

Internship Specification: Laser-Based Instrument Development in Biophysics

Duration: February – June 2024

About the Project:

The Department of Physics at the University Cote d'Azur is seeking highly motivated and enthusiastic Master's students to work with Gian Luca Lippi on the development of a state-of-the-art laser-based instrument for the analysis of biological samples. This project lies at the intersection of physics, optics, and computer vision, offering a unique opportunity to contribute to cutting-edge research in the field of biophysics.

The project concerns the development of an acoustofluidic interferometric device. The device uses interferometric methods to measure the physical properties of single cells in microfluidic channels. The technique has been previously demonstrated in a research environment, and is now undergoing a maturation process with an external collaborator (SATT Sud Est) to identify its use in commercial applications. Several applications have already been identified and help is sought to further develop the device, as well as gather data and feedback on its use.

As an intern, you will participate in the development and optimization of the instrument. At present the device is a bench-top instrument, but the goal is to achieve a portable device, which can be transported to application sites in order to demonstrate potential biological applications. You will assist in the integration of parts in the device and initial testing at application sites. This project involves the integration of advanced optics, laser technologies, and computer vision algorithms to achieve quantitative measurements of cell structural characteristics. By taking part in the project you will gain practical experience in the development of optical instrumentation, improve your skills in data analysis and develop hands-on experience in the laboratory.

Responsibilities:

1. **Laser Technology Integration:** Work on integrating laser sources into the system, optimizing parameters for sample analysis.
2. **Computer Vision Implementation:** Collaborate on implementing computer vision algorithms for data analysis and image processing.
3. **Data Analysis:** Develop Python scripts to analyze experimental data, extract meaningful information, and contribute to the interpretation of results.
4. **Documentation:** Maintain detailed documentation of experimental setups, procedures, and software implementations.

Desirable requirements:

The candidate should be enrolled in a Master's program in Physics, Engineering, or a related field, possessing a strong interest in optics, laser technologies, and computer vision. Although no previous experience in the field is required, a basic understanding of laser physics and Python programming, with skills in NumPy and SciPy, is advantageous. The ability to work independently and collaboratively in a research environment is expected, using problem-solving and analytical skills.

Application Process:

To apply, please submit your CV, a cover letter outlining your interest and relevant experience to Gian-Luca Lippi <Gian-Luca.LIPPI@univ-cotedazur.fr>.