Eleni Sagia

ARDENT - ESR 14
PhD student at Politecnico di Milano

Supervisor: Prof. Stefano Agosteo

Personal Information

Hometown: Athens, Greece

Current City: Milan, Italy

Education

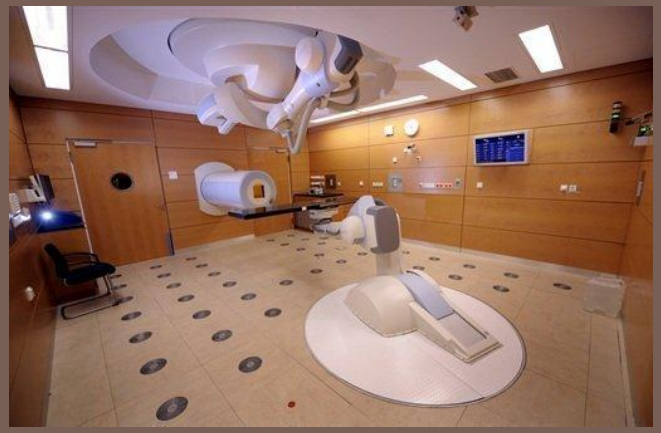
Diploma in
Applied Mathematical and Physical Sciences (2010)

MSc in
Medical Physics and Radiation physics (2012)

Research activity in the Radiation Protection Group
(MSc Thesis)

Previous work

Monte Carlo simulations of ion beams on iron and tissue target for determining shielding parameters for accelerators used for hadron therapy



Supervisor: Dr. Marco Silari

FLUKA Simulations

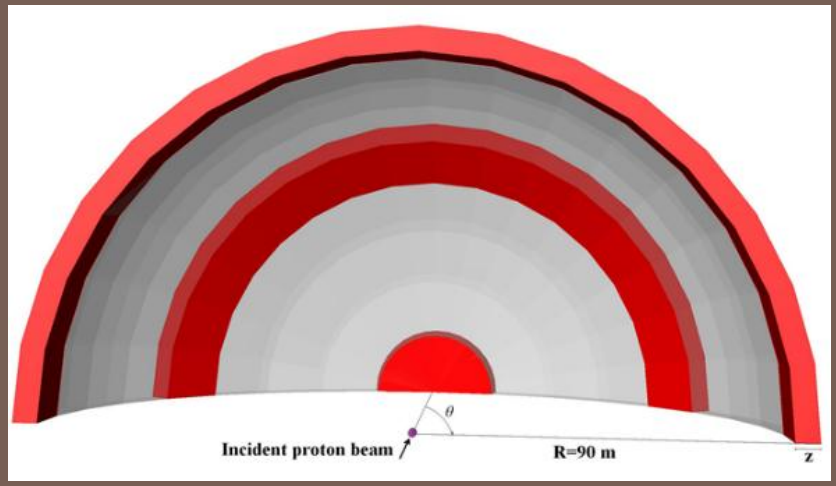
- Monoenergetic pencil ion beam impinging on thick target
  - Range: 29cm in ICRU tissue

Ion beam	Energy (MeV u^{-1})
^{1}H	215
^{4}He	223
^{7}Li	250
^{9}Be	286
^{11}B	342
^{12}C	430
^{14}N	469

- Target geometry
  - Fe ⇨ 60mm thickness right cylinder
  - ICRU TE ⇨ 350mm thickness right cylinder

FLUKA Simulations

- Shielding geometry
  - Concrete sphere
    ρ=2.31 gcm^{-3}



- Shielding parameters
  - Source term (Sv m² per primary)
  - Attenuation length (g cm^{-2})

Future work (I)

Solid State Microdosimetry

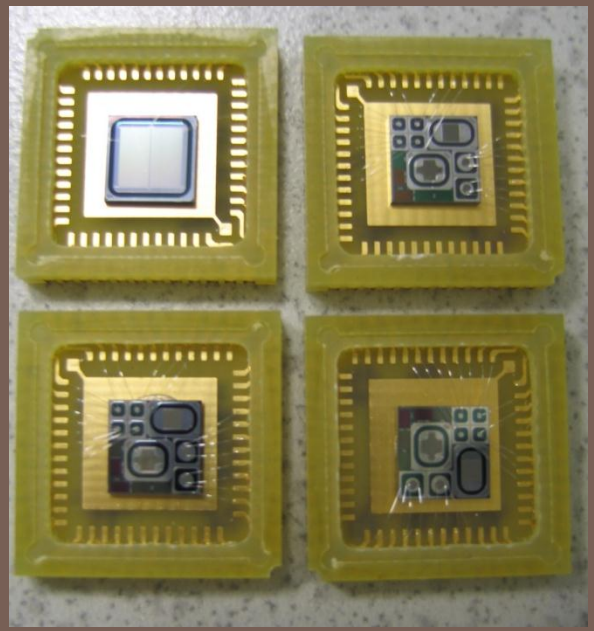
"The fluctuations of energy deposited in individual cells and sub cellular structures and the microscopic tracks of charged particles are the subject of microdosimetry"

ICRU103

Future work (II)

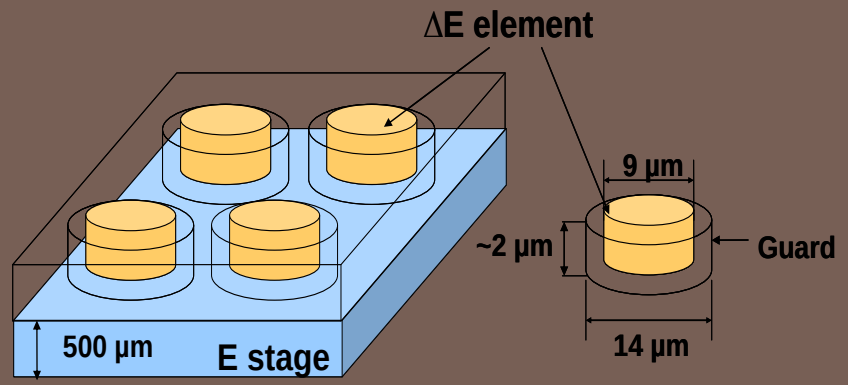
Objectives

- Development of silicon microdosimeters for assessing the quality of hadron therapy fields
- Monte Carlo simulations in order to study the detector response to radiation field facilities
- Experimental measurements at several treatment facilities (CNAO, CATANA)
- Comparison with other detectors in the framework of the ARDENT project



Segmented silicon telescope

- ✓ Matrix of cylindrical ΔE elements (about 2 μm in thickness) and a single residual-energy E stage (500 μm in thickness)
- ✓ the nominal diameter of the ΔE elements is about 9 μm and the width of the pitch separating the elements is about 41 μm
- ✓ more than 7000 pixels are connected in parallel to give an effective sensitive area of about 0.5 mm^2
- ✓ the ΔE stage acts as a microdosimeter while the E stage provides the LET-dependent correction for tissue-equivalency



Future research activity plans

- Secondment with Prof. Rozenfeld
  Wollongong, Australia
- MMND & IPCT 2012
  Wollongong, Australia
- PSI Winter School for Protons 2013

- Experimental measurements at INFN-LNL for characterization of the detector
- Secondment with P. Colautti & involvement in the MITRA project
  INFN-LNL, Italy
- Secondment with Prof. Waker
  University of Ontario Institute of Technology, Canada

The end!

Thank you for your attention!