Andrew Webb (NL) and Mannudeep Kalra (US).

the recent novelties and research in imaging. Moreover, 20 scientific research sessions were presented in this online congress covering four main categories in the field of medical imaging physics: Advances in CT, Advances in MRI, Artificial Intelligence, and Quality in connection with safety.

The online event was successful in following the originally planned ECR programme covering an outstanding set of 30 sessions involving physics in medical imaging. An Editorial article on the ECR physics programme was recently published in European Radiology [1] where the focus was on the scientific presentations including the 52 originally accepted talks which have also been published in the abstract book [2]. The physics presentations and abstracts clearly demonstrate how fast the technology in medical imaging has evolved during the recent years. Along with the hardware technology, many algorithms and software applications related to image quality and patient safety have also shown significant improvement. Overall, the modalities in clinical radiology have become more accurate in spatial and temporal resolution, extended in coverage,

UPCOMING MEETING ANNOUNCEMENT



The core technical areas of modern imaging supporting higher diagnostic value and effectiveness. These areas are driven by four major aspects of technological advancement: resolution, coverage, speed and dimensionality of imaging data.

quickened the speed of examinations and extended on dimensionality of information. This trend has brought wider improvement of diagnostic quality and effectiveness.

The latest advancements observed in the level of physics and technology relate to artificial intelligence in various tasks imaginable in radiology: dosimetry, image reconstruction, image enhancement, image analysis and a widening spectrum of diagnostic applications (classification, estimation and regression related tasks). Developments in imaging hardware have strengthened the prerequisites of better physical image quality, hoping to enable higher sensitivity and specificity of diagnostics.

The online ECR 2020 will continue until the end of this year. I am encouraging all European colleagues to make the most of it – see the online material, explore new insights, and enjoy the versatility of medical imaging & physics!

References

[1] Kortesniemi M. From deep learning to dark fields-medical imaging physics in ECR 2020. Eur Radiol. 30, 6937-6939 (2020). https://doi.org/10.1007/s00330-020-07045-8

[2] ECR 2020 Book of Abstracts. Insights Imaging 11, 34 (2020). https://doi.org/10.1186/s13244-020-00851-0

Dr. Mika Kortesniemi works as the Chief Physicist and Adjunct Professor in the HUS Medical Imaging Center, University of Helsinki, Finland. His professional focus is on the quality assurance, dosimetry, optimisation and radiation protection in x-ray modalities, especially the evolving CT technology. The research work is primarily related on radiological optimisation, utilizing anthropomorphic phantoms and Monte Carlo simulations. Dr Kortesniemi is the past chair of EFOMP Science Committee. In addition to his primary position in HUS Medical Imaging Center, Dr Kortesniemi is also involved in IAEA, ICRP and ESR collaboration, and quality audits in radiology.

MEETING REPORT

The 18th Romanian Conference on Medical Physics

Loredana Marcu gives an account of the recent online version of the Romanian Conference on Medical Physics

The Romanian College of Medical Physicists gathered online, on the 7th of November 2020, to celebrate the International Day of Medical Physics (IDMP) via the **18th Romanian Conference on Medical Physics**. This year was even more special for us as we celebrate 140 years of medical physics in Romania. The history of medical physics in our country dates back to 1880 and to the name Prof. Ioan Stravolca who taught the first medical physics course to first year students enrolled at the Faculty of Medicine, University of Iasi.

Since 2013 our College has celebrated this special day alongside IOMP and many other countries in the world. Each year the IOMP establishes a theme for the IDMP, this year we celebrated "Medical Physicists as a Health Professional". There is no doubt 2020 was full of challenges due to the pandemic we are facing. In these times of hardship, the health system was probably the one suffering the most, together with its employees, medical physicists being no exception. Against all odds, we go forward and try to do our best within our profession. Organised online, the conference was a great opportunity to gather physicists from all around the world and virtually reunite with Romanian physicists living abroad. Together with a number of topics that were presented by world-renowned physicists, we organised round table discussions that allowed vivid conversations on various professional matters and worldwide opportunities for collaboration and mentorship. We had an active online presence from representatives of several international medical physics organisations, such as EFOMP and IOMP, with the participation of Dr. Marco Brambilla (EFOMP President), Dr. Madan Rehani (IOMP President), Dr. Colin Orton (President of International Medical Physics Certification Board), Dr. Raymond Wu (Chief Executive Officer of International Medical Physics Certification Board) and Dr. Adel Mustafa (Chief Examiner and Accreditation Committee Chair of International Medical Physics Certification Board).

The conference was a great success, this was in part due to the circumstances that forced us towards the online setting, allowing a broader participation and bridging the gap between local physicists and the diaspora. On behalf of the Romanian College of Medical Physicists I would like to express my appreciation to all invited speakers and participants of the round table discussions for delivering excellent presentations and for providing a framework for setting quality objectives that our College requires for further progress.

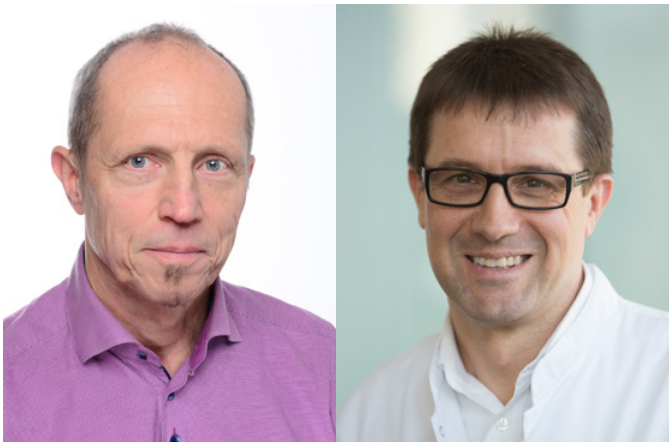
Loredana Marcu is Professor of Medical Physics at the University of Oradea, Romania and Adjunct Professor at the School of Health Sciences, University of South Australia. She is a radiotherapy medical physicist, being educated and trained in Adelaide, South Australia, where she also worked as a TEAP (Training Education and Accreditation Program) preceptor, supervising and coordinating the medical physics training and education of the junior physicists in South Australia. Her current research interests cover in silico modelling of tumour growth and response to treatment, radiobiology, targeted therapies, and the risk of second cancer after radiotherapy. Loredana Marcu is involved in several professional activities being member of the Women in Medical Physics and Biomedical Engineering Task Group within IUPESM. Since 2018 she is the President of the Romanian College of Medical Physicists (CFMR).

MEETING REPORT

51st Annual Conference of the DGMP – Digital Congress 9-11 September 2020

125 years after the discovery of X-rays, the first fully digital annual conference of the DGMP was held. Markus Buchgeister writes about the meeting.

The 51st Annual Meeting of the German Society for Medical Physics (DGMP) originally planned to be organized at Leipzig was successfully held for the first time fully digital and celebrating the 125th anniversary of the discovery of X-rays. Due to the CoVID-19 pandemic, the decision to switch to the new format was taken by the DGMP board together with the two congress presidents end of June. Within 10 weeks the whole programme was restructured and three extremely exciting congress days resulted. Around 650 experts from 15 different countries worldwide discussed their new research results and cutting-edge technologies in 30 digital scientific sessions with 183 lectures, 19 poster sessions and 14 special sessions.



The two congress presidents: Prof. Dr. Ulrich Wolf (left), and Prof. Dr.-Ing. Bernhard Sattler (right).

This year the two congress presidents (pictured above) from the University Hospital Leipzig: Prof. Dr. Ulrich Wolf (Clinic and Polyclinic for Radiotherapy) and Prof. Dr.-Ing. Bernhard Sattler (Clinic and Polyclinic for Nuclear Medicine), focused on a comprehensive connection of the different scientific fields according to the motto: "**Medical physics has the WHOLE human being in view**".

A large part of the programme was devoted to modern radiation therapy with sessions addressing topics like mini-beam concepts or the quality assurance of surface guided stereotactic radiotherapy. An ongoing topic was the implementation of the amendment of the Radiation Protection Act, early in 2019, according to which medical physicists are more closely involved in these applications. Medical physics of hearing in audiology, medical optics and related fields were also a part of the programme.

One of the highlights was a session sponsored by Siemens and United Imaging Healthcare on new PET/CT systems with an axial field of view of about 2m for the entire body. Interactions and dependencies can now be traced not only through organs and organ systems, but even over larger areas of the entire body – a giant leap for the effectiveness of data acquisition in relation to the amount of radioactive substances used. They can now be further minimised and the time patients have to spend in the device can be significantly reduced.

Exciting plenary lectures by renowned experts on the historic development of X-ray tube technology and state-of-the-art CT

Keynote on state-of-the-art developments in computer tomography by Prof. Dr. Marc Kachelrieß, head of the Department of X-ray Imaging and CT at the German Cancer Research Centre DKFZ Heidelberg.

The historic spectrum was spanned by plenary lectures from the discovery of X-rays to state-of-the-art applications. Prof. Dr.-Ing. Andreas Keller from the Institute for Biomedical Engineering and Computer Science at the TU Ilmenau gave a

historical overview from the beginnings since the discovery of X-rays to the technological developments of the present. The aim was to sound out the clinical requirements by means of intelligent technical solutions in the construction of X-ray tubes to the limits of physical-technical feasibility. Prof. Dr. Marc Kachelrieß, head of the Department of X-ray Imaging and CT at the German Cancer Research Centre DKFZ Heidelberg, continued this journey with his presentation on state-of-the-art developments in computer tomography.

Progress in the planning, implementation and verification of radiotherapy

Progress towards adaptive radiation therapy was presented, where on the one hand the radiation planning is adapted to the current position of the tumour as a target area of the radiation in the body with the most modern therapy device, the MR-Linac, and on the other hand the dose distribution itself is even better directed to the tumour areas to be treated from the information on the effect of the radiation therapy. The relatively complex and expensive technology of particle therapy was presented with exciting contributions from Oncoray from Dresden, a partner of the DKFZ in the National Radiation Research Centre in Oncology.

“AI” in all areas of medical physics

Current topics such as the ever-increasing digitalisation in medicine, Big Data and artificial intelligence (AI) have an increasing influence on the working environment in medical physics and were therefore again important discussion points in the congress. Congress president Prof. Wolf stated: “AI can help us to make many processes in diagnostics and therapy more efficient, more precise and also less error-prone”. His Co-president Prof. Sattler put it in a nutshell: “Algorithms can - after sensible training - compare thousands of images with each other much faster. But what they cannot do in comparison to humans is associate, weigh up, decide. But the incredible benefit of AI procedures is the support of these things on the basis of a quantity of data that no human being can even begin to access in fractions of a second in a same rational way”.

Interdisciplinary exchange digitally successful

The young scientists from the DGMP Young Medical Physics Working Group once again actively participated with 3 self-designed meetings from the research groups as well as the study courses on medical physics in Germany. Two further exciting lectures were held at the Behnken-Berger-Award ceremony.

The congress was accompanied by 3 industry symposia and 10 further industry meetings. Leading manufacturers of new devices and innovative software were available for an intensive exchange with the participants of the congress in the new digital format.

Summing up

Despite the current pandemic situation and the late but inevitable switch to the digital format, the congress was a great success: no major technical breakdown, everything went smooth due to the perfect organisation of the Conventus congress team located at Jena. The team guided the session chairs as well as the speakers with great diligence through the programme. “This time the congress participants were not able to meet in person, but only via the internet. There was a great willingness to take this communicative new and challenging path with us and the DGMP,” emphasised Prof. Wolf. “The share of comparatively young scientists in our scientific exchange was pleasingly large this year as well.”

Outlook for the trilateral meeting of ÖGMP, DGMP and SGSMP 2021

The next conference presidents Univ. Prof. Dr. DI Dietmar Georg and Univ. Prof. Dr. DI Wolfgang Birkfellner invited the participants at the closing ceremony to the trilateral conference of the Austrian Society for Medical Physics (ÖGMP), the German Society for Medical Physics (DGMP) and the Swiss Society for Radiobiology and Medical Physics (SGSMP) from September 19 to 22, 2021, at the Austria Center Vienna (Vienna/AT). Further information on the conference can be found on the conference homepage www.dgmp-kongress.de.

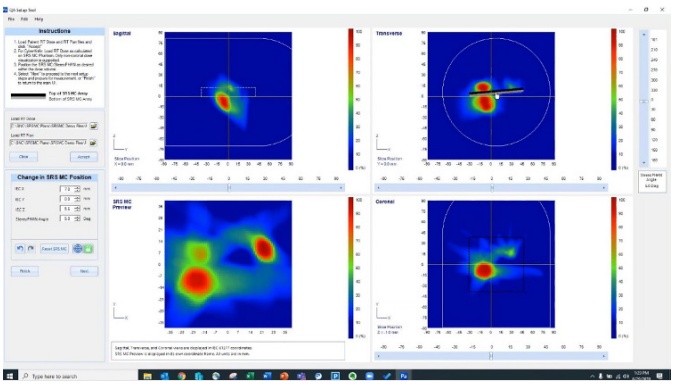
Acknowledgement: The support by Kerstin Aldenhoff (Conventus Congressmanagement & Marketing GmbH) is gratefully acknowledged.

Markus Buchgeister DGMP board member for public relations and communication and Beuth University of applied sciences, Berlin. Markus Buchgeister entered the field of medical physics in radiation therapy at the university clinic of Tübingen in 1995. In 2010, he received a call for a position as professor for medical radiation physics at the Beuth University for applied sciences at Berlin. Since 2003, he is engaged as co-opted DGMP board member for public relations and communications of the German Society for Medical Physics. Parallel, he served as chairman of the EFOMP Communication and Publications Committee 2003-2009 and from 2009-2015 as German EFOMP delegate. In 2017-2018 he was chairman of the EFOMP Education and Training Committee and is now German EFOMP delegate for a second round.

EFOMP COMPANY MEMBER ARTICLE

Sun Nuclear: Expanding Capabilities for Single-Isocentre Multiple-Target (SIMT) Quality Assurance

With nearly 400 devices in clinical use and a growing body of supporting literature, Sun Nuclear's SRS MapCHECK® is the gold standard for fast, filmless SRS/SBRT patient QA. As Single-Isocentre Multiple-Target (SIMT) treatment adoption grows, this array is becoming an even more resourceful tool for clinics with stereotactic programmes.



SNC Patient software displays the sagittal, coronal, and transverse planes and suggests shifts.

An abstract presented by R. Teboh Forbang (Hackensack Univ Medical Center, Hackensack, NJ. U.S.) at the AAPM Annual Meeting, evaluates the SRS MapCHECK for stereotactic plans for patients with Multiple Metastases and small targets. It found that the SRS MapCHECK, with its vertex field capabilities for SIMM and small targets (0.2 cc – 1.4 cc, using 6FFF/10FFF), yielded excellent results [1].

The SRS MapCHECK features a 77 x 77 mm detector area, with unmatched detector spacing and resolution that measures field sizes down to 5 mm (5 diodes in 5 mm cone). Robust angular corrections within the SNC Patient™ software adjust for translational offset between compared datasets with precision of 0.1 mm. The results are in line with film, meeting the TG-218 requirement that angular dependencies be accounted for in 2D arrays.

"The SRS MapCHECK gives us high-quality patient QA in minutes rather than hours, and significantly enhances patient throughput," notes Brett Miller, Chief Physicist (Radiation Oncology) at the University of Tennessee Medical Center in the US.

Planning & Delivery for SRS & Multi-Met Cases

Now, more clinics are performing SIMT treatments and rely on the SRS MapCHECK, and MultiMet-WL Cube from Sun Nuclear to ensure a stringent stereotactic programme.

Within the SNC Patient software, the new QA Setup Tool for SRS MapCHECK provides guidance for optimal setup of SIMT plans – capturing multiple targets with a single setup or shifting to accommodate the occasional larger field.

In addition to the SRS MapCHECK, the novel MultiMet-WL Cube from Sun Nuclear gives clinics confidence that their linacs are accurate enough to perform these highly precise plans, or offers insights to delivery issues that require action. This tool uses six targets set at precise locations from isocentre to measure off-axis and rotational gantry, collimator, and couch errors.

Find relevant publications, clinical user experience and more at sunnuclear.com/srs.

[1] R. Teboh Forbang, A. Ndlovu (Hackensack Univ Medical Center, Hackensack, NJ), "An Evaluation of SRS MapCHECK for the QA of Stereotactic Radiotherapy Plans for Patients with Multiple Metastasis and Small Targets", Joint AAPM/COMP Meeting (2020).

Soufiane Chouaf, M.Sc. Medical Physics

Soufiane Chouaf is a Clinical Applications Physicist for Sun Nuclear, the leader in Quality Management solutions for Radiation Therapy and Diagnostic Imaging. In this role, he supports customers in France and Switzerland — providing training and demonstrations of the latest QA solutions available from Sun Nuclear, and helping customers get setup and troubleshoot their QA solutions. Soufiane obtained a bachelor's degree in Applied Physics in collaboration with the Corpuscular Physics Laboratory (LPC) of Clermont-Ferrand, followed by a master's degree in Medical Physics at University Blaise Pascal. In parallel to his medical physics pathway, he was an intern at Cancerology Center of Grand Montpellier working on CBCT based dose calculation for VMAT head and neck patients with the view to approach adaptive radiotherapy in clinic.

Dr. Oliver Blanck receives IOMP's IDMP Award 2020

The International Organization for Medical Physics (IOMP) recently announced the results of their International Day of Medical Physics (IDMP) 2020 Awards, with one awardee from each of IOMP's regional organisations. For the EFOMP region, the well-deserved honour was awarded by IOMP to Dr. Oliver Blanck, from Germany, following his nomination by the German Society for Medical Physics (DGMP).

Dr. Oliver Blanck

Dr. Oliver Blanck is internationally recognised as an expert in the field of stereotactic radiotherapy. Since 2010, he has been working as a certified medical physicist, specialised in stereotactic radiotherapy, in two specialised radiosurgery centres in Güstrow and Frankfurt am Main, Germany, which are in turn associated with university hospitals in Kiel, Lübeck, Rostock, Greifswald and Frankfurt am Main. Dr. Blanck's clinical work comprises leading the preparation, planning, optimization, validation and execution of all stereotactic radiotherapy treatments performed in these two centres. Furthermore, Dr. Blanck acts as chief operating officer and as head of medical physics of both centres.

Dr. Blanck is a very active member in many national and international societies including DGMP, the German Society for Radiation Oncology (DEGRO), the German Society for Neurosurgery (DGNC) and the Radiosurgery Society (RSS), where he acts as steering committee member in many dedicated working groups. Through these activities, he has coordinated and conducted many national and international multi-centre studies to harmonise and optimise clinical research and practice.

He is also highly committed to education in Medical Physics, lecturing on radiation therapy at the University of Kiel as well as supporting and mentoring students studying at all levels including BSc, MSc, PhD and MD. He has also been very active in interdisciplinary education and knowledge transfer, through membership of conference organising committees (e.g. DGMP and DEGRO congresses) and through the organisation of joint workshops and symposia.

Dr. Blanck is certainly worthy of the International Day of Medical Physics Award of the IOMP!

The full list of IOMP's IDMP 2020 Awardees is as follows:

AFOMP:	Tae Suk-Suh
ALFIM:	Carlos E. Almeida
EFOMP:	Oliver Blanck
FAMPO:	Christoph Trauernicht
MEFOMP:	Mohammad Hassan Kharita
SEAFOMP:	Djarwani S. Soejoko
AAPM:	Robert Jeraj

In 2019, the EFOMP regional awardee of the IOMP IDMP Award was EFOMP's Assistant General Secretary, Efi Koutsouveli from Greece.

David Lurie holds a Chair in Biomedical Physics at the University of Aberdeen, UK, where he has researched and taught MRI Physics since 1983. He is Chair of the Communications and Publications Committee of EFOMP.

NATIONAL MEMBER ORGANISATION ARTICLE

Celebrating International Day of Medical Physics 2020 in Italy

Every 7th of November (the date of birth of Maria Sklodowska Curie), the community of Medical Physicists around the world celebrates the International Day of Medical Physics, IDMP. “Medical Physicist as Health Professional” is the leading theme chosen by IOMP to celebrate the event this year; following this topic AIFM, Italian Association of Medical Physicists, that represents more than 1000 professionals, has organized a virtual meeting that took place on Friday November 6th and was attended by almost 300 medical physicists.

The virtual symposium covered most aspects of the medical physics profession and featured the presidents or other representatives of the major Italian scientific societies in the radiological area, together with medical physicists who are particularly active in the European scenario. But, beyond this, the virtual meeting has been felt by our community also as a chance to remind to each one of us the importance of our profession. In fact, this year has been challenging for all care workers and medical physicists had the possibility to contribute to manage the COVID-19 pandemic with different actions and at different levels of intervention.

Screenshot from the AIFM IDMP webinar, held on 6th November 2020.

For example, ordinary activities have been rearranged from taking into account sanitization when performing QA controls to wearing masks during working hours. Some hospitals have been reorganized to receive COVID-19 patients and some departments have been moved or closed, thus patients have been gathered for therapies in COVID-19 free hospitals and also medical physicists’ activities followed. New CT protocols have been implemented to help in fast COVID-19 diagnosis together with fast quality assurance protocols. In radiotherapy, that was obviously administered without interruption, patients are vulnerable, often immune-depressed and with compromised lung function; strategies had to be thought of to minimize risk. QA activities were performed mostly when the patients were not in the department, radiotherapy planning and management were performed remotely and communications between staff were mostly made by telephone or video-calls. Moreover, when possible, treatment schemes have been modified to diminish patients’ access into radiotherapy facilities. Besides ensuring safety and effectiveness of treatments in this modified setting, medical physicists put their effort into understanding COVID-19 related new scenarios. Some studies reported on Artificial intelligence (AI) techniques applied to the diagnosis of COVID-19 from CT scans and in June results from a human trial of low-dose radiation therapy (LD-RT) for COVID-19 pneumonia were published.

Going back to 1914, while world war I was overwhelming France and the whole of Europe, Marie Curie felt that her knowledge could be at the service of her country and turned her attention to establishing a military radiotherapy service. She invented the first radiological cars, nicknamed “little curies”; she gathered money to build them and she trained volunteers to use them and to follow her on the battlefield where army surgeons could use X-rays to guide their surgeries. She wrote: “The story of radiology in war offers a striking example of the unsuspected amplitude that the application of purely scientific discoveries can take under certain conditions”.

In this spirit, through the virtual meeting held on 6th November, the Italian medical physicists’ community wanted to celebrate this 2020 IDMP, taking inspiration from Marie Curie’s statement and hoping to contribute to our health system and to patient care by sharing our scientific knowledge and technical abilities.

Valeria Landoni is an Italian medical physicist, who works at IFO-IRCCS Regina Elena National Cancer Institute in Rome. Her professional interest is mainly in radiotherapy: treatment planning, imaging applied in radiotherapy, radiobiology, hypo-fractionation, quality assurance and risk assessment. She is a member of the Working Group on SBRT of Italian Association of Medical Physics (AIFM), a member of the Scientific Committee of AIFM and a member of the Editorial Board of Physica Medica, European Journal of Medical Physics.

NATIONAL MEMBER ORGANISATION ARTICLE

International Medical Physics Day: an occasion to promote the profession to the Lithuanian public

Birute Griciene and Kirill Skovorodko describe IDMP activities, past and present, in Lithuania

Vilnius University Hospital Santaros Klinikos (VUHSK), one of the leading hospitals in Lithuania, encompassing the provision of medical care in almost all key areas. VUHSK is oriented towards five main scientific and clinical activities: Heart and vascular medicine, Transplantology, Oncohaematology, Radiology (diagnostic and interventional) and Nuclear medicine, Children's diseases and rehabilitation, and has undergone a notable expansion during the last decade.

The team of medical physicists at VUHSK celebrating International Medical Physics day.

Today, the hospital operates around 100 different sources of ionizing radiation (8 angiography units, PET/CT, 3 SPECT, 6 CT, etc.). The first medical physicist was recruited at VUHSK in the Nuclear medicine department in 2009. In 2010 a Master's programme in medical physics started at Vilnius University, and later some of the graduates were employed at the hospital. Currently, 11 medical physicists (4 full-time staff, 2 students) are working there. While taking into consideration that around 60 medical physicists work in Lithuania, VUHSK employs the largest number of medical physicists in the diagnostic (radiology, nuclear medicine) field. The medical physicists are involved in procurement procedures with ionising radiation, design of new installations, staff and patients dose optimization, equipment quality assurance, organised national and international training courses, jointly with IAEA, on radiation protection in nuclear medicine, etc.

At VUHSK, medical physicists became aware about the fact that their profession is in the shadows and even colleagues from the radiology department are not always familiar with the importance of medical physicists in ensuring radiation safety. Therefore, the division of Clinical radiological surveillance at VUHSK decided to pay tribute to medical physicists all over the world and their dedicated work, on the occasion of International Medial Physics day, every year. In 2018, a seminar was held for hospital staff during which the Head of division, Assoc. Prof. Dr. Birute Griciene, presented the role and activities of medical physicists. The live demonstration of equipment used for dosimetry gained a lot of interest between participants. Moreover, the article published on the www.santa.lt website gathered attention by local media and was reprinted about 5 times.

In 2020 and due to the exceptional situation that followed the COVID-19 outbreak, the seminar was replaced by a video interview (with B. Griciene) promoting the field of medical physics that was posted on all of the hospital social networks. This interview-article entitled "Medical physicists – what do they do in a hospital?" was published in one of the major Lithuanian media websites/newspapers. The article answered some general questions about medical physics profession: how did the specialty of medical physicist come about? Why did it become necessary? What is interesting about the work of a medical physicist? Additionally, some topics of importance to the reader were tackled such as the risk associated with diagnostic procedures, justification, what people should know about potassium iodine tablets, etc.

Since medical physicists play a key role in providing optimal patient radiation exposure, it is important to introduce the public to the profession. Since 2018, our medical physicists from VUHSK

Dr. B. Griciene speaking at the seminar for the International Day of Medical Physics in 2018.

gave several interviews to VUHSK and other local radio stations dedicated to patients and healthcare professionals. Also, the medical physicist profession was promoted in local newspapers through interviews and through open lessons to high school students.

A good relationship with radiologists and radiology technologists is essential, so that our medical physicist community maintains strong relations with their colleagues by not only participating in radiology events but also by celebrating Christmas and New Year holidays together.

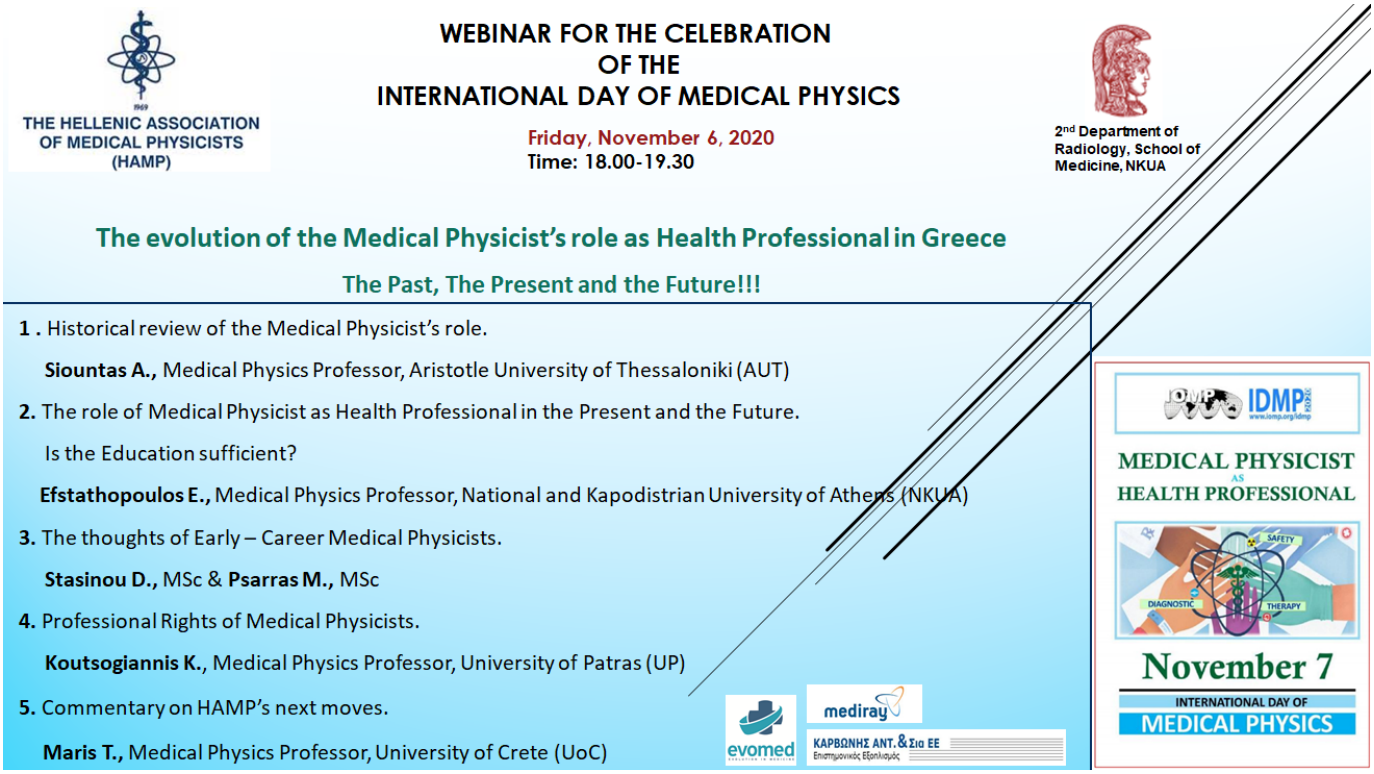
Dr. Birute Griciene is Associate Professor at the Department of Radiology, Nuclear medicine and Medical physics, Faculty of medicine, Vilnius University. PhD in Biomedical sciences; Head of Clinical radiological surveillance division at Vilnius University Hospital Santaros Klinikos, Board member of Medical Physics Society of Lithuania. She has more than 20 years of experience in radiation protection. The last 9 years her main research interests have covered patient and workers dose optimisation and ionising radiation exposure risk assessment.

Kirill Skovorodko is a PhD student at the Center for Physical Sciences and Technology and medical physicist at Vilnius University Hospital Santaros Klinikos. His main interests are radiation protection of radiation protection of patients and medical staff, quality systems, nuclear medicine and metrology in nuclear medicine.

NATIONAL MEMBER ORGANISATION ARTICLE

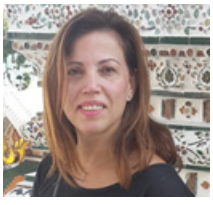
Celebration of the International Day of Medical Physics in Greece

Pola Platoni writes about the activities that took place in Greece to mark IDMP 2020



This year's theme for the celebration of the International Day of Medical Physics (IDMP 2020) was the evolution of the role of Medical Physicists as Health Professionals. Due to the COVID-19 pandemic, taking social distancing measures into consideration, the Hellenic Association of Medical Physics (HAMP) organized a web-based event on the 6th of November, in honour of our profession.

Five different topics were discussed, describing our role as healthcare workers since the beginning of the Medical Physicist career in Greece and the plans for our evolution in the future. Firstly, a historical review of the Medical Physicist's role was made, followed by a discussion on the sufficiency of the education that is provided to the students who are aiming for this profession. Consequently, young members of HAMP had the chance to provide their opinion and considerations about the field employment prospects and the enhancement of the workforce in time to come. The event was concluded with a discussion on the professional rights of Medical Physicists in Greece, as well as HAMP's next moves to further establish the significance of our profession in the healthcare field. The virtual gathering was successfully completed with the online connection of more than 100 participants.



Pola Platoni currently holds the position of Assistant Professor of Medical Physics in the Medical School of National and Kapodistrian University of Athens. She works as a Medical Physics Expert at "Attikon" University Hospital. Her main research work and interest focus on Radiation Physics for Radiation Oncology. She has educational experience and participates in the training of Medical Physicists as well as in the elaboration of MSc and PhD thesis. Since 2016, she is member of Hellenic Association of Medical Physicists Board.

EFOMP COMPANY MEMBER ARTICLE

RTsafe: succeS^{R}S – the RTsafe remote dosimetry auditing service for intracranial stereotactic radiosurgery applications

Promoting a culture of excellence

Stereotactic radiosurgery (SRS) is a radiotherapy (RT) practice based on the spatially accurate administration of high-dose fractions of radiation, and therefore, its proper application is particularly critical to patient safety. It requires well-defined and consistent methods of dose -describing, -prescribing, -modelling, -delivering, -measuring, and -reporting so that individual treatments are delivered accurately and safely. Another significant benefit of having unambiguous, consistent, and harmonized procedures is the ability to share with confidence the clinical experience between centres internationally, thus promoting the "transfer of knowledge" and further empowering the scientific community.

Despite the widespread sets of recommendations on continuous and detailed quality assurance (QA) of equipment, procedures, and processes, including dosimetry, from national and international bodies, the inevitable human factor and/or the existing inadequate procedures during the radiotherapy process may lead to patient mistreatment. The interlinked dosimetry- and geometry-related treatment parameters, require a high degree of accuracy, precision, reliability, and reproducibility. This translates into the need for reduced uncertainties at each step of the complex SRS chain, as well as the entire RT process that contributes to the overall accuracy. External dosimetry audits are recognized as an effective method of evaluating the above, promoting the best practice and assuring high-quality treatments. In recent years, all of these guidelines have been integrated into wider quality management systems (QMS), covering all radiotherapy stages involved.

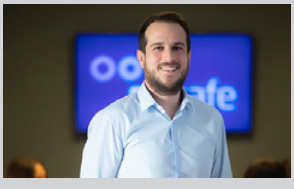
RTsafe's variety of solutions, from remote dosimetry services to cutting-edge high-precision/accuracy phantoms for end-to-end machine and patient QA, form the new generation of QA and external dose verification in radiosurgery. Merging the above, RTsafe recently introduced the succeSRS, a remote dosimetry audit service for intracranial stereotactic radiosurgery applications. Through a mailable end-to-end quality control (QC) program, that verifies the whole treatment chain from imaging to delivery, this service aims to evaluate the dosimetric quality, planned dose accuracy, treatment complexity, and treatment deliverability of brain SRS procedures.

"RTsafe remote dosimetry audit services were accepted as an alternative to those offered by NPL in the UK, and have already been used by one centre for NHS England commissioning"

The phantom used in the audit service is the RTsafe Prime phantom, using the specially designed inserts to accommodate Gafchromic film, OSL and polymer gel dosimeters. All the dosimeters are calibrated at the Secondary Standard Dosimetry Laboratory of the Greek Atomic Energy Commission, providing traceability to BIPM-France. Depending on the user needs, dosimeters for audit purposes can be used either individually or as a bundle. The user receives a specific RT structure set, depending on the practice to be audited, and is challenged to achieve a specific level of accuracy for the required treatment objectives. This service enables clinicians to build maximum confidence in their treatment procedures and staff capacities, both when launching or moving to new clinical practices, as well as in their day-to-day procedures for each SRS patient. It also serves as a powerful tool for quality improvement when included in the centre's routine radiation oncology QMS.

For more information on RTsafe's remote end-to-end dosimetry auditing service contact us at info@rt-safe.com.

Kyveli Zourari - Medical Physicist - Product Manager
Kyveli is focused on developing a comprehensive dosimetry audit program dedicated for SRS & SBRT applications. Prior to RTsafe, she gained experience in computational & experimental dosimetry, as well as dosimetry audits in radiotherapy as a scientific associate at the Medical Physics Laboratory of Medical School, National and Kapodistrian University of Athens and medical physics at the Greek Atomic Energy Commission. She has a PhD in Medical Physics from the Medical School of the University of Athens.

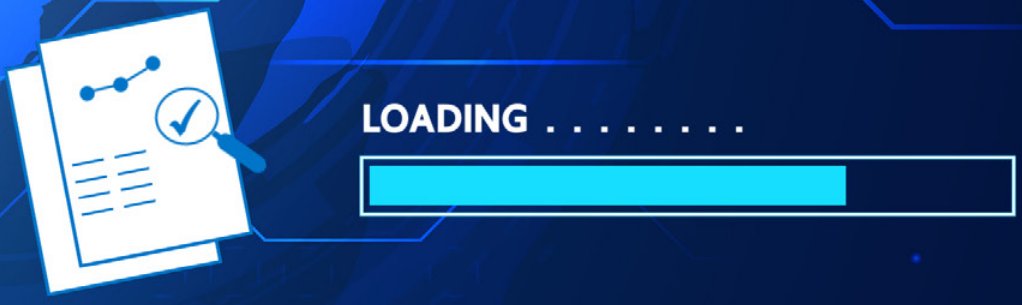


Emmanouil Zoros - Medical Physicist - Product Manager
Emmanouil is responsible for product management, data analysis, and film dosimetry at RTsafe. He has a Diploma in Applied Mathematics & Physics from the National Technical University of Athens and a Master of Science in Medical Physics from the National and Kapodistrian University of Athens. His research interests focus on radiation therapy with emphasis on quality assurance in stereotactic radiosurgery, experimental and computational dosimetry using Monte Carlo simulation techniques.

RTsafe

succeSRS

Remote End-to-End Dosimetry Auditing Service



Promoting a culture of excellence

A mailable End-to-End QC program to verify the whole SRS chain, from imaging to treatment delivery.

- Confidence and reliability
- High quality treatments
- Dosimetry traceable to PSDL

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RESEARCH ARTICLE

Convolutional neural networks for digital breast tomosynthesis research

Roberta Ricciardi describes work carried out for her Master's thesis at University Federico II in Naples.

Computer Aided Detection (CAD) software systems have been developed in particular in mammography for automatic classification of lesions (masses and microcalcifications) in breast images [1]. With the introduction of digital breast tomosynthesis (DBT) as a second-level diagnostic exam in the workflow of breast cancer diagnosis, the development of similar CAD algorithms for DBT represents an important step and an active field of modern research [2]. In particular, with the advent of Artificial Intelligence (AI) methods in medicine – also under the push of medical physicists – leading to the creation of new "intelligent" algorithms, recently CAD systems for DBT exam interpretation are being investigated [3,4]. DBT exams produce a dataset of typically 50-60 slices of the anatomy of the compressed breast, which helps in the localization of the depth of a possible lesion in the glandular tissue distribution within the breast mass.

In my M.Sc. thesis in medical physics at University Federico II (Naples, Italy), discussed online in March 2020 during lockdown in the middle of the first wave of the COVID-19 pandemic, I investigated a computerized system based on an AI algorithm for the classification of breast tomosynthesis images. This work was born from a collaboration between the University of Naples Federico II, the National Institute of Nuclear Physics (INFN) and the "San Giovanni di Dio e Ruggi d'Aragona" hospital (Salerno, Italy) [4].

The development of new "smart" CADs, based on automatic learning models to generate classification, seemed particularly advantageous for my thesis task, looking for a classification – at the single DBT slice – of the possible presence of a lesion signature. For this purpose, I developed a convolutional neural network (CNN). This network processes the images using convolution filters, defined as moving matrices, to generate a signal that will be transferred to the next neural layer. At each layer, the network creates a new representation of the input data useful for their classification [5].

I trained and tested this network on a first dataset of nine DBT exams in cranio-caudal projection. Five cases with pathological diagnosis were confirmed by biopsy. The dataset of the individual DBT slices of all patient exams produced a total of 242 slices. Out of these slices, 70% (169) were used to train the CNN and the remaining 30% (73) to test its learning. Finally, data augmentation techniques were applied to all the training images to expand the dataset of images on which to train the network, obtaining a total of 3024 DBT slices. Example images are shown in Figure 1.

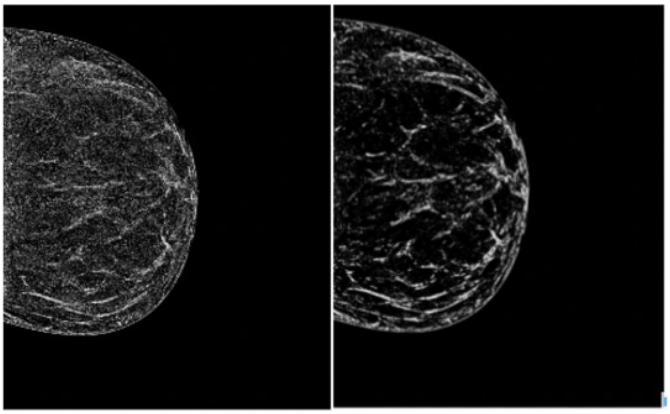

Fig. 1: Comparison between two tomosynthesis images belonging to the same case before (left) and after preprocessing for feeding the Deep CNN. In particular, in the post-processed image (right) we can see a reduction of quantum noise and the accentuation of the edges of the structures inside the breast.

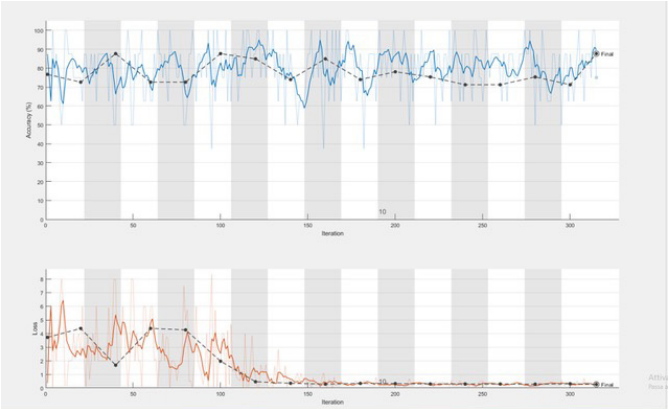

Fig. 2: Training curves (blue) and Loss curves (orange) as a function of the number of iterations. The black curve represents the trend of the curve of validation points. These curves are realized after the CNN realization process as a measure of global performance.

The network was trained for 15 eras on a dual GPU nVIDIA GTX TITAN X hardware platform in parallel mode, using the ADAM algorithm as a network solver. The computation time required to train the neural network is about

20 min. Every 20 iterations a “live” validation point was requested for training in order to constantly analyze the progress of training and avoid network overfitting (Figure 2).

The neural network showed an accuracy and specificity as good as 0.89 ± 0.07 and 0.96 ± 0.04, respectively. These results are comparable with those reported in [3], where Google Health researchers trained a similar neural network on a mixed DBT and DBM dataset of about 28,000 patients, obtaining an accuracy of 93%. This initial study suggested further investigation for confirmation and improvements. The medical physics group at Federico II University has recently started a research programme for the realization of an AI based CAD for breast cancer classification in DBT images. The CNN will be evaluated on a larger dataset of 100 DBT clinical scans within a collaboration with the Radiology Department of a second large hospital in Naples. A third collaboration project (already approved by the hospital IRB) was set up with the Breast Unit radiologists and Medical Physics Section at an oncology hospital in Rome, Italy, for collecting about 250 annotated DBT clinical scans. In addition to the classification task, a new algorithm will be implemented for the localization of breast lesions in single DBT slices of a given DBT clinical scan, to be compared with the radiologist’s delineation of the tumour on the DBT slices.

In line with this and similar studies worldwide, there is the expectation that once fully developed and consolidated, AI approaches using neural networks will be helpful in the routine automatic interpretation of DBT exams.

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Roberta Ricciardi received her B.Sc. (Physics) degree in 2018 with a thesis in Medical Physics on the risk of low doses of ionizing radiation, and her M.Sc. degree in Physics (2020), from Federico II University (Naples, Italy). She is currently attending the first year of the Specialty School of Medical Physics at Federico II University. Since many years, she has been performing as a scientific correspondent also by participating in small and large public events. She believes that scientific correspondence is an excellent way to spread science correctly by stimulating the curiosity of adults and children. Science, like curiosity, is limitless.

EFOMP COMMUNICATES | EDUCATES | INTEGRATES

EFOMP e-learning

EFOMP's e-Learning platform was launched in January 2019. It contains a wealth of information, including video recordings and pdfs of lectures given during seven recent editions of the European School for Medical Physics Experts (ESMPE), as well as complete recordings of the highly-informative "Lockdown webinars" organized by EFOMP and IAPM in Spring 2020 and didactic webinars and masterclasses organized by EFOMP and EUTEMPE in Autumn - Winter 2020.

Access to the EFOMP e-Learning platform is provided to all **Individual Associate Members (IAM) of EFOMP**. Becoming an IAM is very simple – just complete an online registration form and pay a subscription fee of €15 (renewable annually). You will receive immediate access to the e-Learning platform.

Registration as an EFOMP IAM is available to anyone, in any location (including outside Europe) who is interested in continuing and supplementing their education and training in Medical Physics.

EFOMP COMPANY MEMBER ARTICLE

LAP: Hypofractionation - The unique opportunity to revolutionize MLC technology

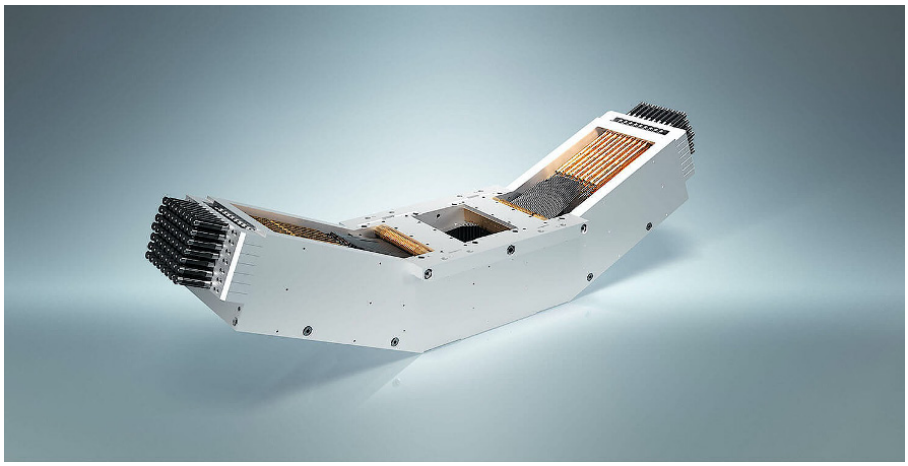
German technical university OTH Amberg-Weiden together with MLC and laser specialist LAP join forces to create an all-new MLC drive&control system addressing the new requirements of radiation therapy hypofractional treatments.

Background

The demographic change is a central challenge for the coming years that we will have to face as a society in general but especially also in medical technology. The Federal Statistical Office expects the proportion of the population aged 60 and older in Germany to increase from 27% to 35% between 2013 and 2030. Increasing number of new diseases that only appear in later decades of life and improved diagnostics lead to an increase from 18 million (2018) to 30 million (2030) in new cancer cases being forecast worldwide [2]. The gold standard for many tumour therapies is radiation therapy (RT) with linear accelerator (LINAC) treatment. Treatment of a patient in radiation oncology often lasts 6 to 8 weeks with usually 5 fractions per week. For some of the most common types of tumours – including the prostate, breast, and lungs – hypofractionated RT can be expected to improve tumour control with recurrence-free survival for tumour biological reasons [3].

Through therapy with hypofractionated RT, the patient is treated in only 3 to 10 fractions (= treatment days) with a dose greater than 2 Gy [4] and possibly irradiated up to 10 Gy [5] per fraction. In addition to improved tumour control, this also means shorter treatment time for the patient and increases “patient comfort”. Estimations show that the broad use of hypofractionated RT may enable up to 40 % higher device utilization.

For the widespread use of hypofractionation in clinical practice for the above-mentioned tumour entities, several technical requirements have to be addressed. These include e.g. the detection and compensation of tumour movement during the irradiation as well as the precise beam shaping and modulation of irradiation [6]. The increased demands on the precision of beam shaping call for new concepts of the mechanical components of multileaf collimators (MLC). To reduce the irradiation time per fraction (currently approx. 10-15 min.), an increased dose rate of the LINAC is an option. The intensity modulated radiation therapy (IMRT) currently uses i.a. the leaves of the MLC for dose modulation for the target organ. With increasing dose rate at the LINAC, a faster MLC movement is necessary in order to optimize the intensity modulation with the MLC. Overall, this results in a faster irradiation per fraction for the patient.



Another technical challenge of conventional MLC is the above-mentioned detection of tumour movement during irradiation. The increasing combination of magnetic resonance tomography (MRT) and LINAC in one hybrid device enables online imaging during the irradiation. This enables active tumour tracking and targeted beam tracking to ensure that the tumour always receives the planned dose. In addition, surrounding tissue and organs at risk can be protected even better. However, the magnetic stray field of the MRT requires reliable components in the MLC head, which will lead to a new type of drive system in the project.

Partners set out to achieve high goals

LAP and OTH Amberg-Weiden joined forces in a unique project with the

goal of revolutionizing the state-of-the-art of MLC technology.

LAP is a leading manufacturer of medical devices used in radiation oncology and diagnostic radiology. Though mostly known for their laser products, LAP also brings more than 25 years of experience in MLC development and manufacturing, which is serving LINAC vendors across the industry.

The Ostbayerische Technische Hochschule (OTH) Amberg-Weiden is an innovative university that provides highly qualified and future-oriented education. The institute of medical engineering has a product-oriented focus helping innovative ideas become available to clinics and patients.

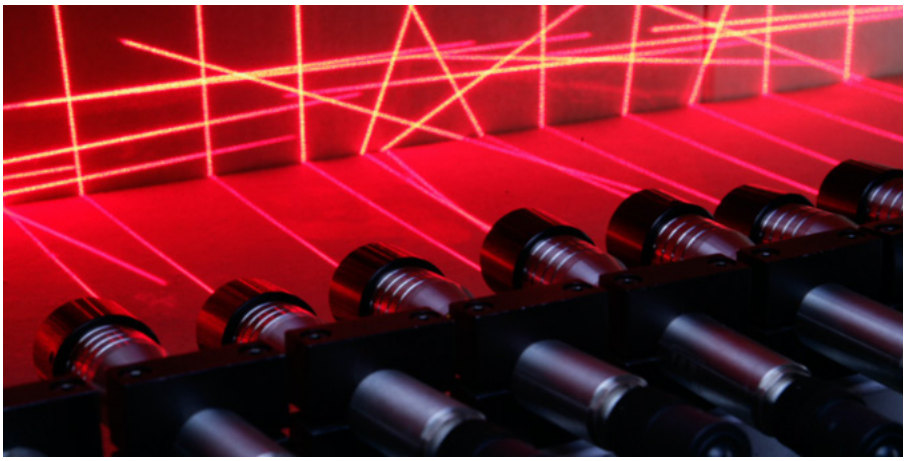
While the partners benefited from the long experience in laser technology, they also generated completely new approaches to many “gold-standards”, which may lead to extended boundary conditions unprecedented in the industry to this day.

One component in focus is a new type of leaf drive system, which is not only smaller, customizable in its form factor, but also faster and more precise. This may include speeds of up to 2-10 times faster than regular DC-motor-spindle-assemblies can generate. The form factor and compactness can lead to an MLC size up to 30% smaller, mostly due to the potential integration into the leaf structure. This also reduced the complexity in production and assembly. Furthermore, the system is likely to provide a precision of at least tenfold better than current standard MLC drives – leading it into the domain of microns.

As the drive module is in an ongoing development the exact details leading to the improved parameters are not disclosed, yet.

Furthermore, the partners work on optical sensoring systems applying the laser know-how existing in the group's network. In contrast to other optical image processing systems existing on the market, this will add another dimension in the image analysis which leads to both a much faster and stable readout and a higher flexibility in where to place a camera. By eliminating the need to look straight down at the leaf tip, the camera can be placed in a position where it is exposed to less radiation and also provides more flexibility in the mechanical setup of the treatment head. Hence, it promises to be more robust and easier to implement with less limitations.

LAP has developed and marketed more than 10 different MLC designs, many of which are in daily operation in RT departments around the world. However, many OEM requirements and a thorough analysis of future needs showed the potential for improvement in particular for speed and accuracy of the leaf movement. In return, these improvements would be applicable to most existing and future models.



Alongside the initialization of the project, the topic also gained the attention of the local state government, who added substantial funding into the budget.

Impact for patients/community

The focus of the development of RT is the continuous improvement of the radiation of tumours for patients. In the current development, the aim is to optimize the irradiation with increased precision to safely deposit the high single dose in the case of hypofractionated treatment of the PTV. In addition, to reduce the dose in the organs at risk (OAR) to a minimum. By moving the MLCs faster, it is possible to further reduce the irradiation time with an increased dose rate. The advantage for the patient is a reduction in the time spent on the treatment couch. This makes a not insignificant contribution to the fact that unintentional patient movements are reduced on a macroscopic level. At the same time, the patient’s organ movement can be tracked using hybrid device technology like MR-LINAC and conventional tracking devices. With the new drive system it is planned that a quick correction of the irradiation field will be made possible in order to continue irradiating the PTV with the planned dose. Thus e.g. breathing-induced organ displacements in a real-time adjustment of the radiation field can still be treated with the full PTV dose without any delays. The Stereotactic Body Radiation Therapy (SBRT) also benefits from the new development of the drive system for MLCs. Since a relatively small, clearly delineated tumour with a high single dose in a few fractions is specifically to be irradiated in a targeted manner in SBRT, the irradiation field must be extremely precise.

The drive system may lead to new parameters in treatment planning for a continuous optimization of patient dose delivery. The LINAC can be used together with the adapted MLC system in two ways. Option 1 is a treatment with similar segments distribution in modern arc radiation therapy at a higher rate of revolutions per minute (RPM) of the gantry in combination with a higher dose rate. The option 2 would be more segments due to an increased drive velocity of the MLCs at same RPM combined with again a higher dose rate. Both above mentioned options could

be used consequently for a hypofractionated treatment. Due to this treatment the total dose for tumour control can be applied in only 5-8 fractions.

In summary: The new drive system leads to a better optimization in radiation therapy. On the technical side a reduction by 20 to 50% is planned for the height, length and eventually the weight of the complete MLC system. That would be a welcome aspect for compact LINAC systems like a ring-based LINAC. The treatment success comes by an increased accuracy of the MLC, a better organ at risk sparing is provided together with an increased PTV coverage while using all advantages of hypofractionation mentioned in the beginning.

In the long run, patients could be treated in a more comfortable and secure way and have higher cure chances - which would eventually be the main success of this project.

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Stefan Ueltzhöffer, M.Sc., General Manager LAP Sued. Stefan Ueltzhöffer studied Medical Physics at University of Heidelberg, Germany and Havard Medical School/Dana Farber Cancer Center in Boston, USA. Soon after entering radiotherapy industry he focused on improving MLC technology amongst other key components. He was acting as General Manager/ CEO in several SMEs and responsible for LAP's MLC and QA business since 2017.

Prof. Dr. Ralf Ringler studied physics at the Friedrich-Alexander University (FAU) Erlangen-Nürnberg. After completing his doctorate, he worked as a medical physics expert (MPE), including the postion as group leader in radiation therapy at the Clinical Center Nuremberg. Since 2010, Prof. Ringler has been accompanying the professorship "Medical Physics, Radiology and Therapeutic Systems" at the East Bavarian Technical University of Amberg-Weiden (OTH). Prof. Ringler is a member of the commission in the Bavarian State Medical Chamber and technical director in nuclear medicine for physics and radiation protection. For the Institute for Medical Technology (IfMZ) founded in 2015 at the OTH in Weiden, Prof. Dr. Ringler is in charge as deputy head of the IFMZ.

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WHAT MEDICAL PHYSICISTS DO IN THEIR FREE TIME

Organic goat's cheese production on a family farm

Tóth Árpád from Serbia writes about his passion for organic cheese production

Happy goats on the farm, and the finished product!

I grew up in the countryside in a small village called Neuzina in the middle of Banat, which is in the north of Serbia. Since I was a boy, nature was all around me. And what a nature! Untouched, where cows, goats and sheep spend most of the year on the grassland.

I may say that goats are a kind of tradition in my family – my grandfather and grandmother had goats, cows, sheep and pigs… well, a true small farm. Therefore, my love of animals dates back to them. By fortune, my father and mother continued that tradition. They still have a lot of different animals on their little farm: cows, sheep, pigs, chicken, ducks – but goats, they are special. At the beginning they had one or two, but slowly the number started to grow. Today we have around 20 goats which we milk, and around 30 baby goats. The goats are milked from March to November, twice a day, in the morning and evening. This is usually done by my father. After that my mother takes control. She is a cheese specialist and has been making cheese for more than 40 years. And today, in this modern world, she still produces cheese as my grandmother used to do, using only fresh goatmilk and bacteria. Then just rest – and after a day, a kind of magic happens. The most delicious fresh farmer's goat's cheese is on the table!

I live with my own family, 100 km away from my parents' farm. So probably you are wondering how I can contribute to farming and cheese production. In fact, I spend most of the weekends in the countryside helping my parents. I usually help preparing food for the animals. In the spring we cut a lot of fresh grass and prepare hay for the winter. And during spring and summer we take them out to grassland. In the autumn we have to collect corn. That's just the food; of course,

there is a lot more work with them and I'm very happy to help. After a long working week, a weekend in the countryside is relaxation therapy for me.

Besides helping with food preparation for winter, I have one more important role. I'm the one responsible for experiments with cheese and developing new products! My mother makes the traditional cheese, but I like to try new things. For example, a few years ago we started to make matured goat's cheese. My father made a special press for this, where we put the fresh cheese, then every day make a turn on the press and let it mature for six weeks. It takes a lot of time and effort but the end result is amazing and well worth the wait. Also, I experiment with different herbs and spices – one of my favourites is a goat's cheese with basil and peperoncini. I also make mozzarella, of course from cow's milk.

The favourite part is, of course the cheese tasting; usually, we do it in the evening after all the work is finished. We prepare a nice cheese plate, with prosciutto, home-made schnaps and wine.

Our small family farm is my battery-charging place. One day I'm going to continue this tradition and fulfil my dream: to make wine and goat's cheese.

Do you have a hobby that you would like to share with readers? Then send your article to pubcommittee@efomp.org. Submission details can be found here.

Tóth Árpád works as a Medical Physicist at the Oncology Institute of Vojvodina and is an associate researcher at the Institute of Nuclear Sciences Vinča, Serbia. He received his PhD in Nuclear Physics in 2018 from the University of Novi Sad, Serbia. He is a member of Serbian Association of Medical Physicist, Council of the Hungarian Academy of Vojvodina and Hungarian Academy of Sciences. Beside clinical work, his main interest is MC simulations especially treatment room design, radiation protection and CBCT dose estimation.

WHAT MEDICAL PHYSICISTS DO IN THEIR FREE TIME

Brewing craft beer in Malta

Jean Bickle and Miguel Camilleri, who work as Medical Physicists in Malta, tell us the story of their beer-making journey, from hobby to business

Miguel and I started off our friendship away from home, during our Medical Physics traineeship in Leeds, at the Leeds Cancer Centre, UK. We were part of a club at the Wharf Chambers, and after a day of work, we would unwind at the modern hipster pub, play table soccer and try the continually changing range of beers there.

As we got back to Malta and started our Medical Physics jobs, we quickly realised that the island was lacking the beers we longed for. From there started the long learning process on how to brew quality craft beer.

Initially, we just wanted to do some home brewing and enjoy the fruits of our labour. However, it didn't take long for our friends to convince us to take this a step further – there wasn't enough home-brewed beer to go around! We had mainly built our home brewing kit ourselves, and we were determined to do as much as we could on the new brewery. This saved us a lot of capital, and is what actually made starting the business a viable option. Miguel put his engineering skills to work and would be at the garage (future brewery) practically every day afterwork, whilst I worked mostly on developing client relations, negotiating future orders, and looking into funding options. The skills we learnt in Medical Physics were quickly and aptly applied to the world of business! It wasn't all smooth sailing. We did have quite a number of mishaps but we worked together to get through it, and almost a whole 2 years later, in late 2019, the brewery was ready.

From a business standpoint, finding what makes you unique is an essential part of building a company. What is the value you are bringing to your client base that others are not? Our mission is to provide a continually changing range of beers, to give our drinkers a variety of experiences in taste and aroma.

Jean and Miguel brewing a fresh batch of Black IPA

We started thinking about creating recipes we hadn't seen before, with flavours we hadn't seen anyone use before. We made beers using Maltese strawberries for example, and we also produced a range of beers inspired by the flavours of the traditional qagħaq ta' l-għasel (honeyring). One of the first three beers we ended up launching with is a Black IPA, a beer style not commonly found internationally, let alone in Malta. It was an instant hit with those who have been looking for something different, and we received very encouraging feedback on the beer.

For such a relatively new business, Huskie is already growing with leaps and bounds. But hours in the day are limited, and managing Huskie at its current level already takes up a lot of our time, and we have had to sacrifice a lot from our private lives. But in doing that, Miguel and I manage to run it whilst still holding full time Medical Physics positions. Where it will take us in the future – well, who knows? We're thinking of employing people to take care of logistics and cleaning

for example. We're also looking into hiring a driver to take care of distribution for us. We're taking a measured approach, as Miguel and I both love what we do in Medical Physics. Working in healthcare is extremely satisfying and keeps us well in check on life's priorities, and that is just as much our passion as brewing beer is. But I believe that if you work hard enough at something, and if you love it enough, you'll find the time for it.

Everybody will say you'll enjoy it once you get there. But for us it's more important to enjoy what we're doing while getting there. God forbid Miguel and I weren't friends. We'd kill each other with all the time we spend in the same room. For us, the brewing thing works because it's part of the development of our friendship. We brew, drink, chat, and joke. It's about enjoying the process. And Quality Control!

Jean Bickle (right) and **Miguel Camilleri** (left)
Jean and Miguel are both Medical Physics Experts in Nuclear Medicine, employed as Medical Physicists at Mater Dei Hospital, Malta. Both graduated with an MSc in Medical Physics from the University of Malta (UoM), and completed their traineeship at Leeds Cancer Centre, UK. Before entering the Medical Physics field, Miguel graduated as a Mechanical Engineer from the UoM, and subsequently completed an MSc in Manufacturing Technologies and Management. Jean had graduated with a double Honours BSc in Mathematics and Physics (UoM). They are first and foremost friends, and also colleagues & business partners, having started work on the brewery in 2017 and launching the first beers in 2019.

EFOMP COMPANY MEMBER ARTICLE

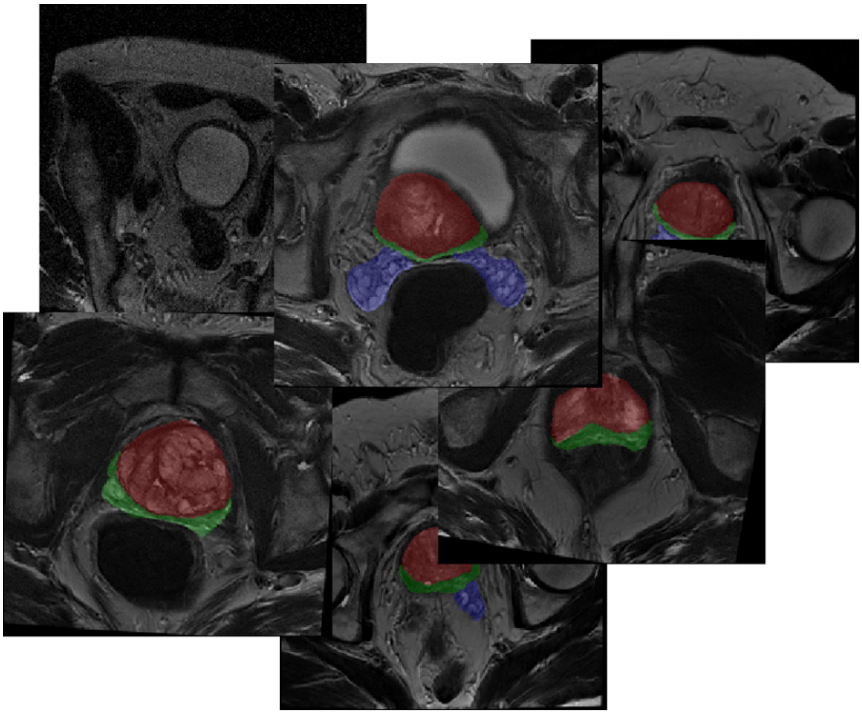
ELSE Solutions s.r.l. & QUIBIM: A new AI-based approach to prostate cancer diagnosis

ELSE Solutions srl, in the person of Giacomo Bartesaghi, Ph.D., Senior Physicist and Board Member, is pleased to submit an article by Ángel Alberich Bayarri, Ph.D., Founder and CEO of QUIBIM. As an EFOMP Company Member, ELSE Solutions srl is excited to present QUIBIM's new AI-based approach to prostate cancer diagnosis.

There are several complementary methods for prostate cancer detection, each one with advantages and disadvantages. All of them are weapons of choice in the war to find cancer. Although Digital Rectal Examination (DRE) has low sensitivity and specificity for detecting prostate cancer, some lesions can be detected by palpation of irregularities in the prostate lobes. Prostate-specific antigen (PSA) and their derived metrics (total PSA, PSA density, PSA aged adjusted, among others) has shown a limited sensitivity of 21% if a cutoff value of 4ng/mL is used [1]. This sensitivity increases in high grade and advanced stage tumours up to 51% of cases.

Medical imaging techniques, more specifically multi-parametric magnetic resonance imaging (MRI) with a magnetic field strength of 3 Tesla has shown to have an increasingly large role in the detection and staging of prostate cancer. As an example, in a multi-variate analysis of an independent cohort including age, family history, prior 5-alpha reductase inhibitor use, digital rectal examination findings, PSA level, PSA density, and MRI, only MRI was predictive of clinically significant (Gleason score ≥7) prostate cancer among men without a history of previous prostate biopsy [2].

Despite the limitations of DRE and PSA, until August 2019, a patient with suspicious DRE or PSA was frequently referred for a 'blind' prostate biopsy. The term 'blind' refers to the fact that several cylinders containing cell samples were extracted from different regions of the prostate through transrectal or transperineal needle access.



Transitional zone, peripheral zone and seminal vesicles masks obtained after the application of a deeply supervised convolutional neural network (CNN) in patients with different prostate pathologies. The model has been trained with more than 300 MR cases (9000 samples) from different manufacturers and magnetic fields

In August 2019, a systematic review and meta-analysis with a total of 2582 patients was published in the Journal of the American Medical Association (JAMA) by Elwenspoek MMC et al. [3], concluding that prebiopsy MRI combined with targeted biopsy (after the identification of the lesion in the MRI) is associated with improved detection of clinically significant prostate cancer and reduced numbers of biopsy cores per procedure (77% reduction compared to systematic biopsy alone), while potentially avoiding unnecessary biopsies in 33% of cases. From that moment onwards, the number of prostate MRI examinations has been growing dramatically worldwide.

A structured report (Prostate Imaging–Reporting and Data System, PI-RADS 2.1) has been proposed to homogenize the radiological reporting of prostate cancer in clinical routine. The latest version 2.1 was published in 2019 and

developed by an internationally representative group involving the American College of Radiology (ACR), European Society of Urogenital Radiology (ESUR), and AdMeTech Foundation.

Standard-of-care prostate MRI examinations include the acquisition of transverse T2, diffusion-weighted imaging (DWI) and (not always) dynamic contrast-enhanced (DCE) series. Beyond the conventional radiological reading, these series allow to extract a huge amount of information that is relevant for lesion detection and staging through the combination of artificial intelligence (AI) techniques and the obtention of imaging biomarkers.

This process can be completely automated in an analysis pipeline lasting seconds, from the images loading till the generation of a quantitative report to be used by the urologist to detect the tumour, preliminarily stage it through imaging and target the biopsy to finally diagnose prostate cancer after the histopathological evaluation and Gleason scoring.

The increased volume of prostate MR examinations worldwide demands for automated AI tools regionally analysing the prostate with a detailed approach and well-differentiating transitional zone, peripheral zone and seminal vesicles. The localization of the tumour is related to its stage (i.e. seminal vesicles involvement) and therefore prostate gland and surrounding areas should not be considered as a whole but something anatomy-driven. In summary, this means that prostate is not a 'ball' and shouldn't be considered like that if we want to guarantee success of AI tools.

The increased volume of prostate MR examinations worldwide demands for automated AI tools that regionally analyze the prostate in a detailed manner and allow for accurate differentiation of the transitional zone, peripheral zone and seminal vesicles. The localization of the tumour is related to its stage (i.e. seminal vesicles involvement) and, therefore, the prostate gland and surrounding areas should not be considered as a whole but in an anatomy-driven manner. In summary, the prostate should not be considered a uniform "ball" if we want to guarantee the success of AI tools.

Before the widespread use of convolutional neural networks (CNN) in 2012, it was not possible to automate complex tasks like prostate segmentation on MRI images. Now, thanks to AI, we have achieved it. QUIBIM, in its own war on cancer will launch qpProstate®, a disruptive automated solution - efficient and standardized reporting - for prostate MRI analysis, including de detection of lesion maps and their exportation to other systems in DICOM-RT format. The software is divided in 5 steps, from the source images, through the processing, analysis and generation of the final report. Stay tuned!

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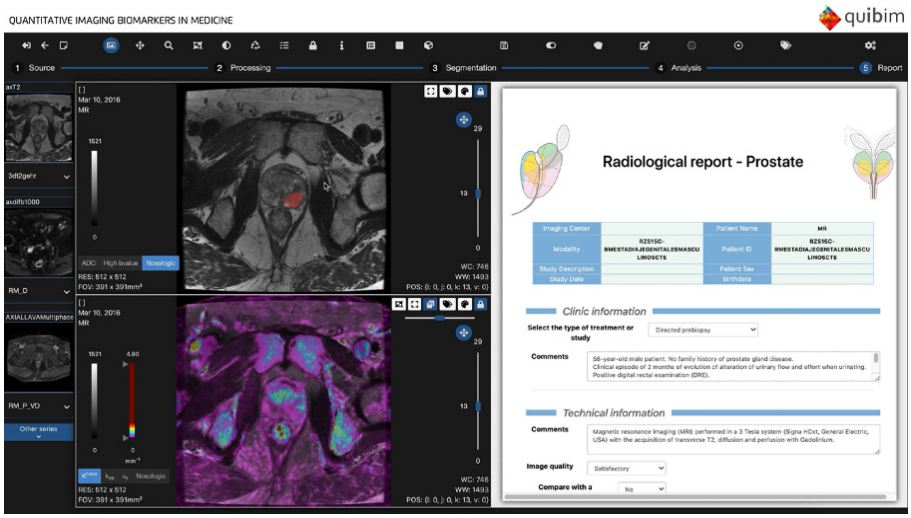


Screenshot of qpProstate solution, showing the nosologic map generation (detection of suspicious lesions) and the integration with structured reporting.

Angel Alberich-Bayarri is a bioengineer, researcher and entrepreneur in medical image processing and the application of AI methods to radiology. He is CEO of Quibim (Quantitative Imaging Biomarkers in Medicine) company in Valencia, Spain. Quibim is focused on the creation of an AI platform for the analysis and usage of imaging biomarkers across hospitals and pharmaceutical companies. He is author of more than 60 publications in the field of imaging biomarkers, author of more than 15 book chapters and editor of 2 books.

EFOMP PHOTO CONTEST

Results of the 5th EFOMP Photo Contest

For the fifth EFOMP Photo Competition, we received an excellent selection of entries on the theme of "Light and Shade". The submitted photographs were evaluated by members of the Communications and Publications Committee

We are very happy to announce that the results were:

First place

Untitled
by Petr Fiala
(Czech Republic).

Petr Fiala is a biomedical engineer working in the University Hospital Olomouc, Czech Republic, in the department of Medical Physics and Radiation Protection. His duties are focused on QC of gamma cameras and image processing. He is interested in photography associated with hiking, sports, and history.

Second Place

Untitled
by Eugene O'Sullivan

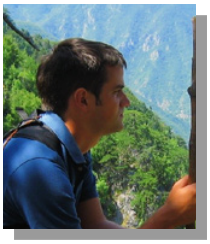
(Ireland).

Eugene O'Sullivan has been working at the Cork University Hospital, Ireland as a Senior Medical Physicist since June 2001. Eugene currently works in the Quality Assurance arm of the Radiotherapy section of the Medical Physics department, performing quality assurance on accelerators, CT, simulator and superficial units. He is administrator for Lantis & Aria databases and is responsible for ordering seeds for Brachytherapy prostate patients. He also gives lectures to junior doctors on CT Tube and PACS.

Third place

"Danube"
by Ozren Čudić

(Serbia).



Ozren Čudić has been working at the Institute of Oncology Vojvodina, Serbia since September 2009. His professional focus is on treatment planning systems and dosimetry.

EFOMP Calendar 2021 – available soon!

A selection of entries from the first five EFOMP Photo Contests has been made into a beautiful calendar, which will be available for free download from the EFOMP web site. Look out for it!

6th EFOMP Photo Contest

Would you like to display your talents as a photographer? Then you should enter the 6th EFOMP Photo Contest by submitting a photograph, on the theme "The Sky at Night"! Entries close on 31st January 2021. Details can be found here.

EFOMP 40th BIRTHDAY

Haiku poets found among European Medical Physicists!

Results of the EFOMP 40th-birthday Haiku Contest

On the occasion of the 40th anniversary of EFOMP, medical physicists were asked to send small verses, called Haikus, which refer to the celebration of 40 years of EFOMP. Haikus, which are of Japanese origin, are defined by a strict use of respectively 5, 7 and 5 syllables in three lines. Only four MPEs took up the challenge and produced some marvelous poems. These MPE poets are Veronica Rosetti from Italy, Leo Romijn and Rick Keesman from the Netherlands, Jaroslav Ptácek from the Czech Republic and (out of competition) Paddy Gilligan from Ireland.

The EFOMP Haiku Contest Jury was formed by EFOMP Communications & Publications Committee chair David Lurie, C&P Secretary Ivan Gencel, EFOMP Vice President Paddy Gilligan and EFOMP Professional Matters Committee chair Ad Maas, acting as jury chair. After a hard day's weekend, they judged Leo Romijn as the winner, with Rick Keesman and Jaroslav Ptácek in second and third places respectively.

Since we only received 11 Haikus, it was decided to publish all of the entries, so you may enjoy the poetic fruits of your colleagues and judge for yourself!

In an era of mindfulness and increasing interest in the workings of the brain it might be helpful to practice the art of Haiku. Try to capture your ideas, feelings and thoughts in a Haiku. This poetic verse is especially suited for scientists, and physicists in particular, because of the strict syllable regulations.

We wish all Medical Physicists much pleasure and success in practicing the art of Haiku!

Here are the winning Haikus:

1st place: untitled by Leo Romijn (NL)
Physics in my brains,
Medtech running through my veins
Embody EFOMP 40.

2nd place: untitled by Rick Keesman (NL)
EFOMP 40 down!
Have done much, still much to do.
EFOMP 40 more!

3rd place: Fluorodeoxyglucose by Jaroslav Ptáček (CZ)
Are those drops on my
table promptly emitting
sweet radiation?

And all the other entries:

untitled by Veronica Rosetti (IT)
Image quality,
it's a very important task
of the MPE.

untitled by Veronica Rosetti (IT)
The small X photon
invisible friend, must be
always controlled.

untitled by Leo Romijn (NL)
Medtech in my veins,
Physics in my brains, embody
Forty years of EFOMP.

untitled by Leo Romijn (NL)
Medtech in my veins,
Physics in my brains, cure + care
Incorporated.

Sinners by Jaroslav Ptáček (CZ)
The rain from heaven,
washes away all our sins.
Enjoy that, earthworms!

SPECT by Jaroslav Ptáček (CZ)
Waves - I see in
reconstructed image!
Uniformity?

untitled by Rick Keesman (NL)
Born a physicist.
The world is ever-changing.
will I improve it?

untitled by Paddy Gilligan (IR)
In all of my years,
I never wrote a haiku.
It will end in tears.

Dr. Ad Maas is the Chair of EFOMP's Professional Matters Committee. He was Head of the Medical Physics Department of the Jeroen Bosch Ziekenhuis in 's-Hertogenbosch (NL) from 1988 until 2014. He is now retired but still working for EFOMP and a member of the Medical Ethics Review Committee, Brabant.

Upcoming Conferences and Educational Activities

This list was correct at the time of going to press.

For a complete, up-to-date list, please visit our Events web page at www.efomp.org/index.php?r=events

Dec 10th, 2020 - Dec 11th, 2020

EFOMP - European School for Medical Physics Experts (ESMPE) Particle Therapy edition 2020
Online

Jan 20th, 2021 - Jan 22nd, 2021

Winter School: Dosimetry-Guided Treatment Planning for Radionuclide Therapy
Bern, Switzerland

Feb 16th, 2021 - Feb 19th, 2021

IAEA-International Conference on Advances in Radiation Oncology (ICARO-3)
Online

Feb 25th, 2021 - Feb 27th, 2021

Australasian Brachytherapy Group 30th Annual Scientific Meeting
Virtual Event

Mar 3rd, 2021 - Mar 7th, 2021

ECR2021
Vienna, Austria

Mar 23rd, 2021 - Mar 26th, 2021

ETRAP 2021 Conference
Online

Apr 11th, 2021 - Apr 13th, 2021

NACP2021 Symposium
Reykjavik, Iceland

Apr 19th, 2021 - Apr 21st, 2021

Virtual 8th MR in RT Symposium
Online

Jun 16th, 2021 - Jun 19th, 2021

EFOMP - 3rd European Congress of Medical Physics
Turin, Italy

Sep 19th, 2021 - Sep 22nd, 2021

ÖGMP, DGMP and SGSMP- three Medical Physics Societies conference
Vienna, Austria

EFOMP Structure

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Ad Maas	Brenda Byrne

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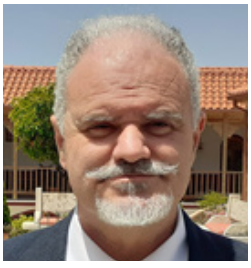	
Constantinos Koutsojannis	Anja Almén

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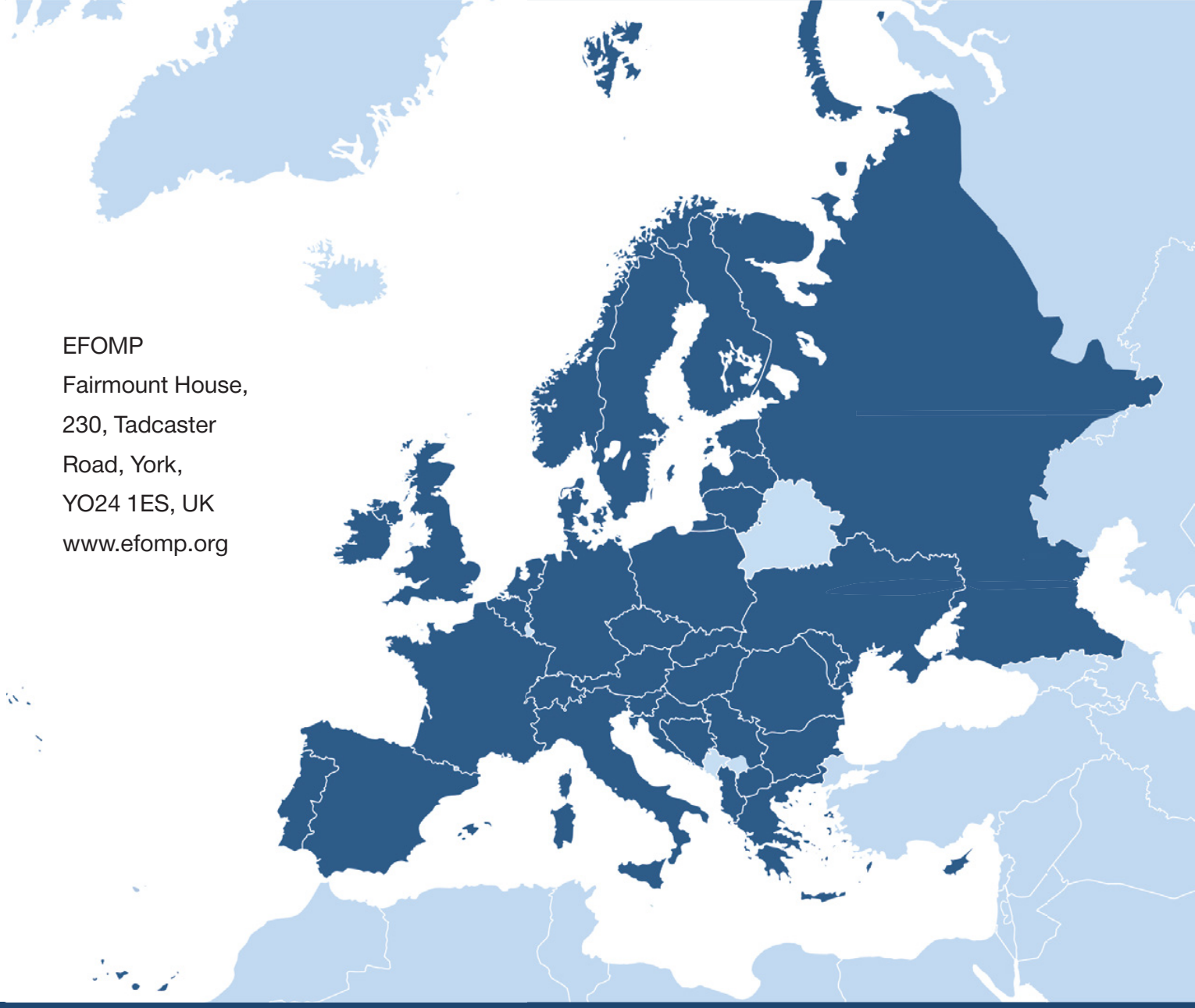
Chairperson	Vice Chairperson
	
Yolanda Prezado	Brendan McClean

EFOMP Company members



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EFOMP

EUROPEAN FEDERATION
OF ORGANIZATIONS
FOR MEDICAL PHYSICS

The European Federation of Organisations in Medical Physics (EFOMP) was founded in May 1980 in London to serve as an umbrella organisation for medical physics societies in Europe. The current membership covers 36 national organisations which together represent more than 9000 medical physicists and clinical engineers working in the field of medical physics. The motto developed and used by EFOMP to underline the important work of medical physics societies in healthcare is “Applying physics to healthcare for the benefit of patients, staff and public”.

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