BULLETIN

September 2024

SGSMP
SSRPM
SSRFM

Schweizerische Gesellschaft für Strahlenbiologie und Medizinische Physik
Société Suisse de Radiobiologie et de Physique Médicale
Società Svizzera di Radiobiologia e di Fisica Medica
Swiss Society of Radiobiology and Medical Physics

No 109 ssrpm.ch

Contents

BULLETIN 109

September 2024

Cover: *Metropolis, 1923*
collage by **Paul Citroen** (1896-1983)
(Leiden NL, Leiden University Library)

Editorial

Letter from the Editors

Dear colleagues,

And here's a new edition! The finalization of a Bulletin is always an opportunity to take a step back over the past 4 months, to look back at how far we've come. And what a joy it is to once again bring you such a rich edition!

We thought the summer edition would be a little more synonymous with a summer break. Not so. In fact, we never stop in our professional lives, perhaps because for many of us, our work is also a hobby. Conferences, meetings and working groups are numerous and productive. Thank you all for all the content you've sent us. It's a privilege to preview all your reports as editors of this Bulletin, and a joy to share them with our community.

So it's in this back-to-school mood that we bring you our President's letter, various announcements concerning autumn events and recently-created working groups. The results of the intercomparison for Megavoltage Units 2024 are also included in this issue. Many congresses took place at the very beginning of the summer, so you can read the impressions of the numerous Swiss physicists who had the chance to take part.

To keep the summer mood going, we're taking you on a little detour to Brazil, followed by a new reading suggestion. If you don't already own this book, go ahead and buy it: it's somewhere between a thriller and a scientific investigation.

Once again, thank you all and happy reading!

Davide & Marie

PS: the deadline to take part in the January 2025 edition (yes, already...) is Friday 13.12.24 ;-)

PRESIDENT'S LETTER

Dear colleagues,

After a short summer break, we are back to work. I hope you had a restful break, enjoyed it thoroughly, and are now recharged with plenty of energy.
It has been already several months since our last bulletin, so let me update you on what has happened during that time.

In June, we had the AMP meeting. For those who attended, I hope you enjoyed it as much as I did, particularly the presentation of Pre Marie-Catherine VOZENIN. Marie-Catherine is a Radiation Biologist currently working at University Hospital of Geneva (HUG). She presented the cutting-edge insights into FLASH radiotherapy, a technique that involves ultra-rapid administration of the radiation dose. During that same meeting, I presented the activities that took place during the 1st semester of 2024 and we had updates from the different active SSRMP working groups “Role and tasks of the medical physicist in imaging”, “Quality control of TPS” and “Nuclear Medicine Physics tasks”. The meeting took place at Bern, and we also had the opportunity and time for some more personal discussions thanks to the nicely organized coffee break that was sponsored by SSRMP. I really appreciate these moments when we can connect with our colleagues and exchange about our activities.

Since the last bulletin in May, we have held two board meetings - one in person, right after the AMP and one online. While I clearly prefer the onsite meetings, I must admit that online meetings are sometimes very convenient. Several topics related to the education committee were discussed. I’m impressed about the number of things that they are dealing with. Among other topics, recently they have been working in the revision of the “Stoffkatalog” (annex II), a document that will undoubtedly be appreciated by students pursuing their certification. We learnt during the summer that our colleague Stephan Klöck, who has been organizing the SSRMP certification exams since 2009 is stepping down from this position after 15 years in this role. I would like to take a moment to express, on behalf of the SSRMP, our sincere gratitude for his invaluable contributions to our society. At the same time, I would like to extend my thanks to his successor, Götz Kohler, who will be taking over the responsibility of organizing the SSRMP certification exams. Thank you both for your commitment to our society.

PRESIDENT'S LETTER

Concerning our activities related to BAG, the Nuclear Medicine group, led by Thiago Lima, has contributed to drafting the L-09-04 BAG directive on Quality assurance of gamma-cameras, SPECT and PET cameras. The objective of this directive is to align the Swiss recommendations more closely with international standards, both in terms of the type and frequency of quality control tests as well as clarifying what would be the tasks and responsibilities of the medical physicist.

As you know, we are permanently in contact with other professional societies. Recently we were contacted by ISROI concerning a very interesting document about the need for IT specialists in Radiation Oncology. During recent discussions, we provided them with our suggestions. By combining our efforts, we aim to achieve a greater impact and produce a more effective result.

As you all probably know, ZMP is the scientific journal of our society. In July, we had a joint meeting between Elsevier, ÖGMP, SSRMP and DGMP to discuss current developments at ZMP. It appears that, after the complete switch to open access, submissions from physicists in certain countries have declined. We brainstormed ways on how to increase the number of submissions and agreed to do more advertising but also making the English title of the journal more prominent than the German one in order to attract more submission of non-German speaking authors. So, if you are looking for a journal to publish your work, keep ZMP – or JMP as it is displaying on its cover now - in mind; it's our official journal and we encourage you to give it a try! Want to see how the new cover looks like? Check it out in this bulletin.

In June, we had the Swiss Congress of Radiology in Geneva, which was a great success, with strong participation from medical physicists specializing in imaging. You can read more about it in this bulletin. If you missed this congress, don't worry, we have been invited to participate again in the scientific committee for next year's event, SCR'25 in St. Gallen.
You don't have to wait that long for another significant event: The 5th European Congress of Medical Physics, ECMP24, the Joint Conference of the DGMP, ÖGMP & SGSMP is coming up soon. It will be held from the 11th till the 14th of September in Munich. I hope to see you there!

More events will bring us together again. The General Assembly (GA) will be held during the upcoming Continuous Education (CE) day on November 22nd in Lausanne. This year, the CE day will focus on the challenges of single-energy CT and multi-energy CT in medical imaging and radiotherapy. The day is organized by medical physicists in imaging from CHUV, Anaïs Viry and Damien Racine, many thanks to them! Of course, you find the program of the CE day in this bulletin and registration will soon be opened. The agenda of the GA will also be sent out soon, so make sure you reserve the date on your calendar. I was tempted to give you a preview of what to expect at the GA, including some exciting news that will be particularly interesting for our members enrolled in the certification process, but I'll leave you in suspense—that's one more reason to attend! ;-)

Well, I think I've shared quite a bit already. I'll let you explore the other topics in this bulletin.
I hope we can all enjoy the summer a little longer. Looking forward to seeing you again soon!

Marta

AMP Meeting

Bern, 28th of June 2024

The first AMP meeting of 2024 took place on June 28th at Bern University.

Following the introduction by the Chair of the Scientific Committee **Maud Jaccard**, the first report on current topics came from our President **Marta Sans Merce**.

The special guest of the meeting was Professor **Marie-Catherine Vozenin** (Head of Radiobiology Sector/Lab, Geneva University Hospital and Geneva University), who gave a very interesting presentation on the FLASH effect - just to remind us that the "R" of "SSRMP" stands for Radiobiology!

After the coffee break, it was time for some update reports from the current Working Groups:

- Role and tasks of medical physicist in imaging (chair **Damien Racine**, presenting **Marta Sans Merce**)
- Quality control of TPS (chair **David Patin**)
- Nuclear Medicine Physics Tasks (chair **Thiago Lima**, presenting **Silvano Gnesin**)

Save the date: 16.12.2024

The next AMP Meeting will take place on December 16th, as usual in Bern.

Margherita Casiraghi will chair the next event.

From single-energy CT to multi-energy CT: Challenges in medical imaging and radiotherapy

Agenda

9:30 - 9:45 **Welcome of participants**

9:45 - 11:15 **Single-energy CT (technique, dose, IQ, application to RT)**
Presentation 1: Basic principles of CT – D. Cester (Zurich)
Presentation 2: CT challenges in radiotherapy – F. Mieville (Fribourg)

11:15 - 11:30 **Break**

11:30 - 13:00 **SSRMP General Assembly**

13:00 - 14:00 **Lunch break**

14:00 - 15:30 **Session 2 Spectral CT**
Presentation 3: DECT physical principles (30 min) – A. Viry (Lausanne)
Presentation 4: Technological perspectives of photon-counting CT – L. Gallego (Lausanne)
Presentation 5: PCCT in radiation therapy – S. Tanadini (Zurich)

15:30 - 15:45 **Break**

15:45 - 16:25 **Session 3 Clinical applications**
Presentation 6: Main clinical applications of spectral CT (DECT and PCCT) (40 min) – D. Rotzinger (Lausanne)

16:25 - 16:30 **Closing**

The SSRMP general assembly will take place during the Continuous Education Day

SSRMP Working Group: Room shielding in the kV domain

Dear experts,

we would like to invite you to participate in the working group “Room shielding in the kV domain”. We will collect, discuss, and analyze cases of the room shielding required for safe usage of X-ray devices, including the cases which are not explicitly covered by the law.

Our main goal is to eliminate individual interpretations and uncertainties in the process and to write clear recommendations for the Swiss hospitals.

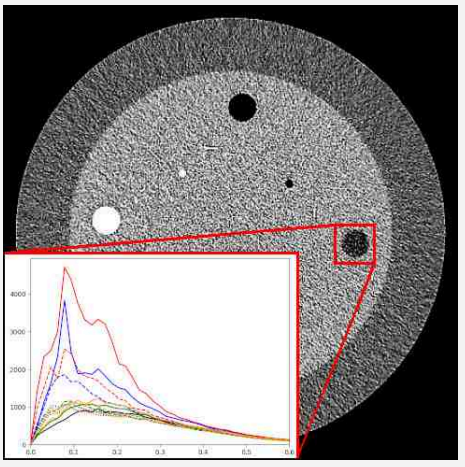
Some examples of the foreseen topics are:

- authorization of two devices in the same room
- clear definition of "Nutzstrahlung / Rayonnement primaire"
- calculations for cone beam devices and fluoroscopy with 3D-mode
- safety margins and minimal values for mA, kV suggested by RöV / OrX

Timeline
Start date: Q4 2024 (tentative September)
End date: Q2 2025 (ideally before Summer)

Contact person
Natalia Saltybaeva
natalia.saltybaeva@luks.ch
Medizinphysikerin Diagnostik
Radiologie und Nuklearmedizin
Luzerner Kantonsspital

Intercomparison study: computation of image quality in the Fourier domain



Medical physicists of the University Hospital in Lausanne, with the collaboration of Davide Cester from the University Hospital in Zurich, undertake an intercomparison study about the computation of image quality in the Fourier domain for computed tomography (CT).

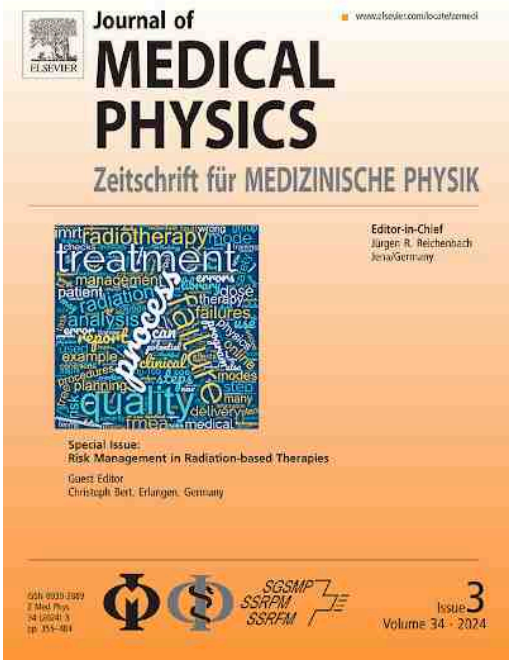
The purpose of this study is to compare different calculation methods of the task-based transfer function (TTF), noise power spectrum (NPS) and detectability index (d') of the NPWE model observer (Non-prewhitening with eye filter) for given CT images.

For more information or to participate, please contact Anaïs Viry by e-mail: anais.viry@gmail.com

Change of Design of our Society Journal

Check out the new design of our society journal!

Find out what changed and feel invited to submit your next manuscript to the Journal of Medical Physics!



Current Call for Papers:

- **Risk management in radiation-based therapies**
  Executive guest editor: Prof. Dr. Christoph Bert
  Submission deadline: **31 December 2024**

Results of the TLD Intercomparison for Megavoltage Units 2024

1. Introduction

The Institute of Radiation Physics (IRA) in Lausanne is mandated by the Swiss Society for Radiobiology and Medical Physics (SSRMP) to organize an annual dosimetry intercomparison for the gantry driven linacs. The 2024 intercomparison followed the same procedure and used the same equipment to carry out the measurements as previous years. The aim was also the same i.e. to check the absolute dosimetry. This year also, we focused on static photon and electron beams.

Thirty-two institutions took part to the 2024 intercomparison with a total of 149 beams checked, including 120 photon beams (58 beams with flattening filter (FF) and 62 flattening filter free beams (FFF)) and 24 electron beams.

Like past audits, the requirement was to check each photon energy used in the institution only once. For example, if two machines are matched, only one machine had to be checked, similarly when two machines are equipped with a 6X beam, only one has to be checked.

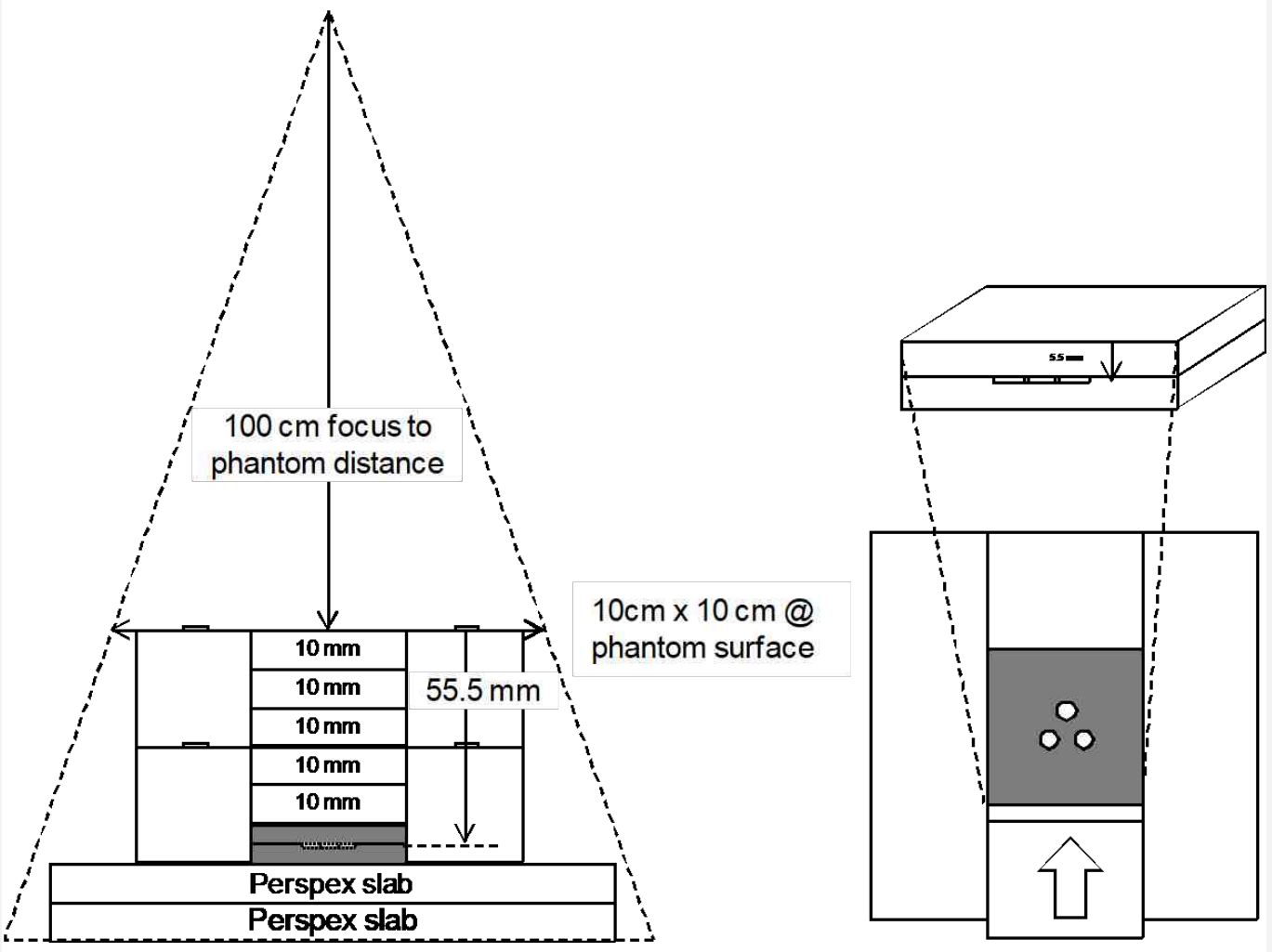


Figure 1. Assembly of the measurement equipment for photon beams: phantom and (closed) phantom frame

2. Material and methods

The same TLD discs (4.5 mm diameter, 0.9 mm thickness, Harshaw Inc.) and solid water phantoms as those for the photon dosimetry intercomparisons of 2011 to 2023 have been used.

For photon beams, the solid phantom was composed of two stacked Perspex phantom frames. The inner square was 4 cm in length, the outer square 10 cm x 10 cm. The frames have been filled with five plain RW3 (PTW Freiburg) slabs, and one slab containing three TLD. The slab dimensions are 40 mm x 40 mm x 10 mm. The measurement depth in solid water was 5.55 cm. The phantom was placed on Perspex or water equivalent material (at minimum 5 cm). This arrangement is shown schematically in Figure 1.

For electron beams, the same material was used. The solid phantom was composed of one or two stacked Perspex phantom frames. The frames have been filled with the plain RW3 slabs and the slab containing the TLD, positioned at the appropriate depth by combining plain slabs of 5 and 10 mm thickness. The phantom was placed on Perspex or water equivalent material (at minimum 5 cm). This arrangement is shown schematically in Figure 2.

Each TLD slab contains 3 TLD chips located on a circle 5 mm away from the center. A correction was applied on the TLD reading to account for the slight difference between solid water and water. For this reason, the user was asked to assume that the phantom was fully water equivalent and provided for sufficient scatter, as it would be the case in a large water phantom.

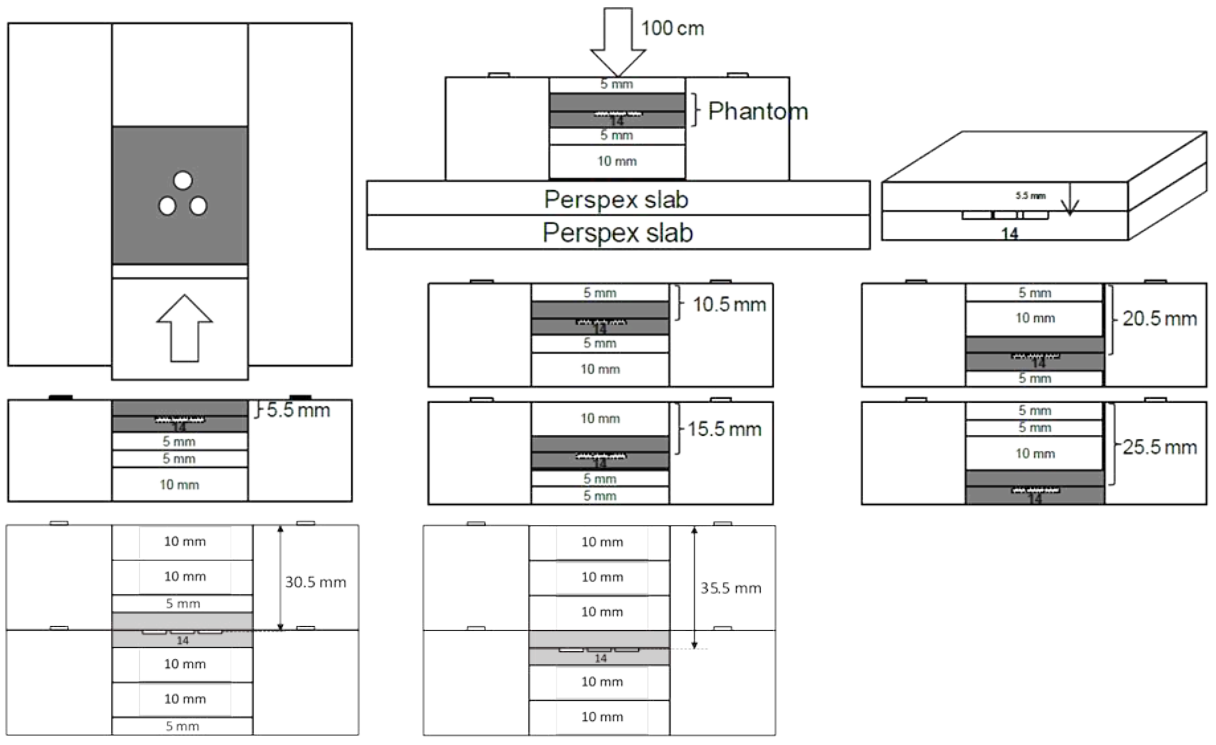


Figure 2. Assembly of the measurement equipment for electron beams: phantom and (closed) phantom frame

A TLD annealing oven and a Harshaw 5500 reader have been used, similarly to earlier intercomparisons. Thanks to the cobalt-60 irradiation facility available at IRA in the calibration laboratory, we could use a less time-consuming procedure insuring the appropriate metrological traceability. In the years 2017-2020, we calibrated the cobalt irradiator in terms of absorbed dose to water for a given radiation quality against the IRA reference dosimeter for photons calibrated at METAS.

In 2021, a direct calibration of the TLD dosimetry system was carried out at METAS for the photon beams. This calibration was used again this year. For electron beams, the same calibration was used as before. This factor is in fact independent of the energy and its value is 1.056±0.008 (relative to Co-60).

This allows us to prepare reference TLD at IRA for each series of measurements in the participant's beams.

The absolute dosimetry with TLD requires several corrections: non-linearity of the TLD response with dose, dependence of photon energy and fading effect. The non-linearity and fading corrections have been carefully determined at IRA. The energy dependence of the TLD response is included in the calibration of the cobalt irradiator. The correction associated to the replacement of the water phantom by the solid water phantom is also included in the calibration of the irradiator.

For the intercomparison irradiations, the measurement conditions in the solid phantom were as follows: source to surface distance 100 cm, field size 10 cm x 10 cm at the surface of the phantom, dose to the TLD close to 1.00 Gy.
The participants were expected to provide their own value of dose (stated dose). It had to be specified at the measurement depth for photon beams (5.55 cm), and at the depth of maximum dose for electron beams. The percentage depth dose was also to report. This allowed us to compare the TLD dose value at the measurement depth with the stated dose at the maximum.

Four runs of measurements were necessary for the 32 participants. A calibration of all the TLD was carried out before and after each run, in order to determine precisely the individual sensitivities of all the TLD chips. For each run, a series of 10 TLD ("reference TLD") in each group of 50 TLD were irradiated to the reference dose of 1 Gy at the cobalt irradiator on the irradiation date recommended to the participants. Then these 50 TLD were all read in one batch and the dose delivered to every chip was calculated from the ratio of its indication to the mean indication of the 10 reference TLD. Finally, the corrections mentioned above were applied.

In June 2024, the TLD dosimetry system was audited in the blind and reference irradiation service offered by the IAEA Dosimetry Laboratory (DOL) to Institutions conducting dosimetry audits in radiotherapy.

3. Results

The agreement between the stated dose and the TLD measured dose is evaluated with the ratio "stated/measured" (noted Ds/Dm) and taking into account the TLD measurement accuracy. For photon beams,

an agreement within 4% is considered a satisfactory check. For electron beams, the criterion is 6%.

The probability for the Ds/Dm ratio to fall outside of the intervals 0.96-1.04 and 0.94-1.06 only due to the normal fluctuations of the TLD signal is low. Indeed, these fluctuations have been investigated for the uncertainty evaluation and the observed standard deviation was low.

3.1 Electron beams

The mean Ds/Dm ratio for the different beam energies is given in Figure 3. The deviations from the unity are probably due to statistical fluctuations.
The distribution of the Ds/Dm ratio for all the electron beams is illustrated in Figure 4.

The mean value of Ds/Dm for all electron beams is 1.017. The statistical dispersion is large. No systematic bias between the participants dosimetry and the TLD dosimetry can be concluded, for all the energies and for any particular energy.

100% of the results are in the interval 0.94-1.06, i.e. within ±6%, which is very satisfactory. In addition, 79% of the results are in the interval 0.97-1.03, i.e. within ±3%.

3.2 Photon beams

We checked 58 conventional beams with flattening filter (FF) and 62 flattening filter free beams (FFF). The mean ratio for the different beam types and energies is given in Figure 5 with the standard deviation. This repartition seems to show that all deviations from the unity can be attributed to statistical fluctuations.

The distribution of the Ds/Dm ratio for all the photon beams is illustrated in Figure 6.
The statistics of the Ds/Dm ratio for all the photon beams are given in Table 2.

The mean value of Ds/Dm for all photon beams is 1.001. No significant bias is observed between the participants dosimetry and the TLD dosimetry. The difference between the mean values of Ds/Dm for FF beams (1.002) and FFF beams (1.001) is not significant.

For 98% of the tested beams, the Ds/Dm value is in the interval 0.96-1.04, i.e. within 4%, which is judged satisfactory. In addition, 81% of the results are in the interval 0.98-1.02, i.e. within 2%.

The three centers with beams for which the deviation was slightly above 4% received a recommendation to check the reference dosimetry and the stated dose. The beams were tested again and in the three cases, the second TLD measurements revealed a good agreement with the stated dose.

We must also mention the case of a center in which the prescribed setup for the measurement was not respected and the stated dose was not calculated for the corresponding conditions. This led to a significant difference with de TLD dosimetry (>10%). The cause was identified, and the participant revised his first estimation of the specified dose. Then the agreement was good. This case is not included in the statistics of Table 2 because it is considered an outlier.

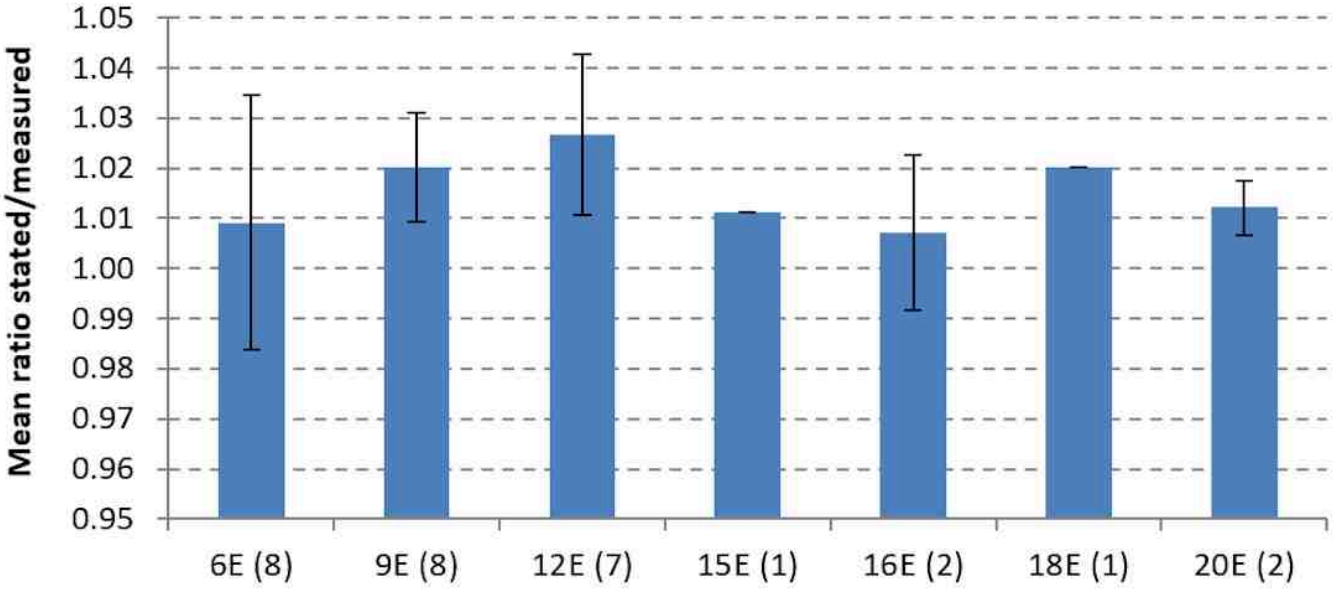


Figure 3: Electron beams: mean Ds/Dm ratio for the different radiation qualities. The number of beams is given in brackets. Error bars=std dev.

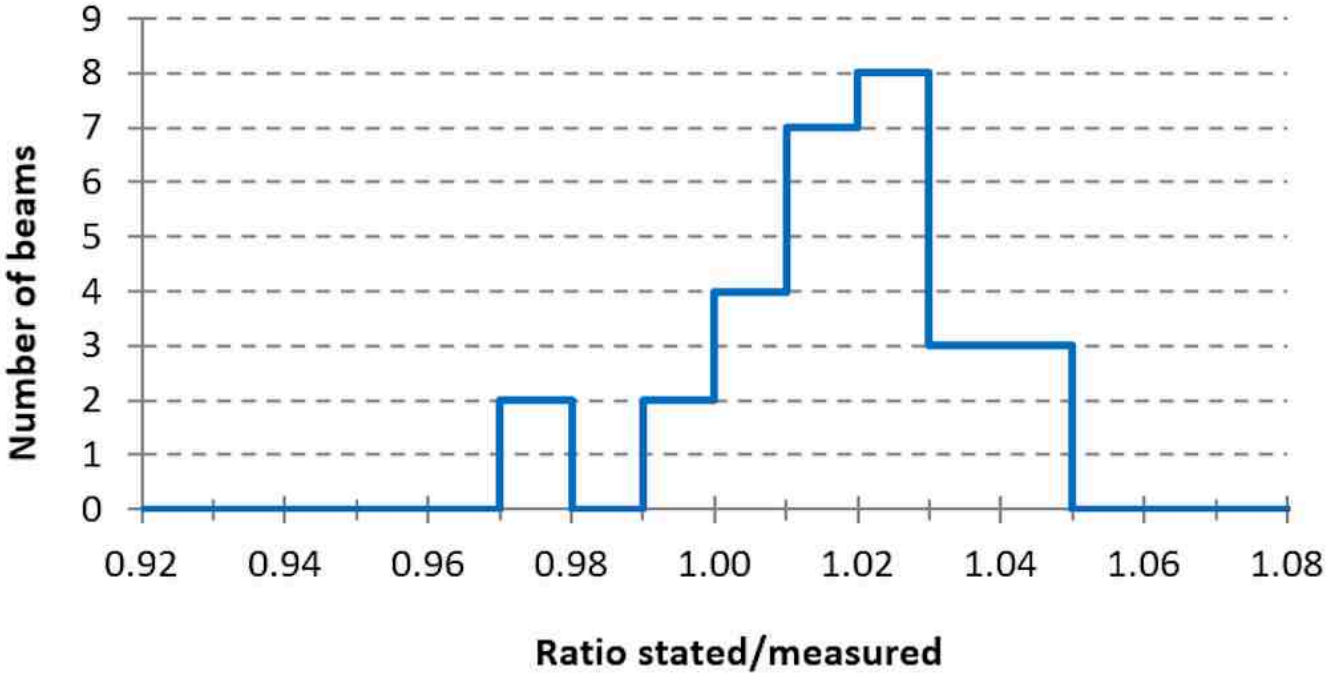


Figure 4: Electron beams: histogram of Ds/Dm ratio for all 29 beams

Parameter	Electron beams
Beam number	29
Mean	1.017
Std dev.	1.7%
Minimum	0.975
Maximum	1.047

Table 1: Electron beams: observed ratio "stated dose/measured dose"

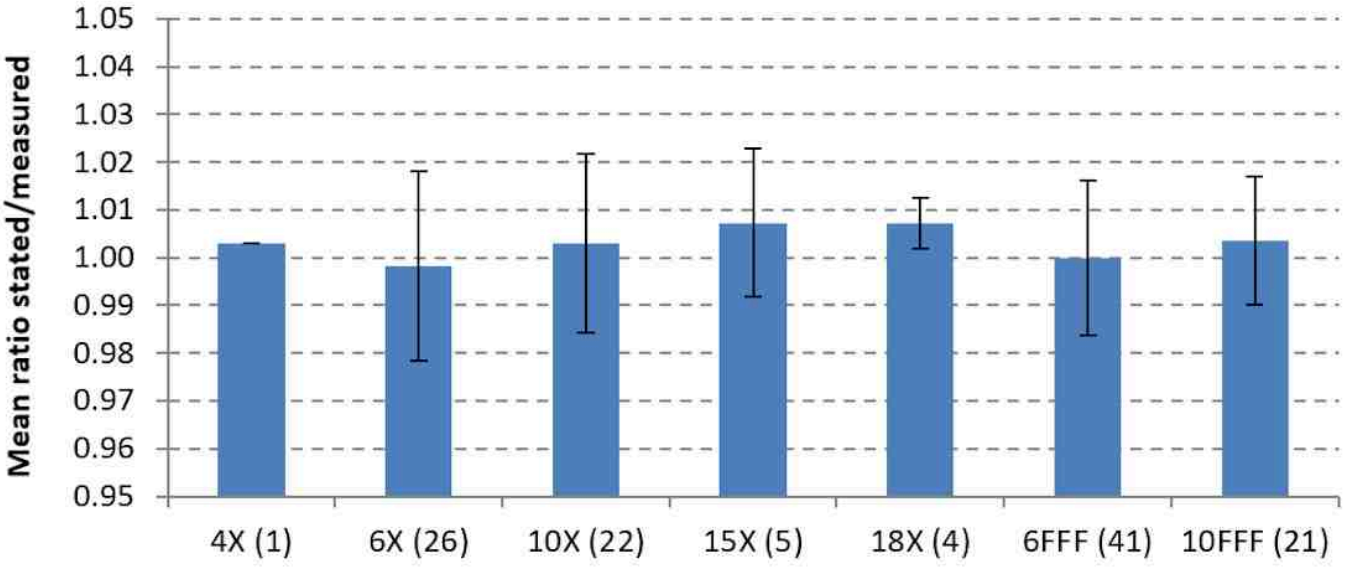


Figure 5: Photon beams: mean Ds/Dm ratio for the different radiation qualities. The number of beams is given in brackets. Error bars=std dev.

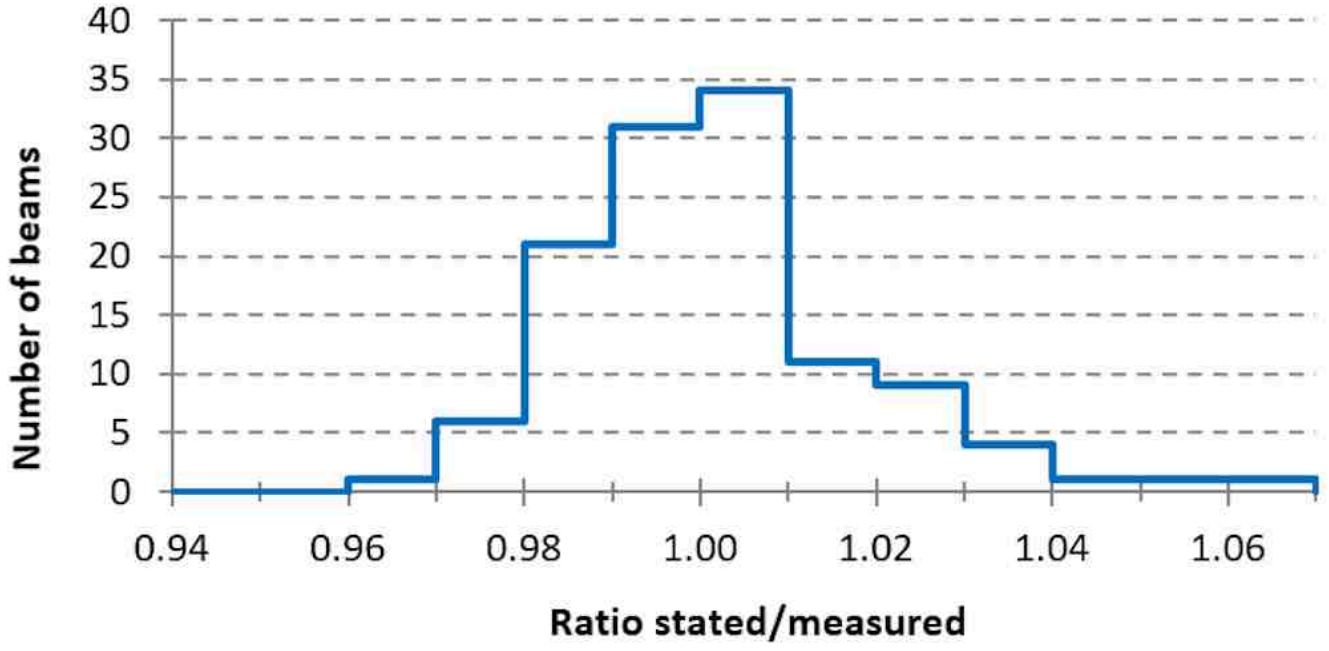


Figure 6: Histogram of Ds/Dm ratio for all 120 photon beams

Parameter	FF beams	FFF beams	Both types
Beam number	58	62	120
Mean	1.002	1.001	1.001
Std dev.	1.8%	1.5%	1.7%
Minimum	0.968	0.971	0.968
Maximum	1.062	1.054	1.062

Table 2: Ratio "stated dose/measured dose" (FF=conventional beams with flattening filter, FFF=flattening filter free beams)

Contribution	comment	Photons std unc.	Electrons std unc.
Positioning	± 1 mm	0.2%	0.2%
Cobalt irradiator calibration	-	1.05%	1.5%
Energy response of TLD	-	0.1%	1.0%
Stat. fluctuations of meas.TLD/ref.TLD	type A eval.	0.6%	0.6%
Non-linearity	all doses 1 Gy	0.05%	0.05%
Fading	t < 3 days	0.10%	0.10%

Table 3: Uncertainty budget for the absorbed dose measurement with TLD. The contributions are given at the level of one standard uncertainty.

Uncertainties

The uncertainty on the dose measured using TLD includes the contributions due to positioning of the phantom in the beam, reading procedure of TLD with all influence quantities and reference in absorbed dose traceable to METAS for the cobalt irradiator at IRA. The uncertainty budget is given in Table 3. The contribution coming from the procedure with reference TLD and measurement TLD was determined using a statistical method. The fluctuations of the ratio of three measurement TLD over ten reference TLD were analyzed for five irradiations of 300 TLD.

The combined standard uncertainty is obtained by quadratic summation.

For photons, it amounts to 1.23% for each measurement with 1 slab containing three TLD, and 1.16% for the mean of 2 such measurements.

For the expanded uncertainty we adopted only one figure of 2.5% (k=2) for simplicity.
Similarly, for electrons, the expanded uncertainty (k=2) is 4%.

Dosimetry protocol

All participants carried out the reference dosimetry using the SSRMP recommendations No. 8 and No. 10, or the IAEA TRS-398 protocol, apart from the CyberKnife (TRS-483), the Radixact and a linac dedicated to total body irradiation.

Reference dosimetry for FFF beams

The participants were asked if they corrected the dosimeter value for the effect of volume averaging during the reference dosimetry at the beam commissioning. According to IAEA TRS-483 protocol, the corrections to apply for FFF beams include in fact two contributions: the correction factor for the difference in water to air stopping-power ratio and the volume averaging correction factor. Eight participants applied such corrections for a conventional linac and for a PTW 30013 chamber. The reported first correction factor amounts to 0.999 for 6XFFF and to 0.997 for 10XFFF beams, and the second one amounts to 1.002 and 1.005 (mean values). One can see that these two corrections almost cancel out.
For a CyberKnife, two participants reported correction factors (mean value 1.009).

4. Discussion and conclusion

During the 2024 TLD dosimetry intercomparison, the dosimetry of 149 photon and electron beams has been checked.

For photon beams, 98% of the tested beams were within ±4% of the TLD dose and 81% were within ±2%. Only three beams out of 120 did not meet the satisfactory criterion of ±4%. In these cases, it was recommended that the dosimetry be verified with the reference dosimeter. This check did not reveal any errors.
For the 29 electron beams, all of them were within the criterion of ±6% and 79% were within ±3%.

We thank all the medical physicists for their participation and for their excellent collaboration.

08.08.2024
Thierry Buchillier and Claude Bailat
CHUV - Institut de radiophysique (IRA)
Rue du Grand-Pré 1
1007 Lausanne

Winter School in Medical Physics

Pichl (A), 10th-15th and 17th-22nd of March 2024

After pandemic and post-pandemic years with a "Summer Edition" in 2022 and a "Spring Edition" in 2023, the "Winterschule Pichl für Medizinische Physik" has returned to its original time frame in March. For the 35th edition of this successful, tri-nationally organized event taking place in the Ennstal close to the well-known ski resort of Schladming, participants from Austria, Germany and Switzerland were greeted with spring-like conditions. The warm temperatures had left little snow for skiing, which was a small disappointment for the ski-sports enthusiasts under the participants. The three great courses, organized by motivated course chairs with top-class speakers, easily made up for this.

Course 1: Nuclear Medicine

The Nuclear Medicine course week for medical physicists really didn't have a hard time this year. The course registrations already showed in advance that this topic is highly popular in the context of further education – across countries. The preliminary interest confirmed the "Kuratorium"s belief: The complex and profound topic of nuclear medicine is an important part of medicine, both diagnostically and therapeutically.

The program devised by the course chair, Univ.-Lektor DI Dr. Johannes Neuwirth, MSc, was tactically well planned. The course started on Monday with a light

State-of-the-art drone technology provides an incredible view of the neighboring mountain peaks.

meal – the basics of modern nuclear medicine. This was followed by the first highlight, radiobiology. One could easily dedicate an entire week to this subject alone. It was all the more exciting to see how colleague Lückerath managed to cover the topic concisely yet comprehensively. The subsequent discussion on diagnostic reference values by colleague Nekolla rounded off the first day.

On Tuesday, colleague Sporer provided deeper insights into the production and application of radiopharmaceuticals in diagnostics and therapy. Then colleague Blaickner shone with the core topic of patient dose estimation and the forward-looking aspects of AI.

On Wednesday, colleague Prenosil focused on quantitative imaging before colleague Dobrozemsky impressively demonstrated that the subject of detectors does not have to be boring or tedious. In the afternoon, colleague Staudenherz explained what state-of-the-art examinations entail and what nuclear medicine physicians actually expect and hope for from us medical physicists – pure excitement was guaranteed.

On the penultimate day, colleague Dobrozemsky excelled with one of his favorite topics, nuclear medicine quality assurance. Then colleague Birkfellner guest-lectured, focusing on DICOM and image evaluation. In the afternoon, colleague Dobrozemsky again took the stage, conducting an exciting comparison of discharge criteria in the DACH countries. Finally, colleague Stettner rounded off the day with experiences in structural radiation protection. It was clear that as a medical physicist, one should also feel comfortable with this topic.

The last day featured a live demonstration of decontamination, conducted in Seibersdorf – right there with the professionals on-site. Thanks to colleague Stolar for this – it was worth seeing and more than educational!

Finally, the white flag was raised, as all participants passed the exam. Congratulations from the Winter School “Kuratorium”.

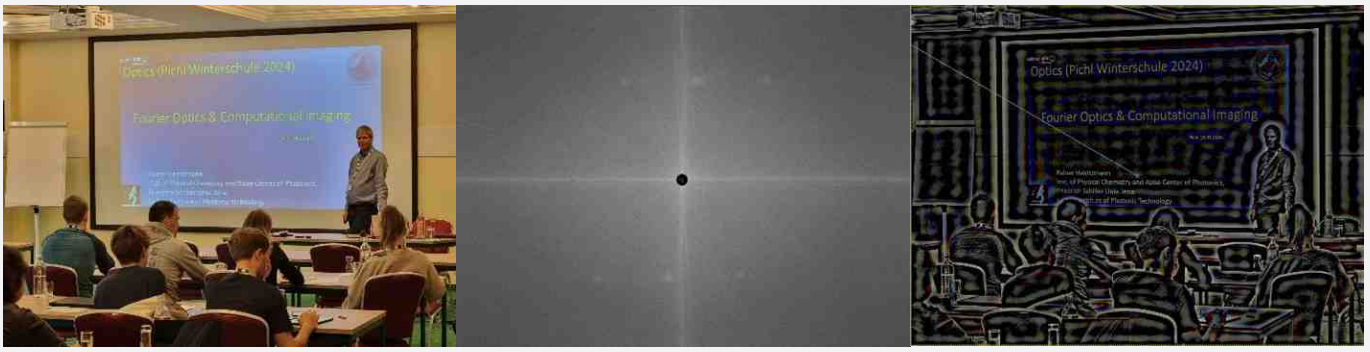
In retrospect, it was a short yet interesting week for both newcomers and experts in the field of nuclear medicine, made even more engaging and challenging for the lecturers due to the interesting questions from the course participants.
We are already looking forward to the next edition of "Nuclear Medicine in Medical Physics" at the Winter School in Pichl!

Andreas Stemberger
Kuratorium der Winterschule

In the second week, two courses shared the stage at the Winter School. A course in medical optics and a basic course in radiation therapy were held in parallel in two separate course rooms.

Course 2: Medical Optics

The Winter school on medical physics in Pichl is now a 30 years plus tradition. The courses at this wonderful location primarily address physicists who work or plan to work in the medical environment. However, the course program is also designed for other natural scientists, engineers and medical doctors.



Rainer Heintzmann during his lecture on "Fourier Optics & Computational Imaging". On the left the original image, in the middle the spatial frequency spectrum of the image with the DC component filtered out, on the right the high-pass image to illustrate the concept of Fourier optics.

The winter school was initiated by Prof. Rassow, pioneer in biomedical optics. Medical optics was from the beginning one course of the winter school. This year, after a five-year break due to the corona pandemic and the saddening death of Prof. Dr. Josef Bille last year, the course was revived by Dr. Gabriele Sroka-Perez, chair of the Winter School's "Kuratorium", Prof. Dr. Gereon Hüttmann and Dr. Norbert Linz from the Institute of Biomedical Optics at the University of Lübeck. Prof. Hüttmann has over 35 years of experience in the field of biomedical research, focusing in particular on novel medical imaging techniques and their translation into clinical practice, while Dr. Linz has been working for 20 years in the field of laser-tissue interaction.

The course started at Sunday evening and ran until Friday afternoon providing 30 hours of high-quality lectures on all important aspects of modern biomedical optics. Successful attendance is recognized by the Deutsche Gesellschaft für Medizinische Physik (DGMP), the Österreichische Gesellschaft für Medizinische Physik (ÖGMP) and the Schweizerische Gesellschaft für Strahlenbiologie und Medizinische Physik (SGSMP) as an integral part of basic and advanced training with the aim of obtaining and renewing specialist recognition in medical physics. The distinguished panel of speakers of this year's optics course came from Germany, Austria and Switzerland in accordance with the participating societies.

Speakers from Germany were Prof. Dr. Rainer Heintzmann (Institute of Physical Chemistry at the Friedrich Schiller University in Jena) an expert on microscopy and pioneer in super resolution microscopy, Prof. Dr. Alwin Kienle (Institute for Laser Technologies in Medicine and Metrology at the University of Ulm) expert on tissue optics and Prof. Dr. Alexander Schlaefer (Institute for Medical Technology and Intelligent Systems at the Hamburg University of Technology) who spoke on robotics. The international team of speakers was completed by Dr. Sabine Kling (Computer Aided Applications in Medicine working group at ETH Zurich) with a lecture on refractive surgery and Prof. Dr. Rainer Leitgeb (Center for Medical Physics and Biomedical Engineering at the Medical University of Vienna) an internationally recognized expert on OCT, who spoke about diffuse optical imaging and photoacoustics. From the Institute for Biomedical Optics in Lübeck Dipl.-Ing. Sebastian Freidank, Prof. Dr. Robert Huber, Dr. Norbert Linz

and Prof. Dr. Gereon Hüttmann gave talks on laser safety, light-tissue interaction and optical coherence tomography. Through a sponsorship agreement, Dr. Julian Weichsel from Heidelberg Engineering GmbH was also able to participate as a speaker and reported on ophthalmic imaging.

Most of the speakers were present for the entire duration of the lectures and thus enabled an intensive exchange with the twenty highly motivated participants of the course. Lectures in the morning and evening with a free afternoon allowed the speakers and participants to exchange scientific information and discuss topics from the lectures, develop new project ideas, but also get to know each other personally and even make friends.

Though the weather in the valley in mid-March would have been more suited to a spring school than a winter school, the lunch breaks included joint skiing, snow sledding and hiking excursions to the snow-covered peaks. The mountains also offered a fantastic view and, thanks to state-of-the-art drone technology, a magnificent overview of the neighboring summits. Special events and highlights were the social evening with a lively exchange with industrial representatives as well as speakers and participants of the parallel course "Radiotherapy" and a joint skittles evening, where not only "all nine" fell but also a "crown" was left standing to the great joy of all participants.

After a break of five years, the course "Medical Optics" course at the winter school in Pichl was rated by speakers and participants as a great success with an excellent scientific program, highly qualified and communicative speakers, as well as curious and motivated participants who exchanged ideas and certainly learned a lot. Everyone involved is already looking forward to the next winter school with a course in optics.

Prof. Dr. Gereon Hüttmann & Dr. Norbert Linz
course chairs

Left: joint social evening of the two courses Medical Optics and Radiotherapy with an overview lecture by Gereon Hüttmann on the history of optics and imaging in medicine and its impact on research, clinics and industry. Right: the participants of the optics course at a skittles evening.

Course 3: Radiation Therapy

The third course of the Pichl Winter School was dedicated to radiation therapy, with a particular emphasis on dosimetry this year. Chaired by Dr. Roger Hälg, who leads the medical physicist team at Kantonsspital Aarau in Switzerland, the course benefitted greatly from his extensive expertise and warm demeanor. The program was thoughtfully designed, offering engaging topics that catered to both beginners and experts. Roger also brought in outstanding speakers, including leading physicists and medical doctors.

To ensure all participants were on the same footing, the fundamental concepts of dosimetry were introduced by Univ.-Prof. Dr. DI Dietmar Georg, the chief physicist at AKH Vienna. Additionally, Markus Stock from MedAustron's proton therapy institute in Austria provided insights into particle therapy. The course concluded on Friday with a session by Samuel Peters from St. Gallen, highlighting the crucial role of informatics and IT systems in radiation oncology departments.

Beyond the informative lectures and sessions, Roger emphasized the social aspects of the Winter School in Pichl. The event offered a unique opportunity for networking and socializing, not only with industry partners during the midweek industry evening but

Dietmar Georg about to start one of his excellent talks.

also with colleagues from Switzerland, Germany, and Austria. Participants enjoyed sharing diverse perspectives and standard operating procedures. The schedule was designed to include a long lunch and afternoon break, allowing time for social activities.

Although skiing was limited due to warm weather, participants still enjoyed hikes and walks through the scenic area. The hotel's spa area also provided a relaxed setting for discussions on radiation therapy and other topics.

Overall, the Winter School in Pichl was a successful and informative experience. I am delighted to have been a part of it and am eagerly anticipating next year's program.

Klara Kefer
USZ

Winterschule Pichl 2025

The "Kuratorium" of the Winterschule for medical physics in Pichl, Austria is happy to announce the three courses for the Winterschule 2025:

1. Sunday, 02.03. - Friday, 07.03.25 **Strahlentherapie - Stereotaxie**
2. Sunday, 09.03. - Friday, 14.03.25 **Statistik und Epidemiologie - Advanced**
3. Sunday, 09.03. - Friday, 14.03.25 **Artificial Intelligence in der Medizinischen Bildverarbeitung**

You can get more information on the contents and register at https://www.winterschule-pichl.de/

French speaking medical physicists' day

Lausanne, 6th of June 2024

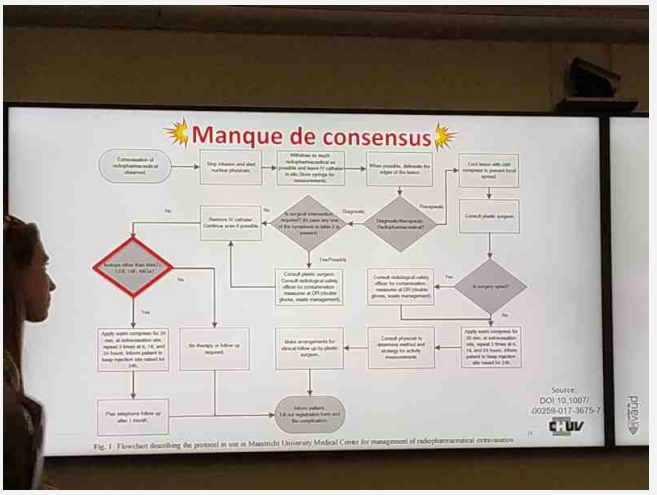
The 1st meeting of physicists from French-speaking Switzerland in 2024 took place on 6 June at the Clinique Bois-Cerf in Lausanne. After a warm welcome from Rachid Boucenna and a good time over pizza, it was time for scientific exchanges!

RadFormation's machine QA management solution arrives in Europe. Jarno Bouveret gave us very positive feedback on its implementation in his radiotherapy department. In the same vein, but concerning patient flow, Nikos Koutsouvelis showed us a fine example of collaboration between IT and physicists in implementing a dashboard to prioritise work efficiently. Similarly, Jean-Yves Ray gave feedback on the Mobius solution for double dose calculation, this time with a more mixed opinion.

After a presentation by his colleague Pierre-Alain Tercier on corrective factors for absolute dosimetry in FFF, Frédéric Miéville presented his work on dose calculation in the presence of metallic elements, such as hip prostheses. Since density override methods are no longer sufficient, given the day-to-day use of Monte Carlo or similar algorithms, he has developed a method based on a HU metric calculated on the planning CT to differentiate between titanium and stainless steel. This method, which is used routinely in his department, avoids errors of the order of 5 to 10% when the prosthesis is within the target volume. Still on the subject of radiotherapy, Tim Fluhmann presented the metrics used to trigger adaptive offline at the right moment for H&N treatments.

Two presentations were given on therapies that are a little more confidential for the moment. Nicolas Perichon presented the study plan for the intercomparison of the absolute and relative dose of Papillon treatment devices in which more than ten European departments will take part. And Gian Guyer reported on his work on the automated placement of spheres for the "lattice radiation therapy" technique. The results are more than promising and we should hear more and more about these new strategies.

Regarding nuclear medicine, Siria Medici told us about the extravasation of radiopharmaceutical products. An incident that is not widely reported, but which is quite common. Quantifying the dose received by the patient in this case is difficult, especially if the physicist arrives a little late in managing the incident. Or: when the physicist turns into a detective!



A good example of investigation job in the case of extravasation incident

We would like to thank Rachid Boucenna for organizing this day and all our colleagues for the quality of the presentations. These days are truly a platform for exchanging experiences both on the very daily aspect of our work and on more enjoyable scientific aspects.

The next day will be held at the Riviera Chablais hospital, we look forward to meeting our colleagues Sarah Ghandour, Olivier Pisaturo and Marc Pachoud in the fall!

Vera Magaddino
Marie Fargier-Voiron

Scientific days of the French Society of Medical Physics

Dijon, 12th of June - 14th of June 2024

The 62nd Scientific Days of the Société Française de Physique Médicale (SFPM) took place in Dijon from June 12th to 14th, 2024. This event brought together leading experts and researchers from the field of medical physics, offering a platform for insightful discussions and the presentation of cutting-edge research. Colleagues from the French-speaking part of Switzerland were also present, proudly representing the Swiss medical physics community and keeping us updated with the latest developments.

As usual, parallel sessions were organized, focusing on key areas such as radiotherapy, medical imaging, and nuclear medicine. The time allocated to imaging and radiotherapy was balanced, reflecting the importance of both fields. Notably, for the first time, the nuclear medicine seminar was officially accredited for continuous professional development (DPC), allowing attendees to earn continuing education credits. Additionally, a new session titled "My Thesis in 180 Seconds" (MT180) was introduced, allowing young researchers to present their work in a concise and engaging manner.

Radiotherapy

Several presentations covered a wide range of topics concerning radiotherapy:

- Technical advances in the optimization of deformable registrations and dose accumulations, although there are cases where these types of registrations may not work effectively.
- Quality assurance and evaluation of plan complexity parameters to predict the relevance of patient QA measurements.
- Feedback from the first peer audits conducted in France.
- Evaluations of the new generation of dose calculation algorithms.
- Assessment of scintillator dosimeters for applications in radiotherapy.
- Adaptive radiotherapy and AI auto-contouring.
- MR-only planning: challenges and QA.
- Automated planning.
- Technical developments for re-irradiations.
- Treatment management for pregnant women.
- New treatment techniques.

Medical Imaging

In the field of medical imaging, several interesting topics were presented:

- Imaging and molecular treatment for neuroendocrine and prostate cancers (^{177}Lu).
- Challenges encountered in the quantification of new alpha emitters.
- Photon counting CT.
- AI in imaging.
- CT perfusion imaging.

An intriguing topic was the tracking of cerebral fibers, which may help better predict and reduce the secondary effects linked to radiation therapy through plan optimization. Another highlight was the possibility of predicting plan complexity to decrease unnecessary plan QA measurements, which consume both staff and machine time.

A fascinating presentation focused on head and neck dosimetry using non-coplanar arcs. It appears that Dynamic Trajectory Radiotherapy (VMAT with a moving patient table) could become a reality in the future.

The future of total body irradiation (TBI) treatments was also discussed. Traditional TBI techniques and materials, such as in vivo diodes and detectors, are becoming increasingly scarce in the market. As a result, VMAT techniques combined with rotating tables and surface monitoring are emerging as attractive alternatives.

There were also compelling presentations on the irradiation of pregnant women and strategies to monitor and optimize fetal exposure to radiation. Notably, our Swiss colleague Marie Fargier-Voiron from Clinique de Genolier delivered a presentation titled "Implementation of Intracranial Stereotactic Radiotherapy in Tomohelical Technique: From Dosimetry to Treatment QA."

All the presentations are available for replay on YouTube:

1. https://www.youtube.com/watch?v=vjZN3A1OtCE
2. https://www.youtube.com/watch?v=RojOjRUNZks
3. https://www.youtube.com/watch?v=HMdKuEo67sA

Finally, a wonderful social event took place in a charming bar in the city center of Dijon, with great music and plenty of opportunities for constructive exchanges!

Misael Caloz
Nikolaos Koutsouvelis
Hôpitaux Universitaires de Genève

From Left to Right: Cedric De Marco, Marie Fargier-Voiron, Nikolaos Koutsouvelis, Misael Caloz

Swiss Congress of Radiology 2024

Geneve, 20th - 22nd of June 2024

Despite the strong clinical focus, the SCR confirmed itself as a multidisciplinary congress, with a strong and increasing presence of medical physicists. Similarly to ECR, two of the bigger topics were Photon-Counting CT (PCCT) and AI. Many interesting topics from the imaging domain were presented, complemented by the presence of several vendors. Many studies dealt with CT in a way or another, but US and MRI have also been the subject of several research studies; only Fluoroscopy seem to remain a separate field with a minority of presentations.

Photon-Counting CT

The use of PCCT is clearly expanding, with different groups exploring its clinical relevance in different sub-domains, e.g. abdominal exams, cardiovascular imaging or the presence of implants. PCCT has the potential not only to reduce the dose but also to improve temporal resolution and hence reduce motion artifacts. At the same time the fundamentals are also being tested – for example, do we really need three or more energy bins, and for which application?

Artificial Intelligence

Numerous presentations focused on the role of AI in radiology and nuclear medicine. AI plays an important role in improving image quality, reducing absorbed dose and injected contrast medium, increasing MRI magnetic field intensity and reducing administered activity. The applications of AI were not limited to image analysis but also document writing and processing of other clinical data, a field of research that received fresh impulse with the recent improvements in NLP models (ChatGPT & friends).

Radiation protection

The topics of dose alerts, skin dose and cumulative dose were again discussed in a session dedicated to radiation protection. With regard to cumulative dose, its actual treatment and the associated risks during several medical procedures are still somewhat undefined and subject of discussion.

Clinical sessions

It is always interesting to explore how the different imaging modalities are used in practice. One session on rheumatology covered the various challenges and techniques involved in the diagnosis of the different forms of arthritis and also gout, with US and Dual-Energy CT being the most recommended modalities. In the session devoted to thoracic imaging the clear star under the spotlight was AI, especially in combination with ultra-low-dose protocols.

Poster sessions

Contrarily to the ECR which went fully digital, the SCR still organizes “analog” sessions with printed presentations attached to temporary walls. It’s true that we are increasingly less used to print something year after year, at

SSRMP group picture (in ...two sessions!) for many of the medical physicists attending this year's congress

the same time the experience of visiting the poster area and talking with the authors standing is somehow more engaging than interacting with a 42" touch screen.
As for the topics, while PCCT applications were understandably the subject of several studies, many posters investigated more conventional and physics-related topics like shielding or dose estimations. In terms of relevance the poster area was definitely on par with the other sessions.

Anaïs Viry, CHUV
Davide Cester, USZ

Interview: Medical Physicists abroad

Country: Brazil

Capital: Brasilia
Official language: Portuguese
Population: 211 million inhabitants

In the last issue we promised that we would have come back to the Alps, and therefore we have a small change to our format: this time Switzerland is the foreign country! We met ***Stéfani Nogueira*** from Brazil, who completed an internship in Luzern this summer.

Davide Cester: Hello Stéfani, thank you for sharing your experience with us! My first question is a the most obvious one: what has brought you to Switzerland?

Stéfani: Hi! In Brazil I am completing my 2-year residency at the National Institute for Cancer (INCA) in Rio de Janeiro specializing in radiodiagnostics and nuclear medicine, with one year dedicated to each area. However, I have a particular affection for nuclear medicine, as it allows me to work on both diagnosis and treatment. In this context I had the opportunity to spend a few weeks at LUKS, with an internship on patient dosimetry.

D: Is it the first time you come to Switzerland?

S: Actually, I've been here previously a few times as a tourist. I must say, I always loved it! There are of course many differences with Brazil, the most striking one for me was… the seasons! I grew up in a tropical country, and in the state of São Paulo, the climate is more uniform with few changes throughout the year, here close to the Alps the changes between summer and winter are really impressive. But in any season the landscape is beautiful, and one can find countless options for spending free time.

And how was your experience during your internship? Is there anything that surprised you particularly?

S: Oh, it was great! My work was mainly focused on dosimetry in the context of cancer therapy with 177-Lutetium-PSMA, but I also had the opportunity to work with dosimetry involving Y-90 which was interesting because we are not using it in my Institute. On the technical side, I couldn't help but notice that most of the devices

Stéfani on her last day of internship at LUKS

I have seen in Switzerland are of the last generation, this surely will have a positive impact on the quality. From the point of view of a medical physicist the bigger difference I found is the emphasis on patient dosimetry, dose levels and protocol optimization that you have here.

In Brazil, protocol optimization is not typically part of a Medical Physicist's work routine, the core of our work is -
represented by QA; and the QA itself is mostly device-oriented, with no internal dosimetry, which is not mandated by law. For example, a patient who underwent therapy with Iodine can leave and just come back after four days for a follow-up, with no dose simulation performed.

D: This is interesting, and reminds me that in the SSRMP we currently have two Working Groups discussing the roles and the tasks of medical physicists in the clinics… could you tell us more about it?

S: To begin with, as MP we have generally no contacts with the patients, with few exceptions. During a residency in the nuclear medicine sector, this may happen, but it is not mandatory. By law, for patients to be released from therapy, there must be written agreement from both the nuclear physician and the Radiation Protection Supervisor (MP). However, this does not necessarily mean that the MP personally releases the patient.

At least one certified medical physicist has to be involved for a certain site; the limits are not calculated on the number of devices, rather on the number of overseen sites and the services offered; the workload is measured in h/week and the total must not be greater than the official contract workload. Example: one MP with a 40 h/week contract could supervise two sites with nuclear medicine therapy (2 x 16 h/week) and one site with PET/CT and SPECT/CT (8 h/week) but not three sites with therapy. In diagnostic imaging there are no such limits.

Regarding the daily work, as said we have this strong focus on device QA, which has to be done periodically depending on the type of device and application. The QA of Ultrasound and MRI devices is also mandatory and it can happen that they are performed by MPs, although this is not explicitly required by the law. Similarly to Switzerland, maintenance and QA can be performed by external companies which are awarded contracts by the hospitals, but there is a fun fact: it is common that these companies are founded and run by medical physicists!

D: That is an additional career path, indeed! Speaking of career, what is the educational path required to become a MP in Brazil?

S: We start with a 5-year university program,that can be either physics only or medical physics. In my case, I studied medical physics. In my university program, the first three years covered general physics and associated subjects, and the last two focused on medical physics. At the University of São Paulo (USP), where I graduated, the program does not end with a thesis, but with 300 hours of internship usually completed in the last six months.
Despite the overall length, I discovered that this degree would only be recognized as a Bachelor in the European system, so in the case I wanted to get certified in Switzerland I would first have to obtain a title equivalent to an European Master degree.

D: Five years for a Bachelor sound like a lot. Can one immediately start to work?

S: Yes, after the 5-year program one can be hired by a hospital or clinic and begin the professional career, but this is not the most common path, because you are allowed to work with devices but you are not authorized to assume any legal responsibilities. The preferred path continues with a 2-year residency, like I am doing right now, which will lead to a specialization title and the accreditation exam. This accreditation in turn results in better contracts being offered by the clinics.
In principle one could get the accreditation right after the five years, after having worked a minimum amount of hours with the devices and passing the exam, but most try to go through the residency which also automatically covers the device time requirement.
There are also MSc and PhD programs in Medical Physics, but it is not a requirement to actually work as medical physicist.

D: Who is administering the exam? Is there an equivalent of the SSRMP?

S: Everything related to radioactivity in Brazil falls under the jurisdiction of the National Commission on Atomic Energy (CNEN). The CNEN sets all the regulations for the nuclear industry, of which the use of radioactive sources in healthcare can be considered a branch, and this includes the organization of the accreditation exam. The exam is relatively expensive and the title must be renewed every five years; for this a job as medical physicist with a pensum of 50% FTE is sufficient.
The CNEN awards specialization titles for radiotherapy and nuclear medicine but not diagnostic imaging. There is also the Brazilian Association of Medical Physics (ABFM) which awards certificates in Radiotherapy, Nuclear Medicine and also Radiology, however these certificates are not equivalent to CNEN titles which are the ones required by the law.
In general, the asymmetries in regulations and titles that the entire medical physics profession has in Brazil are largely due to the fact that it is a relatively recent career. The situation has already improved: until a few years ago there were no residency program but rather a two year unpaid specialization, and of course this made the access to the profession quite hard.

D: How is the residency organized?

S: Well, the workload for these two years is fixed to 60 hours per week, based on shifts, with 30 mandatory vacation days (this number includes weekends). It is an intensive program! But at least it is temporary: the standard workload after the specialization is lower, usually 44 h/week but it can change depending on actual the contract.

By law at least 20% of the residency duration must be spent in classes, the rest is clinical work. While the actual content of the courses depends on the host institute, the topics are not covering medical physics alone, because the concept of residency is quite multidisciplinary. INCA offers courses in 9 different professional specializations covering various aspects of healthcare, as bioethics, health management or public health policies. I find this approach very stimulating, because our normal work is very focused on the technical side of diagnosis and therapy and it is good to learn about the entire system behind each treatment.

Residents from the imaging department performing image quality tests at INCA

In the context of cancer therapy we have regular discussions on real cases; social aspects of care are always taken into account and have a relevant weight in the decision process compared to medical considerations alone: there is no point in planning a treatment path that the patient will be unable to follow due to costs, family situation or other constraints.

D: Is it a frequent issue, that patients can't follow the optimal therapy?

S: Yes, unfortunately it is not rare. The most common reason is of course economical, some patients simply can't afford the overall costs of the treatment. Brazil has a public healthcare system and the Government covers the basic costs of cancer therapy at the hospitals, however there are a lot of "out-of-pocket costs" that patients might have to pay by themselves, like transportation to the clinics or accommodation, additional care or medical supplies. All these costs can account for a significant part of the patient's salary. Additional private insurance is also available in Brazil, but it is not mandatory and for the same economical reasons many citizens don't have one.

For us as a multidisciplinary team, the challenge at the moment of the planning is to take the individual situation of each patient into account, and determine the best treatment path which can actually be followed through. And this is one

of the aspects that we really learn during a residency, by being involved with real cases.

D: You are in the second year of the residency and the your certification is getting closer... we wish you the very best for your exam. Are you already thinking of the next steps?

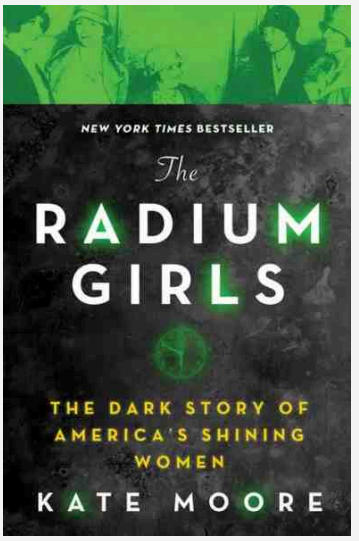
S: Thank you! Well, after the internship I have to go back right away, because the work is waiting and I have a lot of work to do! The next step for me is the accreditation exam, and regarding the future... I don't know yet, I have a couple ideas in my mind – we'll see!

Links:

- INCA: https://www.gov.br/inca/pt-br
- CNEN: https://www.gov.br/cnen/pt-br
- ABFM: https://www.abfm.org.br/

Residents from the medical physics program (radiodiagnosis and radiotherapy) and dosimetry at INCA

Kate Moore
Radium Girls (2016)



At the time when radiactive substances could be normally found in commercial products, one of the best-selling items was a type of watches that could be read in the night, where the digits and the hands of the clocks were covered with radium paint to make them glow in the dark. Although other methods were available, the radium paint was usually applied with tiny brushes by skilled female workers, in one of the few jobs available for women at the time; and these workers were taught to constantly wet the brushes with their lips in order to make them sharper and increase the production quality.
As a direct consequence, most of the women working in these factories developed some kind of pathology, often fatal.

The book follows the story of a few of these women, from their healthy years to the long legal battles that followed the appearance and worsening of the symptoms. The fifty-five short chapters provide a chronological account of the events, mostly focusing on private lives and the legal proceedings, but also describing the scientific context of the period and the evolution of the medical knowledge about radiation. To some extent, the reader will witness the birth of the radiological branch of occupational medicine.

For additional accounts of the events we can also recommend the following sources:

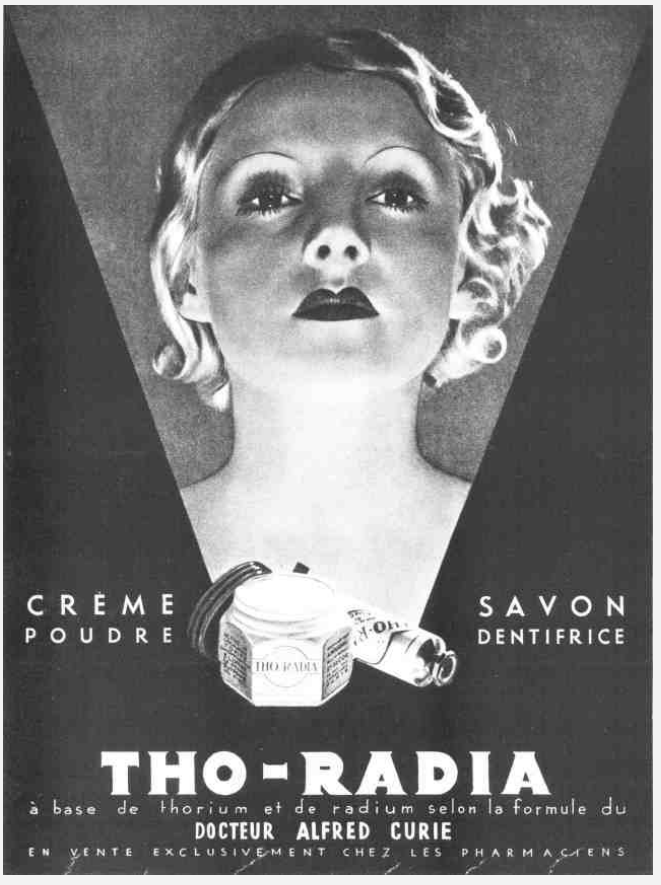
- Bert M. Coursey, *The National Bureau of Standards and the Radium Dial Painters* (https://doi.org/10.6028/jres.126.051)
- Elizabeth Richter, *The Radium Dial Painters: Workers' Rights, Scientific Testing, and the Fight for Humane Treatment* (https://digitalcommons.hamline.edu/dhp/74)

Davide and Marie *(next pages as well)*

The "Radium Fad"

Radioactivity as a commercial product

At the beginning of the XX century radioactivity was seen as one of the triumphs of scientific progress, and it quickly acquired a baseless but positive reputation regarding its potential effects on health. Substances containing radioactive isotopes started to be used in consumer goods like beauty products, energetic food, toothpaste, and even educational toys aimed at introducing kids to the atomic sciences. The enthusiasm for this novelty grew to the point that companies were named after elements (like the american RadiThor or the French Tho-Radia) in a process that today is popularly known as "*Radium Fad*". It did not take long for the negative effects of the radioactive exposure to appear; the first severe cases to be documented, however, did not involve general customers but the special group of workers known as the "Radium Girls".
Consumer goods containing radioactive materials were legally sold in the USA and Europe until the early 1960es.

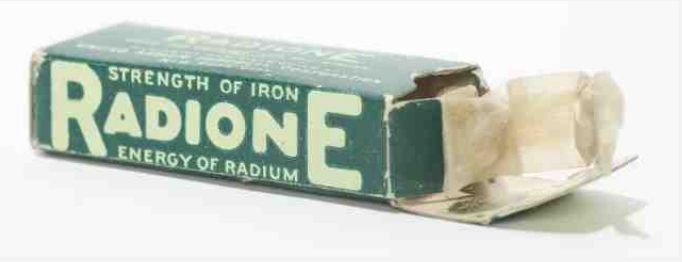


ate charge consultation free.

Radium, King of Cures.

WE have genuine radium sulphate, the wonderful element that cleans out disease of catarrh, T. B., cancers, asthma, rheumatism, kidney, spine, tumors, ulcers, nervousness, pyorrhea, rectum, prostate and female troubles, dropsy, sciatica, heart, stomach, liver, etc., and strengthens every organ in the body. It positively will do it and it remains good forever. Ours is the only Radium sold directly to the sick for treatment by themselves. You try it at our risk. Free booklet. International Radium Co., 156 North Spring St., Los Angeles, Cal.

RADIUM, king of cures; if you are sick and want to get well, write for literature; wonderful, guaranteed. Allie Brown, York, Pa.



Occupational Medicine and Radiation in the 1920s

Understanding radioactive incorporation and how to measure it

Modern-day Medical Phycisists are well familiar with the concept of incorporation risk when dealing with open radioactive sources: we have well-established legislation, procedures, training courses, monitoring detectors and simulation models, all regularly updated.
None of it existed 100 years ago, when the Radium Girls were still painting their dials. Radium and other industrial isotopes were considered unharmful, if not beneficial, even by the medical community; the industrial and commercial use of open sources was basically unregulated, no legal precedent had been set, and radiation safety was not yet a branch of occupational medicine, itself a discipline in its infancy at the time. This was soon going to change. The successful lawsuits against the clock manufacturers, together with an increasing press coverage of the topic, would soon lead to an increased awareness by the general public in the USA and the promulgation of regulations concerning the use of radiactive substances.

Before any scientific discussion on health effects could be started, however, one had to be able to measure the extent of a suspected contamination, and the doctors investigating the first cases of "radium poisoning" had to develop their protocols from scratch. This is an excerpt from the book describing the first measurements taking place in 1925:

Martland wanted to test the two women to see if radium was the cause of their illnesses – but the only tests he knew [...] required burning bone to ash. You couldn't very well do that with living patients. It was von Sochocky who came up with the answer. If the women were radioactive, all they had to do was devise some tests to prove it. These tests, which would be honed and largely invented by Drs Martland and von Sochocky, were created specifically to test the dial-painters' bodies. No physician had ever attempted to test living patients in this way before. Later, Martland would discover that a specialist had done something similar before him, but in June 1925, with the clock running down on Marguerite Carlough, he innovated the tests knowing nothing of the other scientist's work. [...]

The pair devised two methods: the gamma-ray test, which involved sitting the patient before an electroscope to read the gamma radiation coming from the skeleton, and the expired-air method, whereby the patient blew through a series of bottles into an electroscope so that the amount of radon could be measured. This latter was born from the idea that, as radium decayed into the gas radon, if radium was present in the girls' jawbones, the toxic gas might be exhaled as they breathed out. [...]

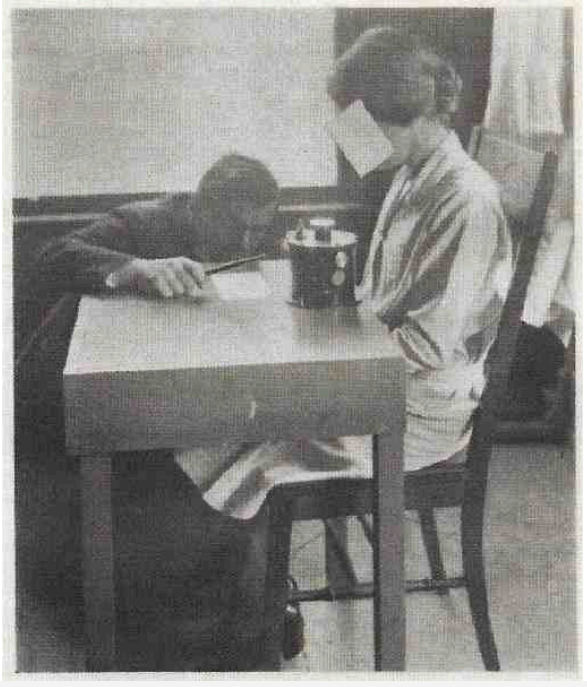
[Months later] There was one final test that Martland now conducted. 'I then took from Mrs Maillefer,' he remembered, 'portions of the femur and other bones and placed dental films over them [...] and left them in a dark room in a box'. [...] Within sixty hours, Sarah's bones caused exposure on the film: white fog-like patches against the ebony black.

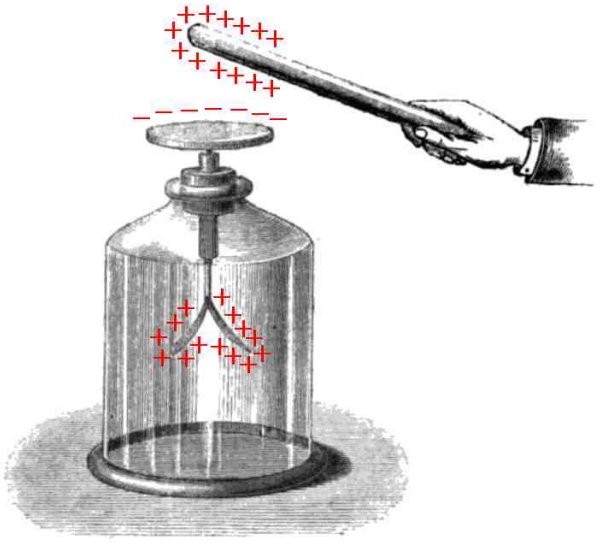
Kate Moore, Radium Girls

A different examination took place in 1928:

> *Shortly after this examination, at the suggestion of von Sochocky, Mrs. Hughes prepared screens of pure phosphorescent zinc sulphide uncontaminated by radioactive substances. After these had been examined in the dark room for scintillations, with negative results, each girl blew her expired air over these screens beneath the microscope. Scintillation from the presence of alpha particles was easily demonstrated in all five cases, proving beyond a doubt that they had deposits of radioactive substances in their bodies, which were giving off emanation.*
>
> *Martland HS (1929) Radium Poisoning. Occupational poisoning in the manufacture of luminous watch dials. Monthly Labor Review, U.S. Bureau of Labor Statistics 28(6):62–95. https://doi.org/10.6028/jres.126.051*

Despite being rudimentary and somehow improvised, the results of these exams were successfully used in courts. The makeshift breath-in electroscope could probably be considered the "grand-grandfather" of the modern thyroid monitors.





Left: measurement by the gamma-ray method (USPHS) 1933; right: diagram of an electroscope.

Credited as being the inventor of the radium paint, Dr. Sabin Arnold von Sochocky himself died of radium poisoning in 1928, after contributing to the first medical investigations of the cases.

Image sources: NIST, Wikipedia / Creative Commons

Off-duty

Hidden message!

C	N	R	K	P	R	O	T	O	N	Y	A
O	O	A	E	E	D	O	N	T	W	P	C
M	T	D	O	I	R	R	R	Y	W	A	C
P	O	I	E	A	R	M	R	E	M	R	E
T	H	A	E	D	I	U	A	C	A	E	L
O	P	T	R	A	E	L	C	U	N	H	E
N	L	I	N	E	G	T	N	O	R	T	R
Y	G	O	L	O	I	D	A	R	P	O	A
H	Y	N	G	Y	G	R	E	N	E	I	T
S	I	R	E	C	N	E	U	L	F	D	O
C	A	B	R	A	G	G	I	S	T	A	R
Y	E	L	E	C	T	R	O	N	S	R	S

This puzzle is a word search puzzle that has a hidden message in it. First find all the words in the list. Words can go in any direction and share letters as well as cross over each other. Once you find all the words, copy the unused letters starting in the top left corner into the blanks to reveal the hidden message:

'___ _ _____ __ ___ _____ _____!

accelerator
bragg
compton
curie
electrons
energy
fluence
gray
kerma
nuclear
photon
proton
radiation
radiology
radiotherapy
rontgen

Solution of the previous game:

1. Nuclear power plant – Iodine tablets
2. Lead vest – Lead glasses
3. CTDI Phantom – Ionization chamber
4. Linac – DVH plot
5. MG unit – PMMA phantom
6. US probe – US scan
7. MobileX-ray – Wireless detector
8. Reading room – Dictation
9. NUK Vial – CoMo detector

Word: LASER BEAM :-)

Editorial staff and Information

Impressum

Bulletin editors

bulletin@ssrpm.ch

Davide Cester
Inst. für Diagn. und Int. Radiologie
UniversitätsSpital Zürich (USZ)
Rämistrasse 100
8091 Zürich

Marie Fargier-Voiron
Clinique de Genolier
Route du Muids 3
1272 Genolier

Website editors

webmaster@ssrpm.ch

Anisoara Socoliuc Toquant
Hôpital de La Tour
Av. J.-D.-Maillard 3
1217 Meyrin

Lotte Wilke
Klinik für Radio-Onkologie
UniversitätsSpital Zürich (USZ)
Rämistrasse 100
8091 Zürich

Head editor

yvonne.kaeser@physmed.ch

Yvonne Käser
PhysMed Consulting GmbH
Kleindorfstrasse 12a
8707 Uetikon a. S.
079 453 99 02

SSRMP Secretary

Véronique Vallet
Institut de Radiophysique
Rue du Grand-Pré
1007 Lausanne
veronique.vallet@chuv.ch

Publisher

SGSMP/SSRPM/SSRFM
Schweizerische Gesellschaft
für Strahlenbiologie und
Medizinische Physik
www.ssrpm.ch

Printing Press

Valmedia AG
Pomonastrasse 12
3930 Visp
www.mengisgruppe.ch

Call for Authors

You are all invited to participate in the construction of our Bulletins.
Of desirability are all contributions that could be of interest to members of our society, such as

- Reports of conferences, working group meetings, seminars, etc.
- Reports on the work of various committees and commissions
- Succinct results of surveys, comparative measurements etc.
- Short portraits of individual institutions (E.g. apparatus equipment, priorities of work, etc.)
- Reports on national and international recommendations
- Short Press Releases
- Photos
- Cartoons & caricatures
- Announcement of publications (E.g. books, magazines)
- Announcement of all kinds of events (E.g. conferences, seminars, etc.)
- Short articles worth reading from newspapers or magazines (if possible in the original)
- Member updates (E.g. appointments, change of jobs, etc.)

The easiest way to send your document is as DOCX or ODT document via email to **bulletin@ssrpm.ch**.

Deadline for submissions to Bulletin No. 110 (Jan 2025): 13.12.2024

SSRMP Board

Board members

PhD	**Marta Sans Merce** President marta.sansmerce@hug.ch	Hôpitaux Universitaires de Genève Département diagnostique Service de Radiologie Rue Gabrielle-Perret-Gentil 4 1205 Genève	079 553 35 06
MSc.	**Yvonne Käser** Chair Professional Affairs yvonne.kaeser@physmed.ch	PhysMed Consulting GmbH Kleindorfstrasse 12a 8707 Uetikon a. S.	079 453 99 02
PhD	**Maud Jaccard** Chair Science Committee mjaccard@genolier.net	Clinique de Genolier, Route du Muids 3 1272 Genolier Clinique Générale-Beaulieu Chemin de Beau-Soleil 20 1206 Genève	079 207 49 72
Dr. sc. nat.	**Jérôme Krayenbühl** Chair Education Committee jerome.krayenbuehl@usz.ch	Klinik für Radio-Onkologie Universitätsspital Zürich Rämistrasse 100 8091 Zürich	044 255 32 49
Prof.	**Michael Fix** Vice President michael.fix@insel.ch	Abteilung für Medizinische Strahlenphysik Inselspital - Universität Bern 3010 Bern	031 632 21 19 031 632 24 29 031 632 21 11 031 632 26 76
MSc.	**Regina Seiler** Treasurer regina.seiler@luks.ch	Radio-Onkologie Luzerner Kantonsspital Spitalstrasse 6000 Luzern 16	041 205 58 07 041 205 58 11
PhD	**Véronique Vallet** Secretary veronique.vallet@chuv.ch	Institut de Radiophysique Rue du Grand-Pré 1007 Lausanne	079 556 02 08
Dr. sc. nat.	**Stefano Gianolini** stefano@gianolini.ch	Medical Software Solutions GmbH Holzwiesstrasse 48 8703 Erlenbach	076 747 00 72
Dr. phil. II	**Roman Menz** roman.menz@usb.ch	Radiologische Physik Universitätsspital Basel Petersgraben 4 4031 Basel	061 328 73 14
PhD	**Margherita Casiraghi** margherita.casiraghi@eoc.ch	Servizio di Fisica Medica, Istituto Imaging della Svizzera Italiana Ente Ospedaliero Cantonale 6500 Bellinzona	091 811 85 30
PhD	**Thiago VM Lima** thiago.lima@luks.ch	Radiologie und Nuklearmedzin, Luzerner Kantonsspital, Spitalstrasse 16 6000 Luzern	041 205 63 78

Event Calendar

Sep 11 Munich, D	5th ECMP - Joint Conference of the DGMP, ÖGMP & SGSMP Sep 11 - Sep 14 https://ecmp2024.org/
Sep 19 **Campus Sursee**	28th Annual SASRO Meeting 2024 Sep 19 - Sep 21 https://www.sasro.ch/home-2024
Sep 19 Konstanz, DE	R3 Imaging 2024 Sep 19 - Sep 21 https://www.r3-imaging.org
Sep 30 Konstanz, DE	R3-MP: Medizinphysik Summit Sep 20 https://www.r3-imaging.org/medizinphysik
Oct 14-19 Durham, USA	Joint IAEA / Argonne NL training on CT physics and optimization Dec 14 - 19 https://international.anl.gov/Training/indexH10.asp
Nov 22 **Lausanne**	SSRMP CE day: "*From Conventional CT to spectral CT: Technical perspectives for radiology and radiation therapy*" Nov 22
Nov 22 **Lausanne**	SSRMP General Assembly Nov 22 https://ssrpm.ch/events/
Dec 01 Chicago, USA	RSNA 2024 Dec 01 - 05 https://www.rsna.org/annual-meeting
Dec 04 Rome, I	4th Flash Radiotherapy and Particle Therapy Conference Dec 04 - 06 https://frpt-conference.org/
Dec 16 **Bern**	SSRMP AMP Meeting Dec 16, 9:30 - 12:30 https://ssrpm.ch/events/
Mar 02 Pichl, A	Winterschule Pichl für medizinische Physik 2025 Mar 02 - 07 and Mar 09 - 14 https://www.winterschule-pichl.de/

And please, if you participate in any conference or meeting, think of writing a few lines or sending a picture for the Bulletin.

THANK YOU!