3IA Institut interdisciplinaire d'intelligence artificielle Côte d'Azur.

- **Post-doc position**: Modelling extracellular matrix from multispectral images

- **Research axis of the 3IA**: axis 3 AI for Computational Biology and Bio-inspired AI

- **Supervisor**: Laure Blanc-Féraud, CNRS, Morpheme team (I3S, INIRA SAM, iBV), laure.blancferaud@cnrs.fr

- **Co-supervisors**: 
  
  Xavier Descombes, INRIA, Morpheme team (I3S, INIRA SAM, iBV), Xavier.Descombes@inria.fr
  
  Ellen Van Obberghen-Schilling, INSERM, iBV, Ellen.VAN-OBBERGHEN@unice.fr

**Laboratory or research group**: laboratoire I3S, équipe MORPHEME, commune INRIA SAM, I3S, iBV

**Remuneration**: according to experience

**Teaching obligation**: the 3IA postdoctoral fellows are subject to a teaching obligation of 64 hours per year

- **Description**: 

  The project concerns imaging of extracellular matrix (ECM) components unregulated in cancer, and involves the development of image processing tools for modeling and analysis of ECM networks in tumor tissue. Work in progress is based on confocal fibronectin images and uses graph modeling and graph matching or optimal transport to define distances capturing the evolution of geometric structures, e.g. fibronectin network. Recent advances in microscope technology now allows to image with high resolution large areas of the different components of ECM (i.e not only fibronectin, but collagen, tenascin C...) in one multispectral image, using a combined scanner multispectral imaging system that produces high-resolution images at high throughput. Such a system is now available at the Université Côte d’Azur. Analyzing these images involve several additional difficulties and image processing questions that are not yet resolved by standard software: detection and modeling multiple fibrillar structures such as fibronectin, tenascin C and collagen, unveils interactions between the biological components (matrix fibers, malignant and non-malignant cells of the tumor microenvironment) and takes advantage of massive data by introducing learning components into image processing tools. The image processing tools involved in this research are segmentation/detection, graph modeling and analysis, graph correlation, learning. This is an interdisciplinary research, which aims to develop new AI methods and algorithms to analyze and extract valuable quantitative information on EMC to obtain biologically and clinically relevant results.

  This project falls within the 3IA Chair of Laure Blanc-Féraud and within a digital pathology initiative in collaboration with Ellen Van Obberghen-Schilling, iBV. (biology Lab).