

Post-doc Biomedical Optics Development and validation of 3D signal reconstruction algorithms for fluorescence tomography in the second biological window (SWIR)

Supervisor: Anabela Da Silva

Tel : +33 4 13 94 54 79

Email : anabela.dasilva@fresnel.fr

Team : DiMABio, Institut Fresnel/CERIMED

Address: Institut Fresnel, Av Escadrille Normandie-Niémen, 13397 Marseille Cedex 20

We propose an 18-month fixed-term contract for a post-doctoral fellow in the field of modeling and image processing for imaging in biomedical optics. The mission is part of a collaborative project between the Fresnel Institute in Marseille, the Optimal platform of the Institute for the Advancement of Biosciences (IAB) in Grenoble, and the company Kaer Labs in Nantes, for the development of a fluorescence tomography system in the second biological window. The mission of the researcher will be to develop 3D reconstruction algorithms for the localization of fluorescence sources. It will take place mainly at the Fresnel Institute and at Kaer Labs, with occasional trips to the IAB. This recruitment offer is part of the France Relance plan on a research collaboration project with a company that will be submitted to DRARI for validation.

The project consists in developing a system similar to the one described in the publications [1-4] but in the spectral range called "NIR-II" (1000 to 1700 nm). Optical biomedical imaging is a non-conventional imaging technique rapidly expanding. The objective of the development of the NIR-II fluorescence tomography system is to provide a non-invasive imaging technique capable of detecting and characterizing, in the most quantitative way possible, fluorescent sources located in deep organs in living organisms (rodents). The technique uses non-ionizing radiation in the so-called SWIR (short wave infrared) spectral range (from 900 nm to 1700 nm, the second biological window), where biological tissues have lower scattering coefficients than in the visible or near infrared range.

The successful candidate will join a team of several researchers involved in specific research projects, notably in polarization imaging and photoacoustic tomography.

Profile required

The main skills required for the project are high performance scientific computing and signal and image processing. Knowledge of physical models would be a plus.

Post-doctoral applicant with a PhD in applied mathematics or signal/image processing or similar field, graduated during the academic years 2019-2020 or 2020-2021.

Languages: C/C++, Python, MATLAB, VTK,...

Autonomy

Experience

Duration of the mission: 18 months

Start date: TBD

To apply: <https://bit.ly/2QTvc8P>

[1] L. Hervé, A. Koenig, A. Da Silva, M. Berger, J. Boutet, J.M. Dinten, P. Peltié, P. Rizo, *NonContact Fluorescence Diffuse Optical Tomography of Heterogeneous Media*, Applied Optics **46**(22), 4896- 4906, 2007.

[2] L. Hervé, A. Da Silva, A. Koenig, J.-M. Dinten, J. Boutet, M. Berger, I. Texier, P. Peltié and P. Rizo, *Fluorescence tomography enhanced by taking into account the medium heterogeneity*, Nuclear Instruments and Methods in Physics Research A, **571** (1-2) 60–63, 2007.

[3] Anne Koenig, Lionel Hervé, Véronique Josserand, Michel Berger, Jérôme Boutet, Anabela Da Silva, Jean-Marc Dinten, Philippe Peltié, Jean-Luc Coll, Philippe Rizo, *In vivo mice lungs tumors follow-up with fluorescence diffuse optical tomography*, Journal of Biomedical Optics **13**(1), 011008 2008.

[4] Koenig A, Hervé L, Gonon G, Josserand V, Berger M, Dinten JM, Boutet J, Peltié P, Coll JL, Rizo P. Fluorescence diffuse optical tomography for free-space and multi-fluorophore studies. J Biomed Opt. 2010 Jan-Feb;15(1):016016. doi: 10.1117/1.3309738. PMID: 20210462.