

Invitation to the seminar on

Medical Radiation Physics and Ion-Beam Therapy

by

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A tale about PyDoseRT and the DoseRAD challenge

The DoseRAD2026 challenge, organized by a multi-institutional board and held at MICCAI 2026, benchmarked fast and accurate dose calculation for photon and proton radiotherapy in the context of online plan adaptation. The dataset comprises paired CT and MRI scans from thoracic and abdominal patients treated on an MR-linac, together with beam-level Monte Carlo (MC) reference doses. Beyond conventional CT-based dose calculation, the challenge also required dose calculation directly on MRI, which lacks the electron density information that dose engines usually rely on.

The team “Dose Happens”, a collaboration between Umeå University and the Medical University of Vienna, participated to evaluate PyDoseRT, a GPU-based dose engine implementing analytical pencil-beam models for photons and protons, with a learned residual correction toward MC accuracy. For MRI, a synthetic CT is generated and passed through the same pipeline. This physics-guided approach contrasts with competing methods that relied solely on physics learned from precomputed MC dose distributions. In the final ranking, PyDoseRT won the proton tasks, while a fully learned approach won the photon tasks. This suggests that there is not yet a single best recipe for AI-accelerated dose calculation.

Tuesday, 20. October 2026, 09:00 am

Zoom:

<https://tuwien.zoom.us/j/69660150906?pwd=FQRS8TnWx4hGuNEqjmVLfYostoOXLW.1>

For updates, please register at: <https://list.tuwien.ac.at/sympa/info/medauston-seminar>

Full programme and infos: <https://indico.global/category/1500/>