M9 Progress Meeting of EMPIR 18HLT04

"Metrology for advanced radiotherapy using particle beams with ultra-high pulse dose rates"

24th June 2020

Virtual meeting held by NPL via Microsoft Teams

AGENDA

Start at 10.00 CET

10.00 -11.00 Introduction (60 min)

1. Opening and welcome (**Anna Subiel**, 5 min)
2. Overview of the project (**Andreas Schüller**, 15 min)
3. Introduction round (**All**, 20 min)
4. Introduction of new Partners and Collaborators
   - IBA (**Séverine Rossomme**, 5 min)
   - Sun Nuclear (**Andreas Schönfeld**, 5 min)
   - Varian (**Simon Busold** and **Michael Schillo**, 5 min)
   - LPC (**Samuel Salvador**, **Chloé Lahaye** and **Jean-Marc Fontbonne**, 5 min)

11.00 – 12.30 Technical progress of WP1

5. **Overview WP1**/NPL - primary standards (**Anna Subiel**, 10 min)

6. Work carried out in the last 9 months
   - **A1.2.10**/NPL - Setup for short pulsed VHEE beams, **A1.2.11/**NPL - Graphite calorimetry of VHEE beams (**Anna Subiel**, 10 min)
   - **A1.1.1**/Curie - Review of beam parameters in FLASH radiotherapy (**Sophie Heinrich**, 5 min)
   - **A1.1.2**/PTB - Optimization of existing reference fields, **A1.1.3**/PTB - Absolute charge measurements,**A1.1.4**/PTB - Monte Carlo simulations of the beam and validation (PTB, **Andreas Schüller**, 10 min)
   - **A1.2.1**/METAS - Parametrization of radiation chemical yield (**Peter Peier**, 5 min)
   - **A1.3.4**/QUB - Characterization of laser-driven beam parameters (**Giuliana Milluzzo**, 5 min)
   - **A1.3.5**/NPL - Small graphite calorimeter at laser-driven proton beams (**Francesco Romano**, 5 min)

7. Work to be carried out in the upcoming 9 months
   - **A1.1.5**/PTB - Draft report on reference fields with ultra-high dose per pulse, **A1.1.6**/PTB - Deliverable 1, **A1.2.3**/PTB - Correction factor calculations for PTB's water calorimeter,

A1.2.4/PTB - Establishment of PTB's water calorimeter as primary standard for FLASH electron RT (PTB, **Andreas Schüller**, 10 min)

- **A1.2.2**/METAS - Establishment of primary standard Fricke dosimetry for FLASH electron RT (**Peter Peier**, 5 min)
- **A1.2.8**/NPL - Traceable graphite calorimetry of FLASH proton beams, **A1.2.12**/NPL - Monte Carlo calculations supporting graphite calorimetry, **A1.3.1**/NPL - Testing of a small graphite calorimeter at FLASH proton beams, **A1.3.2**/NPL - Monte Carlo calculations supporting graphite calorimetry (**Francesco Romano**, 10 min)
- Discussion (**All,** 15 min)

12.30 – 13.10 Lunch Break

13.10 – 14.20 Technical progress of WP2

8. Overview WP2/METAS - secondary standards and reference methods for reference and relative dosimetry (**Peter Peier**, 10 min)

9. Work carried out in the last 9 months
   - **A2.2.1**/NPL – Preparation of experimental setup, **A2.2.3**/NPL – Characterization of ionization chambers in VHEE beams, **A2.2.4**/NPL – Development of empirical models for ion-recombination, **A2.4.1**/NPL – Development of irradiation phantoms (**Anna Subiel**, 15 min)
   - **A2.3.1**/PTB – Reference conditions for FLASH electron beams (**Peter Peier**, 5 min)
   - Discussion (**All**, 10 min)

10. Work to be carried out in the upcoming 9 months
    - **A2.1.1**/PTB – Characterization of FLASH beams, **A2.1.3**/IC – Calibration of radiochromic dosimetry films, **A2.1.4**/PTB – Characterization of Alanine/ESR secondary standard dosimetry system, **A2.1.5**/PTB – Characterisation of ionisation chambers as secondary dosimetry standards (**Andreas Schüller**, 20 min)
    - **A2.1.2**/METAS – Calibration of chemical dosimeters (**Maria Trachsel**, 5 min)
    - **A2.4.2**/NPL – Beam profile measurements, **A2.4.3**/NPL – Beam modelling by means of Monte Carlo simulations (**Anna Subiel**, 5 min)
    - Discussion (**All**, 5 min)

14.20 – 15.30 Technical progress of WP3

11. Overview WP3/CHUV - Detector systems for measurements in the primary beam (CHUV) (**Claude Bailat**, 10 min)

12. Report on the work carried out the last and next 9 month
    - **A3.1.1**/CHUV - Improving the monitoring of FLASH beam facility, **A3.2.1**/CHUV - Survey of the high-dose rate pulsed beams characteristics for radiobiology experiments, **A3.2.2**/CHUV - Evaluating commercial available and novel detectors in clinical FLASH electron beams, **A3.2.5**/CHUV - Comparison of detectors for Flash beams (**Claude Bailat**, 15 min)
    - **A3.3.2**/CSIC-IMB - Testing detectors in laser-driven pulsed proton beams, **A3.2.6**/**A3.3.3**/CSIC-IMB - Documenting the tests, **A3.2.4**/CSIC-IMB - Improving custom-built detectors (**Celeste Festa**, 15 min)

- **A3.3.1**/ FZU-ELI - Survey of the laser-driven pulsed beams characteristics (**Anna Cimmino**, 10 min)
- A3.2.3/ USC - Designing custom-built detectors for FLASH proton beams (**Faustino Gomez**, 10 min)
- Discussion (**All**, 10 min)

14.30 – 16.00 Technical progress of WP4 (90 min)

13. Overview WP4/ADV - Detector systems and methods for dosimetry outside primary beam – stray radiation (**Jiri Pivec**, 5 min)

14. Report on the work carried out the last and next 9 month
    - **A4.1.1**/ADV - Testing of potentially suitable TPX3 sensors for stray radiation measurement, **A4.1.2**/ADV - Optimization of the detector for stray radiation measurement, **A4.1.4**/ADV - Method for particle quantification, **A4.1.3**/CMI - Monte Carlo modelling, **A4.2.2**/CMI - Monte Carlo modelling, **A4.4.1**/CMI TPX3 measurements in reference, non-pulsed fields (**Jiri Pivec**, **Cristina Oncea**, **Vladimir Linhart** and **Jaroslav Solc** 40 min)
      A4.2.1/FZU-ELI - Testing of luminescence dosimeters in stray radiation field (**Anna Cimmino**, 10 min)
    - **A4.3.1**/POLIMI - Development of a Bonner Sphere Spectrometer read out in current mode (**Marco Caresana**, 10min)
    - **A4.3.4**/PTB Development of a Bonner sphere spectrometer based on a fission chamber (**Miroslav Zboril**, 10min)
    - **A4.3.2**/NPL Response function calculations, **A4.3.3**./NPL Bonner Sphere characterisation with monoenergetic neutron beams (**Alberto Boso**, 5min)
    - Discussion (**All**, 10 min)

16.00 – 16.45 Creating Impact: WP5

15. Work carried out in the last 9 months
    - All activities (**Jaroslav Solc**, 25 min)
16. Work to be carried out in the upcoming 9 months
    - All activities except A5.2.1 (**Jaroslav Solc**, 10 min)
    - A5.2.1 First scientific workshop for stakeholders (**Andreas Schüller**, 10 min)

16.45– 18.00 Further discussions

Further project-related discussions (**Andreas Schüller, All**):

- Application for an extension of the project duration due to covid-19
- Required input for M9 reporting, uptake and exploitation plan, publishable summary
- Communication and desired feedback from SAC
- Date and organizer for next progress meeting
- A.O.B.
- Closing remarks