

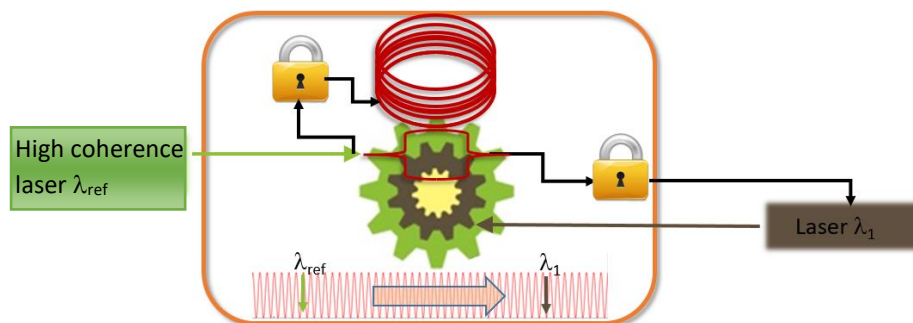
Internship for master 2020 Photonics systems

Fiber Interferometer and Laser Frequency Metrology

Keywords: *Laser, Noise, Spectrum, Optical fiber, Interferometry, Servo, Metrology*

What is laser interferometry? Laser interferometry uses the purity of the wave generated by a laser in association with a phase sensitive interferometric optical system to perform high sensitivity measurement. It is with this principle that gravitational waves have been recorded for the first time in 2015.

What is laser frequency metrology? Frequency metrology of lasers deals with the spectral properties of coherence of the wave generated by those sources. Lasers are now the building bricks of the most stable optical clocks in the world. Numerous other domains such that sensors, optical coherent telecommunications, quantum engineering, benefit from the unique spectral properties of lasers.



Spectral transfer interferometer

What are we working on? Our team are interested in new concepts for laser frequency stabilization and measurement. We study the potential of a new technique to transfer the coherence between lasers of different wavelengths with a fiber based Michelson interferometer. By locking one of the resonance frequency of the interferometer on a high coherence laser (« master » laser), all the interferometer modes are stabilized thanks to the strong correlation between refractive index and dispersion in optical fiber. Then, one or several other lasers can be locked on other modes and acquire the coherence of the « master » laser. We have already validated a very low noise technique of double locking on a fiber interferometer which made possible to reach a fundamental noise floor from non-linear origin which had never been exhibited before. The internship subject, mainly experimental, will consist in the implementation of the locking of the interferometer on the « master » laser and the characterization of the performance of the spectral transfer of coherence with a new “mini” frequency comb

The laboratory: ARTEMIS is located on a hill at the Est of Nice about 20 km from the city center. It belongs to the Observatoire de la Côte d'Azur and is associated to CNRS and the University of Nice. It is a member of the national network of excellence in time and frequency and is strongly involved in the realization of the gravitational wave detector Advanced VIRGO. The laboratory have a large expertise in ultra-low noise measurement and laser locking which has been in particular acknowledged by the award of the highest French scientific award to its founder in 2017.

Profile of the successful candidate : Student in optics-photonics master, you have general knowledge of signal processing, an interest for measurement and instrumentation, interest in measurement, instrumentation, physics systems and experiments, you are persevering and able to work in team.

Contact : Dr Fabien Kéfélian : fabien.kefelian@oca.eu Web : <https://tinyurl.com/sytras>