Post-doctoral position
Compartment-specific diffusion modeling in the brain

**Job description:** The present offer is for a 4-year post-doctoral position funded by a grant from the European Research Council (LactaDiff project, PI: Julien Valette) and available now. The post-doc will work on the development of diffusion modeling. These new methods will be evaluated on data acquired in rodents and humans at 11.7 T.

More specifically, she/he will be developing models to predict diffusion-weighted MR signal inside different cell populations (neurons and astrocytes) and in the extracellular space. Conversely, diffusion-weighted MR spectroscopy data will be analyzed to determine the relative fraction of brain metabolites, and in particular lactate, in these different compartments. Modeling will be mostly based on numerical simulations of diffusion inside microstructure as directly extracted from ex vivo optical or electron microscopy, or inside parameterized geometries that remain to be implemented to some extent, in particular for the extracellular space. Analytical models will also be considered if relevant.

Another aspect of the research will consist in combining compartment-specific diffusion modeling with chemical exchange saturation transfer (CEST) and compartmental exchange, to analyze diffusion-weighted CEST MRI data and tentatively extract information such as compartment-specific water diffusion and preexchange lifetime.

**Location and environment:** The work will be performed in MIRCen, a preclinical research center part of the French Atomic Energy Commission (CEA), located in the CEA site of Fontenay-aux-Roses (5 km south from Paris). MIRCen is equipped with state-of-the-art 11.7 T MRI scanner for rodents, and provides on-site expertise and access to confocal microscopes, gene transfer... Collaboration will be tight with CEA/NeuroSpin, which is just a few km away and will soon operate an 11.7 T clinical MR.

**Candidate profile:** The candidate should hold a Ph.D. in biophysics/physics/computer sciences or related fields. Salary will be commensurate with experience (past post-docs, etc…). He/she should be highly motivated, creative, and willing to collaborate with people having different backgrounds, in particular neurobiologists. The candidate should be fluent in English or in French. The candidate should be an expert in at least one of the following domains, and willing to deeply engage in the others:

- MR physics and sequences, diffusion-weighted MR.
- Diffusion physics and mathematics.
- Computer programming and computational methods, including Matlab and C languages, 3D modeling and rendering, Monte Carlo simulations, parallel computing, GPU programming, machine learning.

**Contact info:** CVs and application letters, as well as requests for additional information, should be sent to Julien Valette by email at the following address: julien.valette@cea.fr