

Title: Industrial Research program PhD Thesis ALPhANOV/LaBRI.

Position Summary:

ALPhANOV is a technological center specialized in lasers and photonics based in Talence in France.

ALPhANOV is leading a new project "XPulse" focused on design and development of a medical imaging system using laser based x-rays for breast cancer application. The XPulse project is a collaborative R&D project involving industrial, clinical and academic partners and is funded by the Nouvelle Aquitaine region in France and the EU for a 5 years period.

The successful candidate will assume the leading role in development of image reconstruction, image processing and image analysis algorithms with emphasis with clinical and industrial partners.

You will work on developing a new methodology for 3D reconstruction of X-ray phase contrast and spectral imaging in biological samples. You will participate in setting up the experiments and in acquiring data within the XPulse setup.

You will work on extending the 2D phase contrast and spectral imaging algorithm into a 3D algorithm. Rather than performing 3D reconstruction on phase contrast and spectral retrieved projections, your goal will be to perform directly a 3D reconstructed volume from the initial data in order to reduce processing time and to achieve better resolution and contrast.

This work will be carried out using experimental X-ray imaging setups available at ALPhANOV. This setups are based in two kind of X-ray sources: a micro-focus metal jet source and a laser based X-ray source. Multiple detector technologies can be used to acquire the images: Photon counting detector, flat panel detector...

Responsibilities:

- Programming and testing of algorithms and routines for image reconstruction, image processing/segmentation and image analysis.
- Development and implementation of innovative integrated reconstruction method for phase contrast and spectral imaging
- Empirical evaluations of x-ray based imaging systems and techniques.
- Interact with collaborators/Partners from other institutions and organizations.
- Collaborate in preparation of manuscripts for publications, presentations at conferences, and for grant applications.
- Participate in the development of protocols for pre-clinical and clinical tests.

Knowledge, Skills:

- Should have strong computational skills
- Computer programming experience with C/C++, and Python.
- Experience in image processing and segmentation.
- Abilities in technical writing and scientific communication.

Minimum Qualifications: Master's degree in computing, applied mathematics, engineering, medical imaging...



Preferred Qualifications:

- Knowledge of the principles and techniques of x-ray imaging systems and methods.
- Knowledge/Experience with implementing reconstruction algorithm.
- Knowledge/Experience with GEANT4 or similar Monte Carlo modeling toolkit.

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