IAESTE BELGIUM

WORK OFFER

Ref. No. BE-2017-121UGE

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:	Biotechnology Energy Engineering Physics	*Study level:*	End (7 Semesters and over)	
Specialization:	Bioengineering Nuclear Energy Engineering Medical Physics	*Language required:*	English	Excellent

Other requirements:

Nationality: EU, Switzerland, USA, student status obligatory.

Work Offered

Title:
Optimization of personal dosimetry of medical staff wearing radioprotective garments
Introduction:
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 lead 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)].
Objective:
The main objective of this internship is to investigate possible options to adapt current personal dosimetry methodologies in order to improve the estimation of the effective dose of IR/IC medical staff wearing RP garments.
To achieve this, the energy and angular dependence of the effective dose will be calculated for RP garments made of different material compositions (lead, tungsten and bismuth composites) and thicknesses. Photon exposure conditions of interest in IR and IC will be studied. The Reference Computational Male Phantom of ICRP 110 will be used to calculate the organ doses needed for the effective dose calculation. Besides, the energy and angular dependence of the
estimated effective dose using the adapted personal dosimetry methodology will also be calculated for same exposure conditions. Results of the effective dose calculated with the virtual phantom wearing RP garments will be used as a reference to evaluate the performance of the adapted methodology. The goal is to provide a conservative estimation of the effective dose with minimum possible overestimation for all the exposure conditions considered. All dose calculations will be performed using the MCNP Monte Carlo code.

Number of weeks offered:	20 - 32	*Working environment:*	Research and development
Within the months:	01-MAR-2017 - 31-DEC-2017	*Gross pay:*	400 EUR / Month
Or within:	-	*Deduction to be expected:*	0
Holidays:	15-JUL-2017 - 06-AUG-2017		

Accomodation

Lodging will by arranged by:	emloyer	*Estimated cost of lodging:*	0 EUR / Month
		Estimated cost of living incl. lodging:	400 EUR / Month

Additional Information

Nomination Information

Deadline for nomination:	31-OCT-2017	*Please send nominations by*	Exchange Platform

Date: 22-SEP-2017 *On behalf of receiving country:* Annelies Vermeir