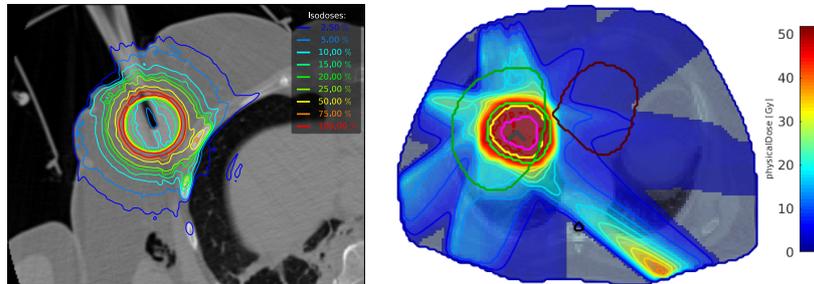


## Post-Doctoral Fellowship:

### Exploring deep learning for fast dosimetry in medical application



**Figure 1:** Numerical simulation of the irradiation dose in (left) intraoperative treatment for breast cancer and (right) in external beam radiotherapy for liver cancer.

#### Scientific context

Monte Carlo simulations (MCS) are using random sampling methods for solving physical and mathematical problems. They play a key role in medical applications, especially to treat cancer by radiotherapy. MCS simulate the interactions of the particles through the matter allowing to estimate the irradiation dose deposition within human tissue. This predictive dose is used to plan with accuracy treatment in radiotherapy. However, MCS time calculation is too heavy to be used in a clinical context. Instead clinical treatment planning systems (TPS) use analytical models to get the dose with lower accuracy and robustness. The aim of this postdoc is exploring IA technique in order to improve the calculation speed of Monte Carlo method in a context medical physics. We want to develop new generation of MCS and then new generation of TPS allowing a fast and accurate treatment for cancer.

#### Job description and missions

The job consists in researching and developing new methods based on IA especially in deep learning for MCS. Instead of learning the complete dose distribution within the patient we want to learn how a particle drop energy within matter. The aim is to investigate deep learning at the particle's navigation level, allowing fast dose estimation of any system and patient anatomy.

#### Profile

We look for a candidate with a PhD in computer sciences, image processing, computer vision or applied mathematics. Good programming skills is an important requisite. Autonomy, open-mindedness and motivation, as well as good English speaking/writing skills, are also expected. Some experience in deep learning and MCS is appreciated but not required. This position is a good opportunity to learn and master one of these topics.

#### Position context

The postdoc will join the INSERM UMR1101 Laboratory of Medical Information Processing (LaTIM, Brest, France). Our research group is composed of 20 peoples including PhD students and others postdocs. The future recruited postdoc will work in collaboration with different academic and hospital partners. The position will be for an initial duration of one year and could be renewable. Salary is about 2100 € net/month, depending on the candidate's experience.

#### Contact and additional information

For application, a folder that contains a CV, a motivation letter, a resume of the thesis, a complete list of publications, as well as letters of recommendation, have to be sent to the following e-mails:

Julien Bert ([julien.bert@univ-brest.fr](mailto:julien.bert@univ-brest.fr))