



Postdoctoral position in radiation dosimetry for Magnetic Resonance guided Radiotherapy

The LNHB (Laboratoire National Henri Becquerel) at CEA (Commissariat à l'énergie atomique et aux énergies alternatives), Paris-Saclay France, offers a postdoctoral position funded by the French metrology laboratory – LNE (Laboratoire National de métrologie et d'Essais). The position is for 12 months, starting as soon as possible. The LNE-LNHB has been the French National Metrology Laboratory for ionizing radiation since 1969, and is today one of the four French national laboratories, federated by the LNE to cover the entire domain of metrology. LNE-LNHB is using and developing specific instruments to maintain and upgrade the standards for activity (Becquerel) and dosimetry (Gray) measurements.

Magnetic resonance guided radiotherapy (MRgRT), employing the simultaneous use of MR-imaging and ionizing radiation treatment beams, offers a new powerful treatment modality. MR image guidance allows for good resolution soft tissue imaging during treatment without the need for imaging modalities using ionizing radiation (e.g. Cone Beam CT). The benefit of online MR-image guidance is the increased accuracy in the tumour volume definition and avoidance of additional exposure to radiation from CT. This allows hospitals for real-time imaging during treatment for enhanced verification of planned dose delivery and the adjustment of the planned dose distribution based on the actual patient anatomy. Several MRgRT facilities, from ViewRay and Elekta manufacturers, are already installed in French hospitals.

The influence of magnetic field on the absorbed dose delivered during the treatment, and on the dosimetry instrumentation, must be investigated. Following a previous European Metrology project on MRgRT, the LNE-LNHB proposes a research project at national level to develop a dosimetry method for the QA of this new treatment modality for French hospitals. The two main tasks of this project are :

- The establishment of a dosimetry standard based on calorimetry. A graphite calorimeter suitable to operate in magnetic fields is being built by LNE-LNHB.
- The tests under magnetic field of the method based on alanine dosimetry. Alanine is a good candidate for carrying measurements in magnetic fields, but further studies are needed in order to establish its performances in real conditions.

The candidate will start with bibliographic studies and participate to measurements with alanine dosimeters in the ViewRay MRIdian facility installed in the partner hospital (Institut Paoli-Calmette at Marseille), and their reading by electron paramagnetic resonance (EPR). Subsequently he/she will compare the performance of available Monte-Carlo codes for the transport of charged particles in magnetic fields, and use it to calculate the correction factors needed for alanine and calorimetry dose measurements. The candidate will also be involved in the construction and the testing of the new calorimeter.

Ideal candidates should have a recent Ph.D. degree in medical physics or dosimetry, with a significant experience in dose measurements and Monte-Carlo codes.

For technical enquiries, please contact

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In order to apply, interested candidates should submit their application through the CEA website:

https://www.emploi.cea.fr/offre-de-emploi/emploi-postdoc-dosimetrie-pour-la-radiotherapie-guidee-par-l-imagerie-temps-reel-par-resonance-magnetique-h-f_11983.aspx