# Simon Labouesse

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## Latest Professional Position

- **Contract Research Engineer at CBI (Toulouse, France)** **01/07/2022**
  Optimization of illumination patterns for Random Illumination Microscopy (RIM)
  Achieved a 10x speed increase (patent filed)
  Developed a real-time reconstruction algorithm in C++ named AlgoRIM (APP filing in progress)

## Professional Career After PhD

- **Postdoctoral Fellow at IBDM (Marseille, France)** **01/07/2020 - 31/12/2021**
  Installation and development of a Random Illumination Fluorescence Microscope (RIM)

- **Postdoctoral Fellow at CU Boulder (Boulder, USA)** **01/02/2018 - 31/01/2020**
  Development of new optical imaging modalities (Optical fiber, s-SNOM)

## PhD Thesis

- **PhD at the Fresnel Institute (Marseille, France)** **01/11/2014 - 01/10/2017**
  Doctorate in Optics, Photonics, and Image Processing
  Study of active imagers with unknown illumination. Development of algorithms for fluorescence microscopy with speckle illumination.
  Supervisors: Dr. Anne Sentenac (anne.sentenac@fresnel.fr), Dr. Marc Allain (marc.allain@univ-amu.fr)

## Higher Education

- **General Engineering Degree** **2013–2014**
  École Centrale de Nantes, Nantes, France

- **Double Master's Degree in Automation, Signal, and Image Processing** **2013–2014**
  École Centrale de Nantes, Nantes, France

## Professional Career Before PhD

- **Master's Internship at IPHT (Jena, Germany)** **02/04/2014 - 30/09/2014**
  Structured Illumination Microscopy (SIM)
  Improvement of a SIM reconstruction algorithm (coding in Matlab and Julia). Comparison of different SIM illumination patterns (harmonic and dot matrix).
  Supervisor: Professor Rainer Heintzmann (heintzmann@gmail.com)

- **Gap Year Internship at ISIT (Puy-en-Velay, France)** **08/04/2013 - 09/08/2013**
  Surface meshing from noisy data
  Development of a meshing algorithm from a noisy point cloud (coding in C++).
  Supervisor: Assistant Professor Antoine Vacavant (antoine.vacavant@uca.fr)

- **Gap Year Internship at ATEME (Vélizy-Paris, France)** **21/05/2012 - 31/03/2013**
  Creation and demonstration of an HEVC video encoder
  Creation of an HEVC video encoder (coding in C++), first satellite transmission of a 4K HEVC video stream.
  Supervisor: Director of Research and Innovation Jérôme Vieron (j.vieron@ateme.com)

## Summary of Activities

**Research Activities**

- Super-resolved fluorescence microscopy based on unknown random speckle illuminations
  - Joint estimation of the object and illuminations
  - Creation of a deconvolution algorithm with sparsity and positivity constraints (preconditioned primal-dual splitting PPDS)
  - Marginal estimation
  - Study of asymptotic resolution capability
- Rapid imaging through multimode optical fibers
  - Compressed sensing acquisition
  - Use of a fast 1D spatial light modulator (SLM) (350 kHz) for 2D optical modulation through a diffusing optical element
- Sampling reduction in hyperspectral imaging (scattering scanning near-field optical microscopy s-SNOM)
  - Combination of compressed sensing techniques and low-rank matrix completion
  - Adaptive random sampling
- Aberration correction without a spatial light modulator (SLM)
  - Block convex optimization

**Teaching Activities**

- **Computational Imaging**, PhD level in English, 1h15 of lectures, 2018–2019
- **Compressed Sampling**, PhD level in English, 1h15 of lectures, 2018–2019
- **Signal and Image Acquisition and Processing**, Master's level, 30h of tutorials, 2016–2017
- **C Programming Language**, Bachelor's level