



# IBEB

Instituto de Biofísica e Engenharia Biomédica

## **Announcement for Post-Doctoral candidate position**

PET Physics Group at Jülich Research Centre – Germany

Functional Imaging and Clinical Applications Group - Institute of Biophysics  
and Biomedical Engineering – Portugal

The PET Physics Group at Jülich Research Centre – Germany and Institute of Biophysics and Biomedical Engineering – Portugal are searching for highly motivated candidates to submit a research project proposal to an European Financing Agency (either national or EC-based). Candidates must have a Ph.D. in Physics, Medical Imaging, or related area.

The candidate must have a proven knowledge on C/C++ programming and statistics. Knowledge of IDL, ITK, GATE and ROOT and previous publication on the field of Image reconstruction for medical imaging are desirable.

The project to be developed aims at a new approach to regularize tomographic PET projection data before 3D image reconstruction (patent pending). For the reconstruction of the processed PET data the “PET Reconstruction Software Toolkit” (PRESTO) developed in Jülich is available. PRESTO allows the iterative fully 3D PET image reconstruction using unconventional discretisation of image space as well as projection space to generate highly compressed system matrices.

Basically, for the project a new regularisation method of the reconstruction's input data has to be implemented and evaluated. The method exploits the limited detector resolution of a specific PET system to reduce variance in the statistical data. For it, the detector responses of true Lines-of-Response obtained either with empirical models, measurements and/or detailed detector simulations (e.g. with GATE) allows to determine “inverse detection probabilities” using to the Bayes Theorem. First, simple empirical models to take detector crystal sizes into account should be evaluated. Finally, the evaluation of detailed detector simulations will follow to achieve the precise resolution modeling needed for the new regularization procedure.

If funded, the successful candidate will implement modulus to handle the statistical evaluations related to the Bayes Theorem, to reduce the effort of simulations, and validate the implemented method with consistent synthetic data and real data.

Interested candidates should contact (until 31 July 2010):

Prof. Pedro Almeida

Instituto de Biofísica e Engenharia Biomédica

Faculdade de Ciências da Universidade de Lisboa

e-mail: [palmeida@fc.ul.pt](mailto:palmeida@fc.ul.pt)