I EDITION COURSE ON MONTE CARLO SIMULATION IN MEDICAL PHYSICS AND RADIATION PROTECTION WITH GAMOS/GEANT4

Online mode

DATE: November 2-27, 2015

DURATION: 3 weeks + 1 catch-up

NUMBER OF HOURS: 60 hours (10h theoretical and 50h practical)

PRESENTATION:

The Monte Carlo simulation codes have proven to be the most accurate tool for dose calculations or for the detailed description of the behaviour of radiation detectors. Among these codes GEANT4 stands out, as it has become during the last years the most used one, thanks to its flexibility and the amount of functionality offered in different fields of physics. However, its use, like that of other simulation codes, often offers considerable difficulty.

The GAMOS tool has been designed for making easy the use of GEANT4 without losing its flexibility. The achievement of these objectives it is supported by its more than two thousand registered users.

This course is designed for students with no experience in the Monte Carlo simulation and for GAMOS users who want to deepen their capabilities. After a brief introduction to the GEANT4 simulation and the possibilities of GAMOS, it is explained step by step the installation on Linux, Mac OS and Windows, and a first example with GAMOS is build and executed.

The student can choose to perform the exercises on Radiotherapy, Radiation Protection or Nuclear Medicine detectors. In all cases the course starts with simple problems that grow in difficulty. The professor will be available continuously to assist the student in everything required.

OBJECTIVE:

The course objective is to provide the student with the knowledge necessary to be able to make by him/herself realistic Monte Carlo simulation problems in the fields of Radiotherapy, Radiation Protection and Nuclear Medicine detectors.

ADRESSED TO:

- Graduates in science, technology, engineering & math fields
- Medical Physic Experts, Radiation Protection Experts and Clinical trainees.
- Last course students

TEACHING METHOD: on-line.

The teaching-learning process is based on the methodology e-learning, student-centered. The content is delivered through exercises raised by the teacher. Communication tools offered by this modality allow constant interaction between student and teacher. The learning progress is customized and supervised, ensuring the success of the training.

INSCRIPTION: On line, using the form that will be enabled after the opening of the registration period in the course web.

The students have to choose a field in which develop the practical exercises:

- **Radiotherapy**
- **Radiation Protection**
- **Nuclear Medicine detectors**

LANGUAGE: English.

COST: 750 € (*)

(*) It is offered in the following situations a limited number of reduced fees, after conveniently proving the required condition:

- Unemployed members (document updated proving to be registered in the INEM and Curriculum Vitae)
- Residents in Latin America and developing countries (document updated proving the current residence of the applicant and Curriculum Vitae)

DIRECTION COMMITTEE:

- Marisa Marco Arbolí, Knowledge Management Division, Ciemat
- Cristina Llorente Herranz, Education and Training, Ciemat
- Pedro Arce Dubois, Ciemat

COURSE SECRETARY:

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PROGRAM:

- **THEORICAL MODULE**

  Unit 1. Introduction to GEANT4.

  Unit 2. Introduction to GAMOS

  Unit 3a. Installation and first example with GAMOS for Linux y Mac OS

  Unit 3b. Installation and first example with GAMOS for Windows

- **PRACTICAL MODULE (choosing one)**

  - **A: RADIOTHERAPY exercises**

    Practice A.1: Linear accelerator
    Practice A.2: Phase space
    Practice A.3: Dose calculation in phantoms
    Practice A.4: Simulation optimization
    Practice A.5: Brachytherapy

  - **B: RADIATION PROTECTION exercises**

    Practice B.1: Study of a shielding effect
    Practice B.2: Shielding from an Am-Be source
    Practice B.3: Equivalent dose
    Practice B.4: Activation studies

  - **C: NUCLEAR MEDICINE DETECTORS exercises**

    Practice C.1: PET Detector
    Practice C.2: PET events analysis
    Practice C.3: Physics effects in the detector
    Practice C.4: SPECT Detector

- **A certificate of the course will be delivered to students who return the exercises**