ETRAP
23-26 March, 2021 - Online
International Conference on Education and Training in Radiation Protection

Medical physics and Radiation Protection skills training through Undergraduate Final Degree Thesis

S. Oliver[1], B. Juste[1], R. Miró[1], G. Verdú[1]

[1]Instituto de Seguridad Industrial, Radiofísica y Medioambiental (ISIRYM), Universitat Politècnica de València

INTRODUCTION

UNIVERSITAT POLITÈCNICA DE VALÈNCIA → **Biomedical Engineering** → **Final Degree Thesis (FDT)** → **Medical physics and radiation protection** ← La Fe HOSPITAL UNIVERSITARI

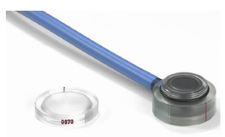
Developing a FDT in a medical field allow the students to increase their knowledge in radiation treatment techniques currently used in the hospital setting. These studies are done in collaboration with the **Hospital Universitari I Politècnic La Fe** of València, solving real problems of the radiophysical department. This kind of FDTs train students in the main skills of their last university stage, as develop an autonomous activity, be able to access the information required as databases, scientific articles, know how to work in multidisciplinary teams, and design the objectives of a research work, etc.

MATERIALS AND METHODS

isirym

ISIRYM research group offers FDTs focused on learning geometry modeling of medical devices and Monte-Carlo (MC) simulations of treatments and dose measurements. An example are these titles:

- Correction factors for dose measurements using Advanced Markus ionization chamber

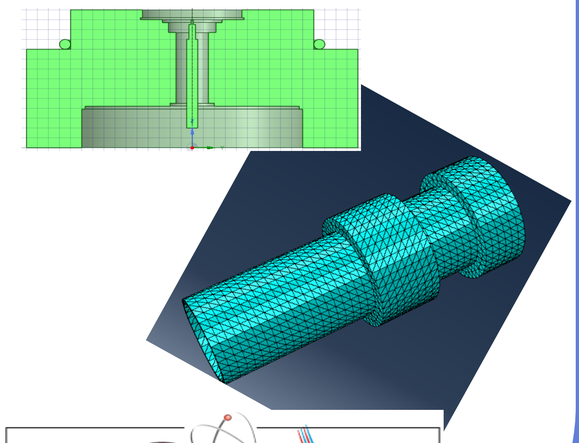


- Modeling and validation of Varian TrueBeam LinAc geometry
- Monte Carlo simulations to estimate dose in patients using Y90 for liver treatment

- Filter design for Intraoperative linear accelerator device

GEOMETRY MODELING

Some companies as PTW or Varian, share the blueprints of medical devices for researching puposes under confidential agreements. With this information, these systems can be modeled using CAD and mesh programs as Space Claim and Abaqus to obtain a detailed geometry configuration for MC simulations.



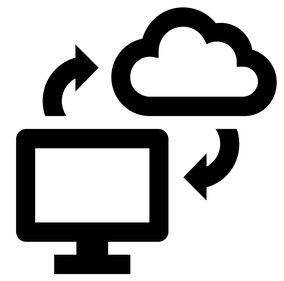
MONTE CARLO SIMULATIONS

MC methods, are statistically based methods that can be used to solve radiation transport problems by random sampling. These methods are widely used to solve complex physical problems providing accurate results, reproducing real situations. MCNP6 is a general purpose MC radiation-transport code designed to track many particle types over broad ranges of energies which can be used for dosimetry and radiotherapy.

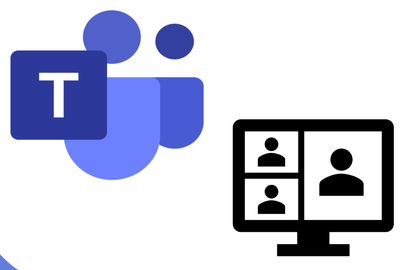
MCNP6

ONLINE METHODOLOGIES

Due to the new pandemic situation, we have to search a new way to track the student's work and clarify their doubts:



ONLINE MEETINGS



AUTONOMOUS WORK

SPACECLAIM CORPORATION

3DS SIMULIA Abaqus

REMOTE SIMULATIONS WITH INPUT TEMPLATES

Simulations run in a cluster with all the infrastructure required

Input file templates have been prepared for a general simulation. The students learn to modify them according to their needs, changing source, or geometry and to understand the results, validating them with experimental measures provided by hospitals

CONCLUSIONS

Medical physics and radiation protection FDTs allow students...

how to simulate real clinical environments with MC methods and reproduce experimental data provided by the hospitals. Moreover, develope their FDTs bounded to real clinical applications generate an additional motivation which turn into good results in their final evaluation. The proposed projects cover all of the basic, general and transversal skills required to acquired the degree. Finally, the knowledge acquired during their project development, can offer to the students carrer opportunities related with medical physics as hospital radiophysics, among others.