



## Workshop on X-ray imaging dosimetry

Programme draft: 2024-10-03 (subject to changes)  
Place: Helsinki university hospital, Finland  
When: 20 – 22 November 2024  
Workshop hotel: [Scandic Meilahti](#)  
Linked with the EURAMET 22NRM01 TraMeXI -project  
More information: <https://tramexi.com/workshop/>

### Wednesday: 20 November 2024

#### X-ray dosimetry fundamentals and codes of practice

Lunch (not included)

##### **12:00 – 12:10 Welcome**

- Dosimetry as a bridge to overall beam characterisation (10 min)  
*Mika Kortensniemi HUS and Paula Toroi, HUS/STUK, Finland*

##### **12:10 - 13:15 Dosimetry equipment principles and operation**

- 12:10 – 12:30 Ionization chambers (ICs) and X-ray multimeters (XMMs) (20 min)  
*Stefan Pojtinger, PTB, Germany*
  - Principles, performance
- 12:30 – 12:50 Quantities and parameters beyond air kerma (20 min)  
*Milos Zivanovic, VINS, Serbia and Markus Borowski, SKBS, Germany*
  - Measurement of tube voltage related quantities
  - Other quantities
- 12:50 – 13:05 Calibration and metrology (15 min)  
*Leon de Prez, VSL, the Netherlands*
  - Primary standards, calibration conditions, assumptions, certificate
- Discussion (10 min)

Coffee break 13:15-13:45

##### **13:45 - 15:25 Developments in mammography dosimetry**

- 13:45 – 14:45 New CoP: EFOMP-AAPM breast dosimetry protocol (60 min)  
*Ioannis Sechopoulos, the Netherlands*
  - Dosimetry model
  - Measurement of air kerma
    - Standard, contrast-enhanced and tomosynthesis

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- Determination of AGD
- 14:45 - 15:05 Novel radiation qualities and spectra measurements (20 min)  
*Elisabeth Salomon, PTB, Germany*
  - Range of radiation qualities
  - Spectrometry methods
  - XMM results
- 15:05 – 15:15 XMM results in mammography (10 min)  
*Andrea Kojic, VINS, Serbia*
- Discussion (10 min)

*Break 15:25-15:45*

**15:45 – 17:00 Introduction on imaging modality specific measurement procedures**

- 15:45 – 16:10 Overall introduction (25 min)  
*Luigi Rinaldi, OPBG, Italy*
  - General measurement protocols, TRS-457
  - Conventional projection X-ray
  - What will change when XMMs are used instead of IC
- 16:10 – 16:30 Interventional (including C-arms, CBCT), (20 min)  
*Jouni Uusi-Simola, HUS, Finland*
- 16:30 – 16:50 CT (including wide beams) (20 min)  
*Mika Kortensniemi, HUS, Finland*
- Discussion (10 min)

**17:00 – 18:00 Dosimetry companies presenting their products**

- List later... (5-10 min each)
- Discussion 10 min

*Social event 19:00 –*

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## Thursday: 21 November 2024

### Practical approach and uncertainties

#### 9:00 – 10:30 Patient specific dosimetry

- 9:00 – 9:20 What is patient dose? (20 min)  
*Bente Konst, Vestfold, Norway and Linköping, Sweden*
  - Measurable quantity vrs. Organ doses
- 9:20 – 9:50 MC simulations: skin dose in interventional radiology (30 min)  
*Jonas Andersson, University of Umeå, Sweden*
- 9:50 – 10:20 Use of AI in dosimetry (30 min)  
*Satu Inkinen, HUS, Finland*
- Discussion (10 min)

Coffee break 10:30-11:00

#### 11:00 – 12:10 Uncertainties

- 11:00 – 11:20 Theory and practice for air kerma and HVL (20 min)  
*Aino Tietäväinen, STUK, Finland*
- 11:20 – 11:40 Practical example for clinical measurements (20 min)  
*Niko Kiiskinen, HUS, Finland*
- 11:40 – 12:00 Practical example for skin dose (20 min)  
*Jonas Andersson, University of Umeå, Sweden*
- Discussion 10 min

Lunch break 12:10 – 14:00

- Long lunch break with a walk outside

#### 14:00 – 14:30 Raptor visit

#### 14:30 – 18:00 Practical exercises

- 14:30 – 17:00 Practical exercises (live video connection+other material)
  - Measurement group: 1 with camera, 2 persons measuring.
    - 14:40 – 15:20 Conventional 25 min video+15 min for the analysis of results  
*Juha Peltonen, Jenna Tarvonen, 5 backstage participants*
    - 15:25 – 16:05 Mammography 25 min video+15 min for the analysis of results  
*Anne-Mari Vitikainen, Jenna Tarvonen, 5 backstage participants*
    - 16:10 – 16:50 Interventional 25 min video+15 min for the analysis of results  
*Touko Kaasalainen, Jenna Tarvonen, 5 backstage participants*
  - Moderators: *Mika Kortnesniemi* (at lecture room), *Paula Toroi* (at site)
  - Short breaks between
- 17:00 – 18:00 Practical: calculation of uncertainties  
*Paula Toroi, Aino Tietäväinen, Niko Kiiskinen*
  - Using the data collected in the practical session
  - Additional data from TraMeXI group

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## Friday: 22 November 2024

### Plans for future: targets and aims

#### **9:00 – 9:50 Current status of dosimetry**

- 9:00 – 9:20 Short introduction to current situation (20 min)  
*Miloš Živanović, VINS, Serbia and Markus Borowski, SKBS, Germany*
  - Why we do dosimetry?
  - How we use dosimetric data?
  - What are current target uncertainties and why?
  - What is expected clinically?
  - What is currently provided by the manufacturers and calibration laboratories?
- 9:20 – 9:40 How to use calibration certificates in clinical practice (20 min)  
*Nikola Kržanović, VINS, Serbia / Paula Toroi, STUK/HUS, Finland*
- Discussion 10 min

*Short break 09:50 – 10:00*

#### **10:00 – 11:00 Deep learning-powered multimodality medical imaging**

- Invited lecture  
*Prof. Habib Zaidi, Geneva, Switzerland*

*Coffee break 11:00 - 11:30*

#### **11:30 – 13:00 New aim for the future**

- 11:30 – 12:00 Update of Code of Practice (30 min)  
*Miloš Živanović, VINS, Serbia*
  - What changes are proposed?
  - Summary of discussions on practical sessions
- 12:00 – 13:00 Discussion  
*Moderators: Miloš Živanović, VINS, Serbia and Markus Borowski, SKBS, Germany*
  - Feedback on update of protocols (to TraMeXI consortium)
  - What should be the target uncertainty?
  - What is clinically needed?
  - What is expected for different purposes (QA, research, optimization)?
- Conclusions and Farewell (10 min)  
*Mika Kortnesniemi HUS and Paula Toroi, HUS/STUK, Finland*

The workshop ends.

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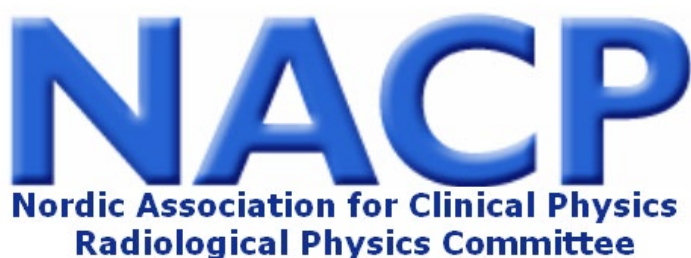
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To be added later

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