

# Particle Therapy Masterclass – tangible impacts

NERMINE MURADI

Physics Department

Universty Of Tetova & OSMU Nikola Stein,  
North Macedonia



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

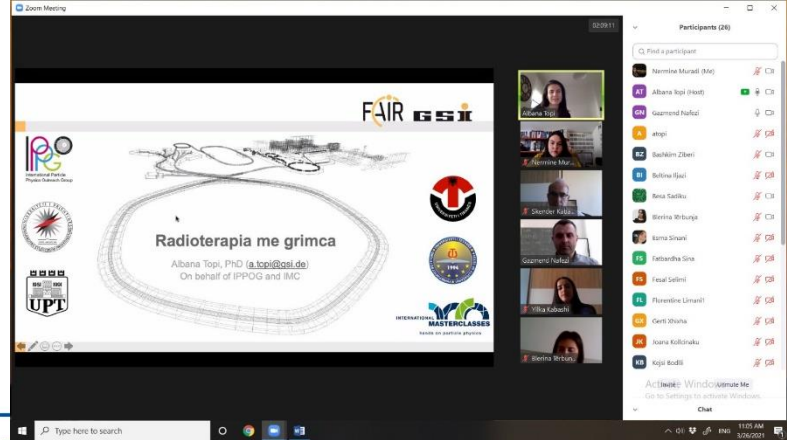
# Eramsus + exchanges

Learning never exhaust the mind.



# Particle Therapy Masterclass 2021

Albana Topi GSI :  
North Macedonia  
Kosovo  
Albania



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# Heavy Ion Therapy Masterclass School 17 -21 May 2021

**Heavy Ion Therapy MasterClass School** | 17 - 22 May 2021  
Online Course

The program is intended for the students of the following disciplines Medical Physics, Physics, Radiotherapy, Radiology, Bioengineering and Imaging and Radiotherapy Techniques and early stage researchers.

In collaboration with




**Topics**

- Particle Therapy
- Treatment Planning
- Accelerator Physics
- Beam Delivery
- Radiation Protection
- Imaging
- Biophysics
- AI/ML for Particle Therapy

**Scope**

Focus on Heavy Ion Therapy Treatment Planning Systems (TPS) including lectures, treatment planning tool demonstrations, hands-on exercises and student projects.

**Programme Committee**

- Y. Foka (GSI/EMMI, Chair)
- A. Gazibegović-Busuladžić (UNSA)
- N. Sammut (Uni. Malta)
- M. Sapinski (SEEIST)
- J. Seco (DKFZ)
- M. Vretenar (CERN)
- N. Wahl (DKFZ)
- H.P. Wieser (LMU)

**Scientific Assistants**

- A. Mamaras (AUTH/CERN)
- A. Kapić (EPFL/CERN)
- D. Skrijelj (UNSA/DKFZ)
- R. Taylor (ICL/CERN)

**SIGN UP NOW TO THE FIRST HEAVY ION THERAPY COURSE!**

**Registration link:** <https://indico.cern.ch/e/HeavyIonTherapyMasterClass>

**Registration deadline:** 15 May 2021

**HITRI**  
Heavy Ion Therapy Research Integration



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**Heavy Ion Therapy Masterclass**  
17th May - 21st May 2021  
Evening Socials  
From 18:00



**MON** **Introductory Drinks**  
*Meeting the other attendees with drinks!*  
**Speaker:** Manjit discussing the ENLIGHT network  
Dress Code: Smart Casual

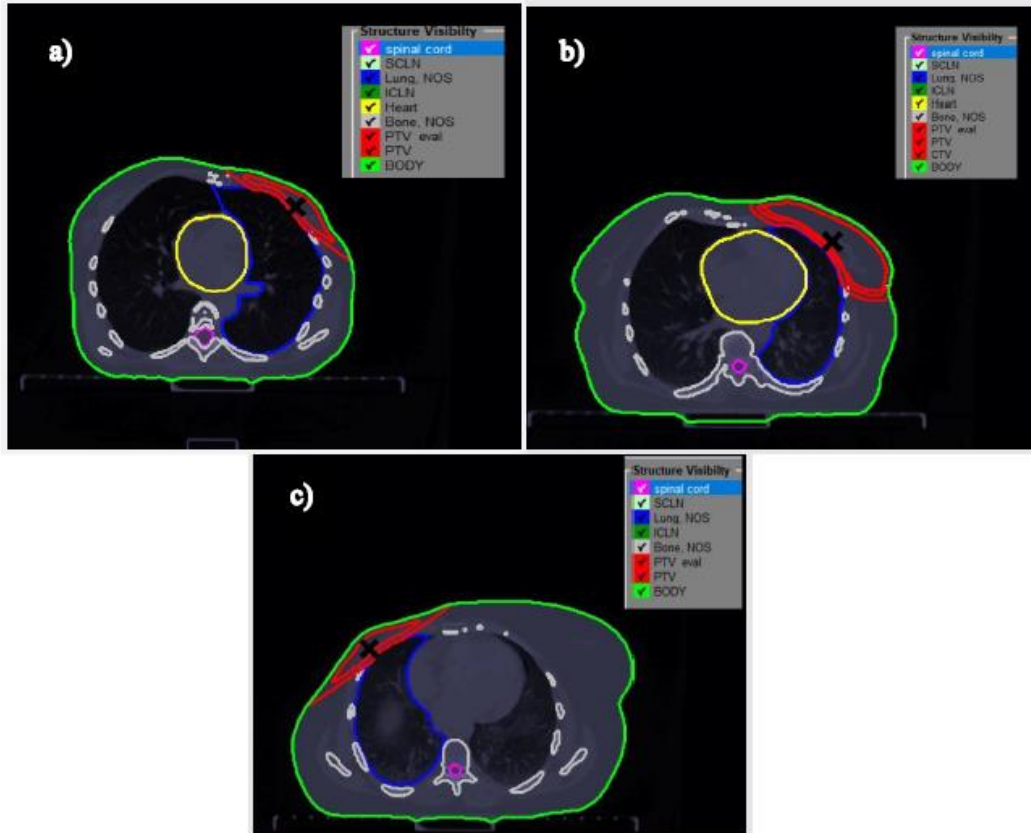
**TUE** **Language Cafe**  
*Learn other languages & cultures!*  
**Speaker:** Mimosa - ion treatment for beginners  
Dress Code: Traditional

**WED** **Student Q&A**  
*Ask advice & chat to current students*  
**Speaker:** CERN Knowledge Transfer  
Dress Code: Pyjama Party

**THU** **Tours, Games & Disco**  
*Share music tastes & play games & quizzes*  
Dress Code: Impress Us.

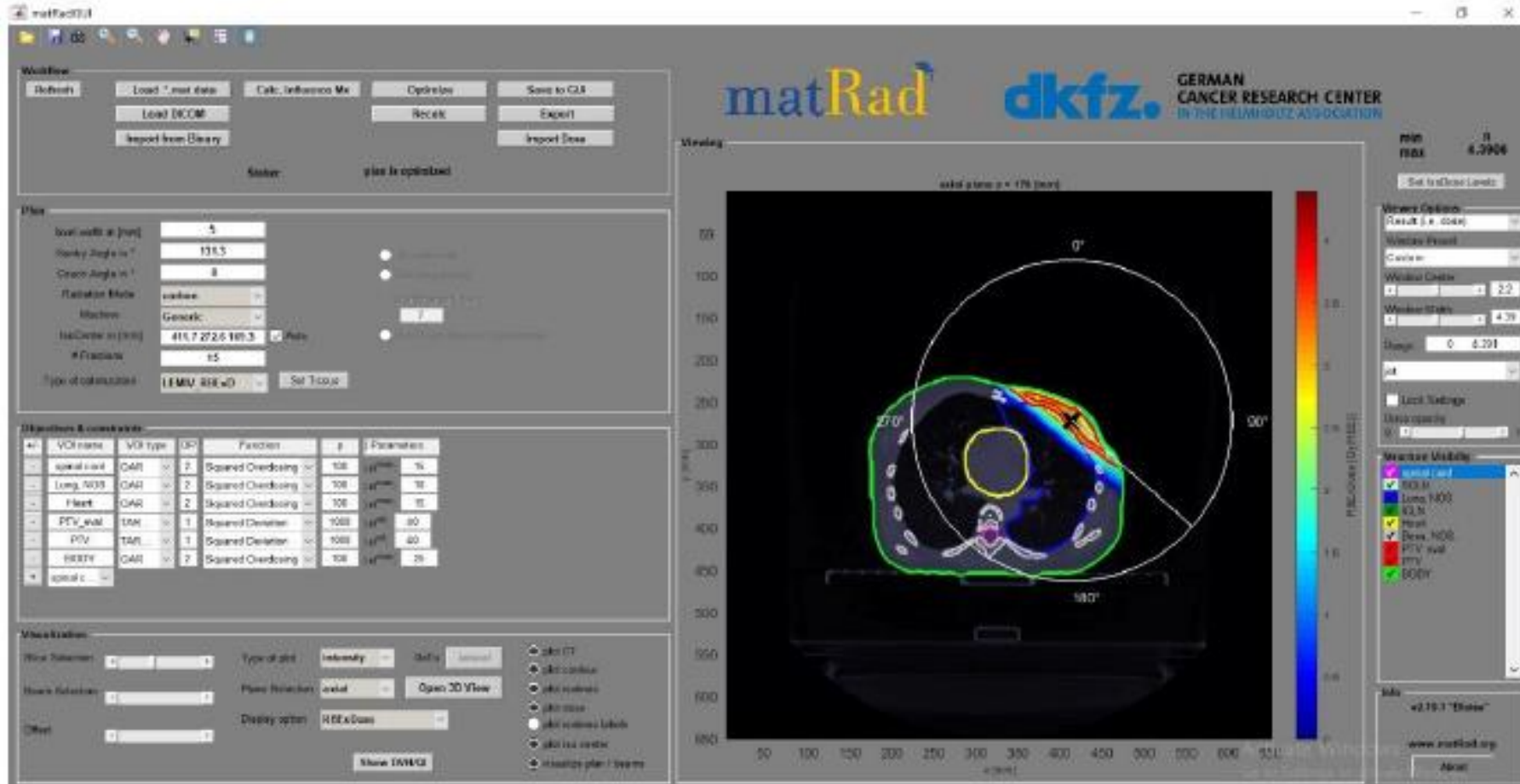
**FRI** **Career Fair**  
*Discussion with experts on career paths*  
**Speakers:** CERN, GSI, CNAO, DKFZ & Cosylab  
Dress Code: Formal Attire

# Master thesis: Simulations of treatment planning of breast cancer and comparison with real cases



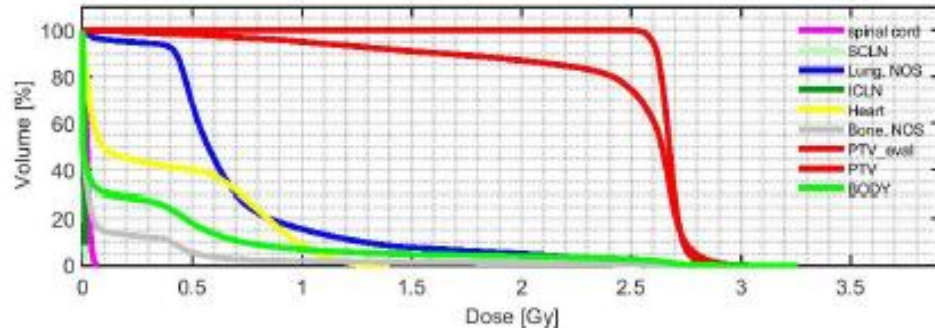
- a) First case beam angles  $131.3^\circ$ ,  $131.3^\circ$  and  $308.4^\circ$ , and third with three different beams coming in angles  $131.3^\circ$ ,  $308.4^\circ$  dhe  $355^\circ$ .
- b)  $131.5^\circ$ ,  $131.5^\circ$  and  $308.9^\circ$ , and three beams  $131.5^\circ$ ,  $308.9^\circ$  and  $350^\circ$ .
- c)  $229.1^\circ$ , second plan with two beams in angles  $53.5^\circ$  and  $229.1^\circ$ , and third plan with three beams  $10^\circ$ ,  $53.3^\circ$  and  $229.1^\circ$ .

# Master thesis: Simulations of treatment planning of breast cancer and comparison with real cases

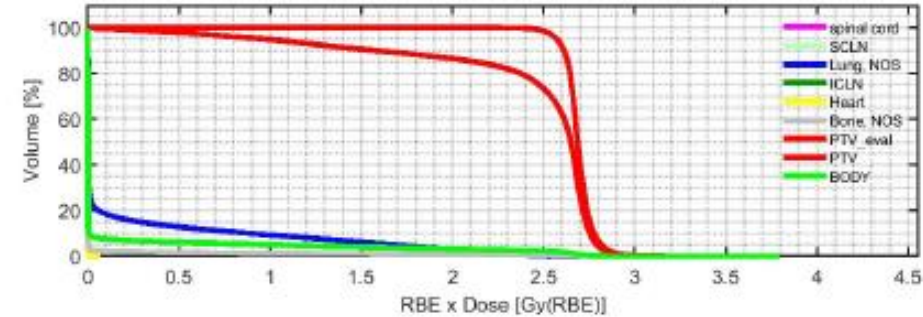


40 Gy in 15 fractions

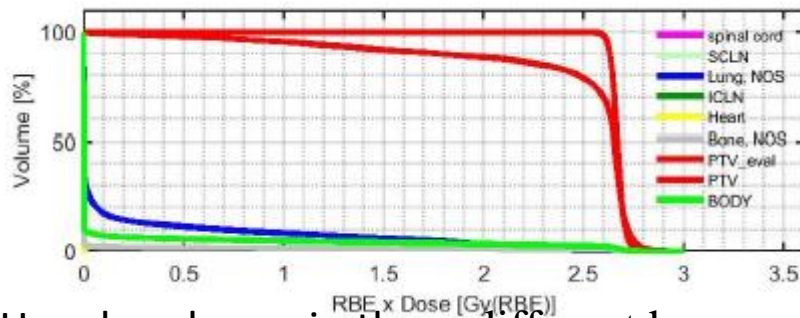
# Master thesis: Simulations of treatment planning of breast cancer and comparison with real cases



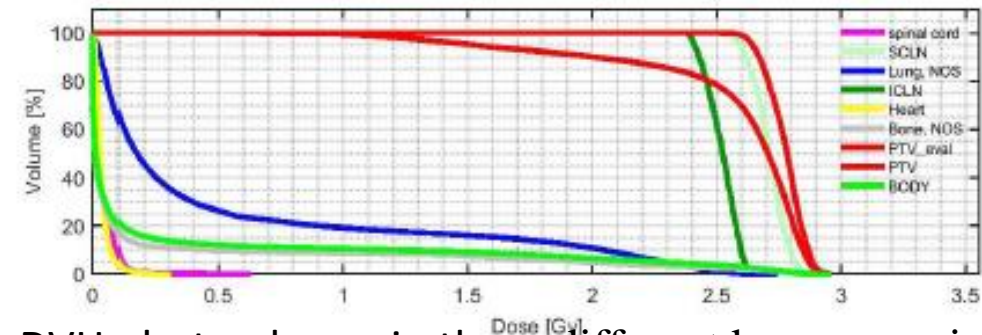
DVH photon beam in three different beams coming in angles  $131.3^\circ$ ,  $308.4^\circ$  and  $355^\circ$ .



DVH proton beam in three different beams coming in angles  $131.3^\circ$ ,  $308.4^\circ$  and  $355^\circ$ .



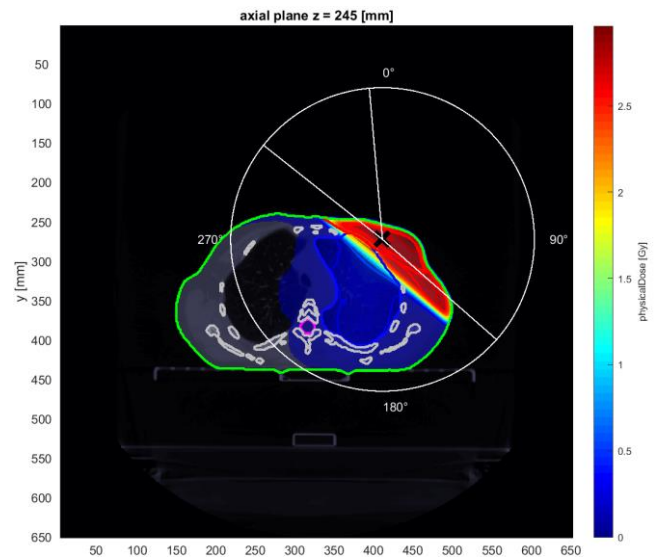
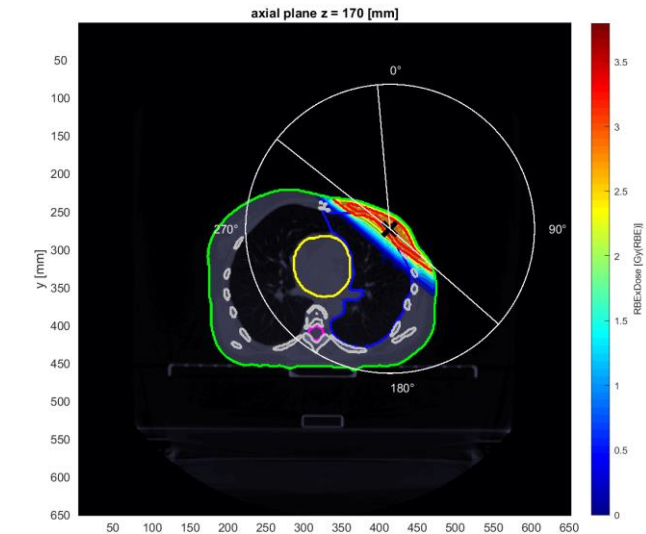
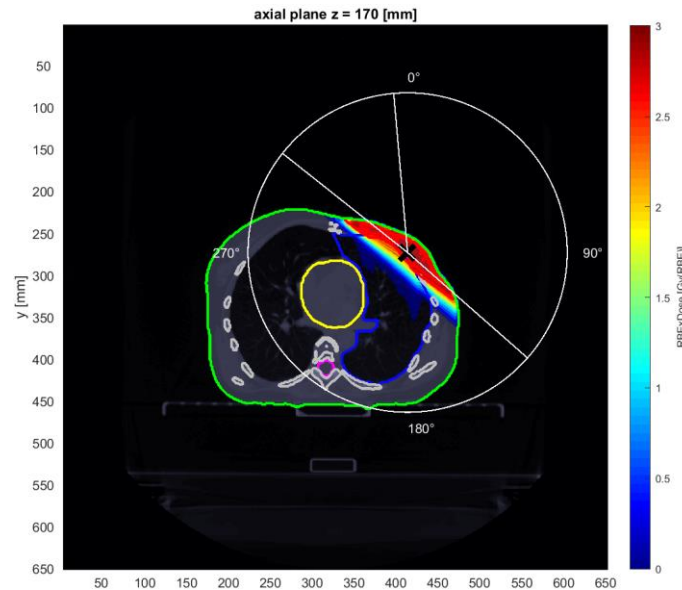
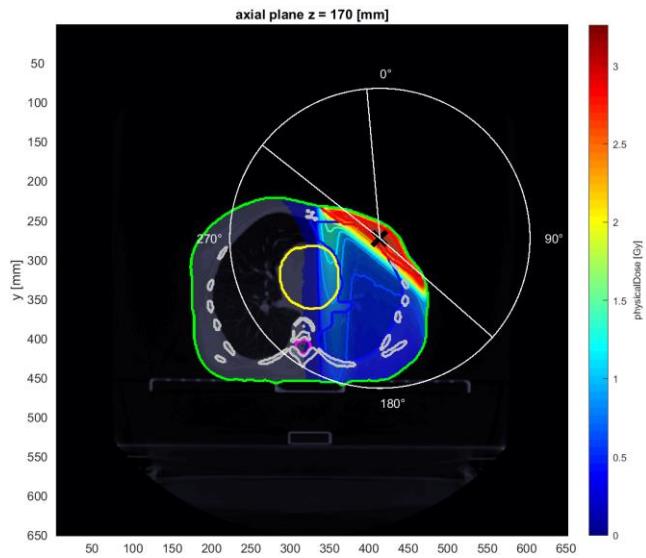
DVH carbon beam in three different beams coming in angles  $131.3^\circ$ ,  $308.4^\circ$  and  $355^\circ$ .



DVH photon beam in three different beams coming in angles  $131.3^\circ$ ,  $308.4^\circ$  and  $355^\circ$  in clinic



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$$MDR = \frac{D_X^{VOI} - D_Y^{VOI}}{D_{photons}^{VOI}}$$

MDR photons vs protons 73.4% for the lungs, 99.9% for the heart and 56% for the body  
0.19% for PTV

MDR photons vs carbons: 71% for the lungs, 99% for the heart and 54% for the body



# Particle Therapy Masterclass 2022

## 140 high school pupils - online

Next generation facility for cancer tumour therapy and research with heavy-ion beams

FAIR GSI

Proposal for a facility in South East

GSI Helmholtzzentrum für Schwerionenforschung GmbH

January 15, 2018

Zoom Meeting

Participants: 140

00:27:52

LIVER CASE - PROTON BEAM

Proton one angle beam

Beam	1.00	1.25	1.50	1.75	2.00
IMPT	1.00	1.00	1.00	1.00	1.00
IMPT-1	1.00	1.00	1.00	1.00	1.00
IMPT-2	1.00	1.00	1.00	1.00	1.00
IMPT-3	1.00	1.00	1.00	1.00	1.00
IMPT-4	1.00	1.00	1.00	1.00	1.00
IMPT-5	1.00	1.00	1.00	1.00	1.00
IMPT-6	1.00	1.00	1.00	1.00	1.00
IMPT-7	1.00	1.00	1.00	1.00	1.00
IMPT-8	1.00	1.00	1.00	1.00	1.00
IMPT-9	1.00	1.00	1.00	1.00	1.00
IMPT-10	1.00	1.00	1.00	1.00	1.00
IMPT-11	1.00	1.00	1.00	1.00	1.00
IMPT-12	1.00	1.00	1.00	1.00	1.00
IMPT-13	1.00	1.00	1.00	1.00	1.00
IMPT-14	1.00	1.00	1.00	1.00	1.00
IMPT-15	1.00	1.00	1.00	1.00	1.00
IMPT-16	1.00	1.00	1.00	1.00	1.00
IMPT-17	1.00	1.00	1.00	1.00	1.00
IMPT-18	1.00	1.00	1.00	1.00	1.00
IMPT-19	1.00	1.00	1.00	1.00	1.00
IMPT-20	1.00	1.00	1.00	1.00	1.00

Zoom Meeting

Participants (125)

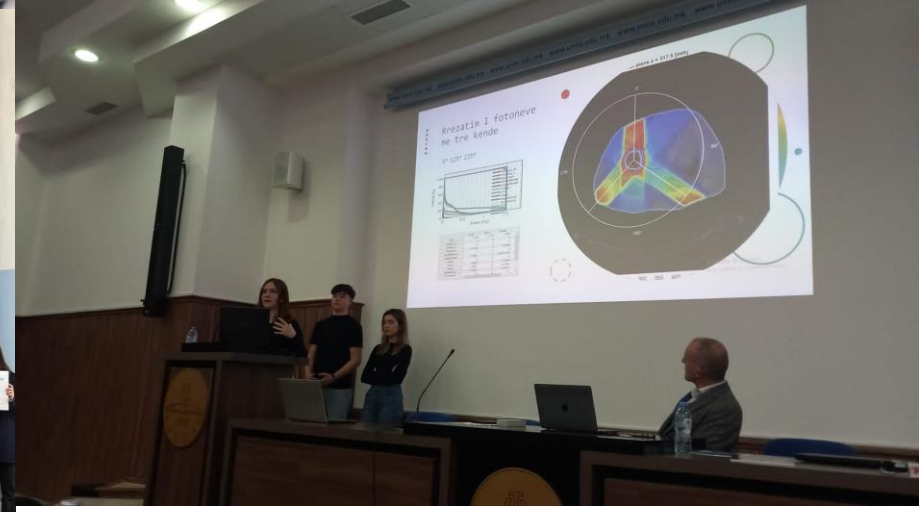
00:30:27



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# Particle Therapy Masterclass 2023

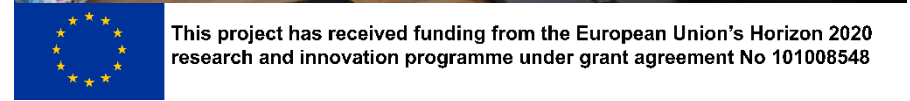
## 200 high schools students UT



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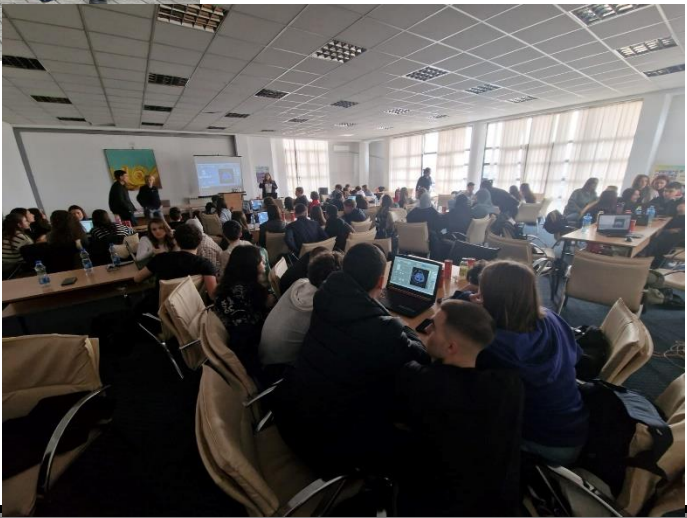
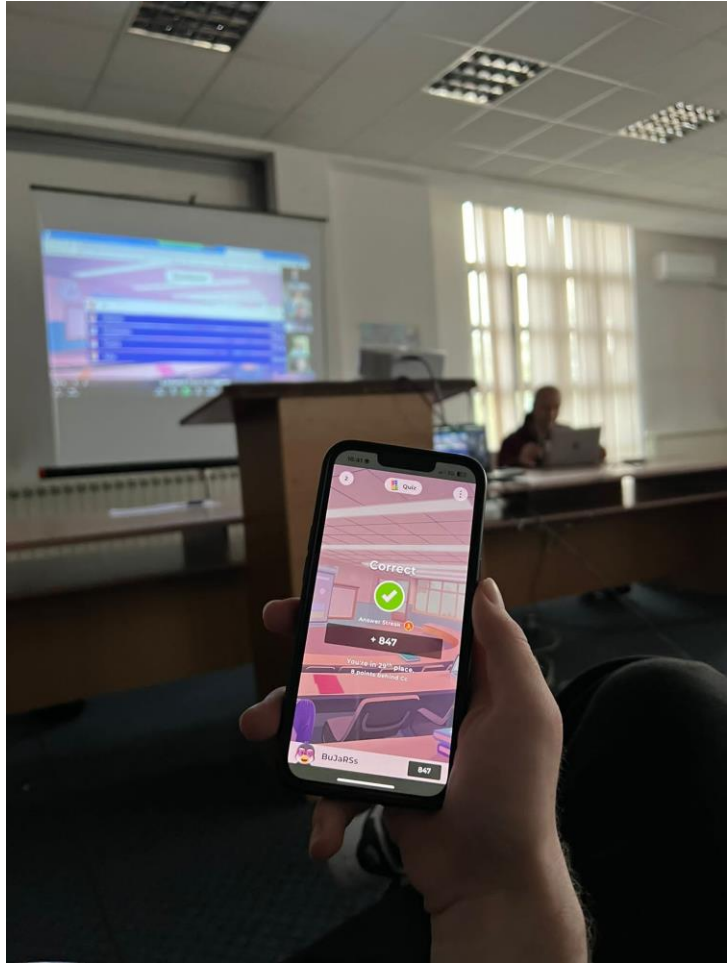
# Particle Therapy Masterclass 2024

## 272 high school students Tetova



# Particle Therapy Masterclass 2024

## 100 high school students Skopje



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# Particle Therapy Masterclass 2024

## 272 Tetova, 100 high school students Skopje

-Train the tutors sessions

4 Bachelor students

4 Bachelor and Master thesis

- Many friendships, connection and sharing information from HitriSchools



Particle Therapy Masterclass Training 19th January 2024  
Friday 19 Jan 2024, 16:00 → 19:30 Europe/Zurich  
<https://oern.zoom.us/j/66143245261?pwd=MmpoenZmVhKSWMQUUmyYUJDe0pSOT09> (CERN, GSI)

Description

**HITRI**  
Heavy Ion Therapy Research Integration

PTMC Training starting at 16 pm CET, 19th January 2024. Below, one can find, as an example, a typical PTMC agenda with attached materials for tutors.

**GSI FAIR EMMI** **dkfz.** **CERN** **INTERNATIONAL MASTERCLASSES** **IPG**

PTMC\_Tutorial\_12...

**16:00** → **16:05** Welcome  
Welcome and aim of the PTMC training day, set the stage.  
For a visual Impression a virtual Particle Therapy centre is in the link below.  
A good summary connecting physics and particle therapy can be found on the animation link.  
Convener: Yveta Folz (GSI - Helmholtzzentrum für Schwerionenforschung GmbH (GSI))  
[Presentations and r...](#) [PTMC Webpage](#) [YP-PTMC-TRAINL...](#) [YP-PTMC-TRAINL...](#)

**16:05** → **16:20** PTMC Indico Webpage Example  
[PTMC Example](#)

**16:20** → **16:25** Animations 5m  
[Animations](#)

**16:25** → **16:30** Theoretical Material for Tutors 5m  
[Dosen/Physics Jo...](#) [MasterClass\\_theory...](#) [Radiotherapy.pdf](#)

**16:30** → **16:50** Hands-on-Session Material for Tutors 20m  
[ALDERSON.met](#) [BOXPHANTOM.met](#) [HEAD\\_AND Neck...](#) [LIVER.met](#) [MerRad GitHub](#) [PROSTATE.met](#)  
[PTMC Handon Se...](#) [PTMCPres...Englis...](#) [Recording MatRad...](#) [TG119.met](#) [Workflow\\_Englis...](#)

**16:50** → **16:55** PTMC Webpage 5m  
[PTMC in a kit](#) [PTMC Webpage](#)

**16:55** → **17:15** MatRad Installation Material 20m  
[MatRad installation...](#) [README\\_installat...](#) [README\\_installat...](#)

**17:15** → **17:25** Videoconferencing material 10m  
[Kahoot for quiz](#) [Moderators-OS.doc](#) [Particle therapy me...](#) [Particle therapy me...](#) [Particle therapy me...](#)  
[Particle therapy me...](#) [quiz-PTMC-2020-D...](#) [quiz-PTMC-2020-D...](#) [Video conferencing...](#)



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# Breast month cancer awareness

Here's to strong woman, may we know them, may we be them or may be raise them



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# AIM: SURVIVAL AND QUALITY OF LIFE



*Thank you*