

POST DOCTORAL POSITION IN RADIOBIOLOGY MODELING

Dosimetric approaches for the treatment of amyloid plaques by BNCT

Workplace: IRSN, Fontenay-aux-Roses, France

Laboratory: PSE-SANTE/SDOS/LDRI

Duration: 18 months

Starting: January 2022

Context:

As part of its missions, the Institute for Radiological Protection and Nuclear Safety (IRSN) seeks to improve understanding of the mechanisms initiated by the interaction of ionizing radiation in living organisms. The Ionizing Radiation Dosimetry Laboratory (LDRI) develops simulation tools for the characterization of the topology of energy deposits based on the Monte Carlo code Geant4-DNA (geant4-dna.org) and the consequences in terms of cell fate. As a member of the Geant4-DNA collaboration, LDRI is making its developments public through this platform.

NECTAR (<http://fisica.unipv.it/NECTAR-EU-FETOpen/index.html>) is a European H2020-FET project that brings together the universities of Pavia, Turin, Milan, Stockholm and IRSN to evaluate the feasibility and safety of treating Alzheimer's disease with BNCT. Amyloid is a protein that can be found in the form of a simple fibril to an aggregate of variable dimensions, responsible for the disease. The goal is to specifically target amyloid aggregates with Gadolinium 157 nanoparticles (which has a large effective cross-section for neutron capture) and to take advantage of the secondary particles for the disaggregation of the amyloid plaques.

Mission:

The post-doctorate at IRSN is integrated into the NECTAR project and it aims at exploring the micro and nanodosimetric aspects of the effect of ionizing radiation (dose/effect relationship, preparation of data for treatment planning in the mouse model and in humans) by Monte-Carlo Geant4/Geant4-DNA modelling.

Activities:

- Contribution to the characterization of amyloid aggregates
- Modelling the effect of high LET secondaries under the different experimental conditions (Gd/B concentrations, amyloid concentrations)
- Micro and nanodosimetric simulations to perform the correlation with biological effect on aggregates

Profile:

- Good knowledge in radiation-matter interactions applied to radiobiology.
- Expert use of Monte-Carlo simulation tools (Geant4 is a plus).
- Good C++ programming skills.
- Ability to interact in the context of a multidisciplinary and international project.
- Communication skills in English.

For information and applications (CV, cover letter, publications and references):

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NECTAR project: <http://fisica.unipv.it/NECTAR-EU-FETOpen/index.html>