HITRI plus
Heavy Ion Therapy Research Integration

WP12 – Radiobiological Dosimetry and QA

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008548

WP12 – Objectives and Tasks

Work package number [9]	WP12	**Lead beneficiary** [10]	15 - UMR
Work package title	JRA6 - Radiobiological Dosimetry and QA		
Start month	1	**End month**	48

Dosimetry standardization for radiobiological experiments

- Evaluate and compare research results between European ion therapy centres.
- Enable collaborative experiments between the facilities

Involved partners: UMR, UKHD/HIT, CNAO, GSI, MedAustron

Task12.1 In vitro joint experiment for Radiobiological dosimetry and quality assurance

Task12.2 Modelling joint experiment for radiobiological dosimetry and quality assurance

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WP12 – Deliverables and Milestones

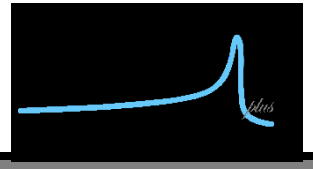
D12.1
- Conceptual design report and proceeding; joint radiobiological experiments in all facilities
- Due: 2024

D12.2
- Modelling of the joint results
- Due: Spring 2025

D12.3
- Final report and summary
- Due: Summer 2025

MS12
- Generation of a standardized dosimetry for collaborative radiobiological experiments between the facilities
- Due: 2025

Dissemination activity
- Scientific publication (1)
- Participation at conferences (>)



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WP12 – This is where we are

Protocols and experimental setup:

- Radiobiological experiments
  - are finished at CNAO, GSI, UMR
  - MedAustron experiments were performed by UMR
  - HIT experiments are still awaited
- Characterization of mixed radiation field using silicon detectors, TEPC
  - Protocol was provided by MedAustron
  - Performed at the partner sites in UMR, MedAustron
  - HIT due in July, CNAO follows
  - Radiobiological experiments for validation were performed at UMR
  - Evaluation is still ongoing

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Geometry prescription for C-12 irradiation and plan optimization

	Geometry B
Target area size, mm (x,y,z)	60 x 80 x 40
Target center position, mm (z)	105
SOBP	85 mm $\leq z \leq$ 125 mm
R_{90} (distal edge), mm	126.2
Width = R_{90} (dist) – R_{90} (prox), mm	45.9
Physical dose in target, Gy	4

TRiP98

- Base data from MIT
- 3 mm RiFi
- Definition of a box (x,y,z) and positioning in water
- Optimization for homogeneous physical dose in box
- Lateral spot spacing: 1.8 mm (in x and y)
- Distal spot spacing: 1 mm
- Definition of R90 not possible

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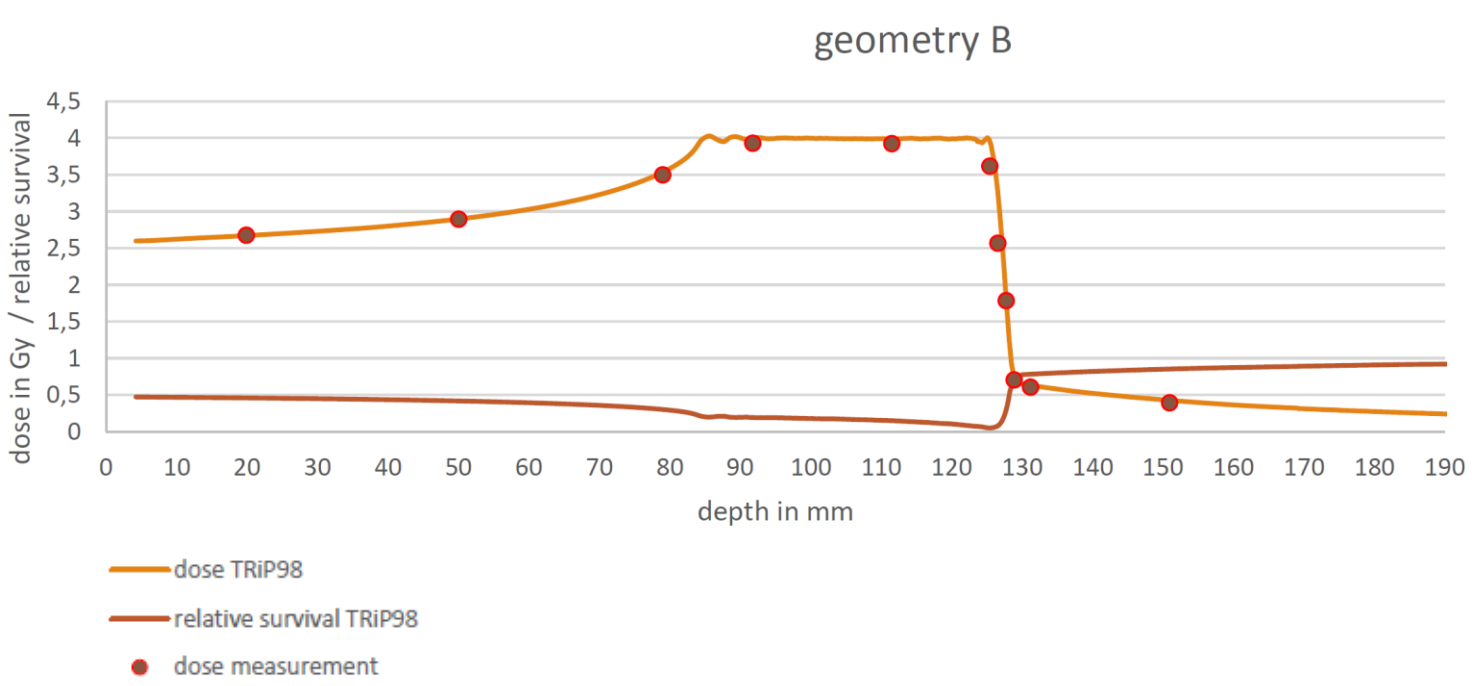
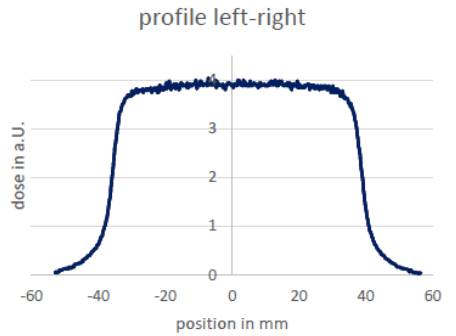
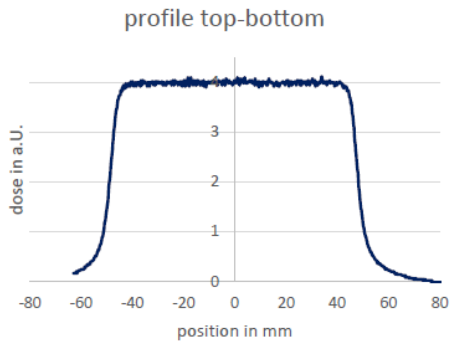
Results Geometry B







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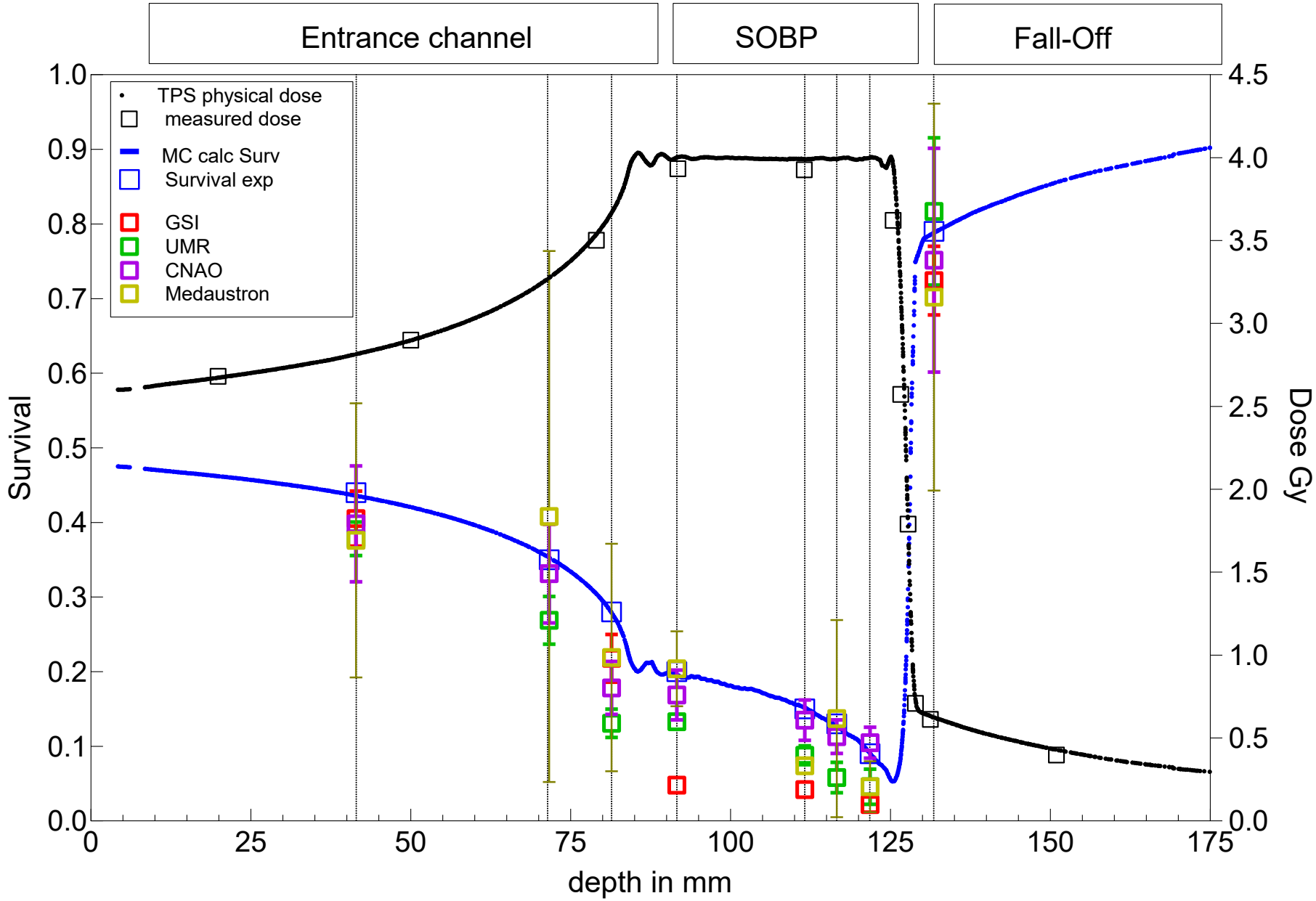
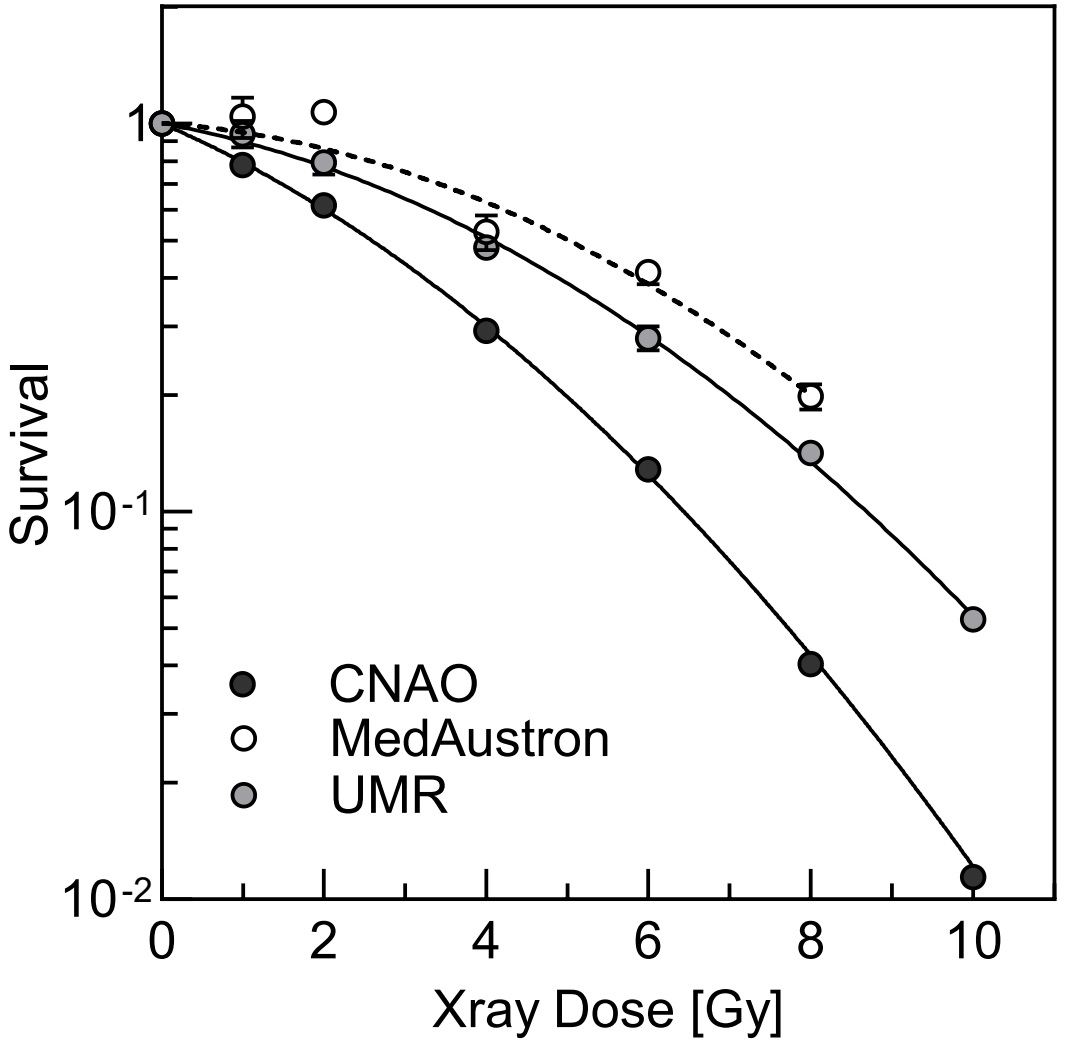
Results Radiobiology



Depth dose and survival curves

Results
Radiobiology



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Outlook

Radiobiological results
- Awaiting results Xray from GSI
- Xray and 12C HIT

Modelling of the joint results
- Data is transferred to HIT

Microdosimetry
- Data is evaluated by MedAustron

D12.3
- Final report and summary
- Due: Summer 2025

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Thank you for your attention.

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