IAESTE BELGIUM

WORK OFFER

Ref. No. BE-2018-002UGE

Employer Information

Employer:		*Website:*	
		Location of placement:	
		Number of employees:	
		Working hours per week:	40.0
Business or products	nuclear research center	*Working hours per day:*	8.0

Student Required

Field of study:	40-PHYSICAL SCIENCES	*Study level:*	Middle (4-6 Semesters);End (7 Semesters and over)	
Specialization:	40.0801-Physics, General;40.0806-Nuclear Physics	*Language required:*	English	Excellent

Other requirements:

Good command of MS Excel, good writing and oral reporting skills.
The candidate must be enrolled in an academic institution during the entire period of the internship.
The minimum time required to work on the project is 5 months, but a longer internship time is possible.
Nationality: EU, Australia, Canada, Iceland, Norway, Switzerland, UK, US

Work Offered

Development of a personal dosimeter for medical staff wearing radioprotective lead garments.
Medical staff working in the interventional radiology (IR) and cardiology (IC) suites are exposed to scattered ionizing radiation coming from the patient. Protection garments like a lead (Pb) apron and thyroid collar are usually worn as personal radiation protection (RP) equipment. This poses a challenge for whole body personal dosimetry because a conventional Hp(10) dosimeter is no longer capable of providing just by itself an acceptable estimation of the effective dose when
radioprotective garments (RPG) are used: an Hp(10) dosimeter worn under RPG would underestimate the effective dose, whereas a dosimeter over RPG would result in its overestimation.
Different methodologies have been proposed to estimate the effective dose when RPG are used, like applying a correction factor to the dose of a standard Hp(10) dosimeter worn above or below RPG (single dosimetry, SD), or the use of an algorithm combining the dose from two of them: one worn above RPG and the other one worn below (double dosimetry, DD); but even with these methodologies it remains a difficult task to provide a good estimate of the effective dose (i.e. a
conservative estimate with minimum possible overestimation) under all possible exposure conditions [Jarvinen et al., Rad Prot Dosim. 2008; 129(1-3)].
The main objective of this internship is to develop a personal whole-body dosimeter suitable for estimating the effective dose while wearing radioprotective garments. A model of such dosimeter has already been designed at the SCK•CEN by means of Monte Carlo calculations, but further improvement of its performance is still possible. The energy and angular dependence of the effective dose has already been calculated for photon exposure conditions of interest in interventional radiology and cardiology using the Reference Computational Male Phantom of ICRP 110 equipped with 0.5 mm lead garments. These results are used as a reference to evaluate the performance of the new dosimeter, which should provide a conservative estimation of the effective dose with minimum possible overestimation for all the exposure conditions considered. The idea of this project is to improve the design of current dosimeter elements by, for instance,
evaluating the effect of different filter materials, shapes and thicknesses, on the dose received by the radiation detectors of the dosimeter. This will, in turn, determine the dose response of the dosimeter. The energy and angular dependence of the dose estimated by the dosimeter will be investigated for different dosimeter geometries by means of Monte Carlo calculations using the radiation transport code MCNPX (the student will learn how to use this software during the
internship). Once the design of the dosimeter has been optimized, a prototype will be built and then tested under different irradiation conditions. A scientific report summarizing the work done during the inter

Number of weeks offered:	20 - 44	*Working environment:*	Research and development
Within the months:	01-NOV-2017 - 31-AUG-2018	*Gross pay:*	620 EUR / Month
Or within:	-	*Deduction to be expected:*	0
Holidays:	23-DEC-2017 - 01-JAN-2018		

Accomodation

Lodging will by arranged by:	employer	*Estimated cost of lodging:*	220 EUR / Month
		Estimated cost of living incl. lodging:	600 EUR / Month

Additional Information

Nomination Information

Deadline for nomination:	30-NOV-2017	*Please send nominations by*	Exchange Platform

Date: 25-SEP-2017 *On behalf of receiving country:* Annelies Vermeir