ASTROPHYSIQUE RELATIVISTE – THÉORIES – EXPÉRIENCES - MÉTROLOGIE - INSTRUMENTATION - SIGNAUX
Observatoire de Nice, Boulevard de l'Observatoire, CS 34229, 06304 Nice cedex 4

PhD Position available starting sept. 2021

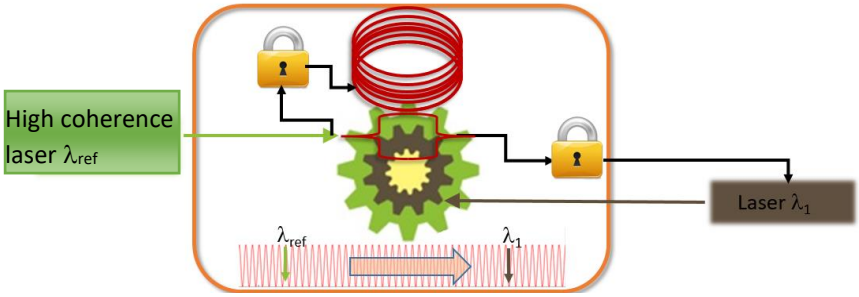
in ARTEMIS Lab, NICE, France

Join the LASER Frequency Metrology Research

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 is the quantitative study of 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? We are interested in new concepts for laser frequency stabilization and measurement using fiber-based interferometer. We study experimentally the potential of a new technique we have introduced to transfer the coherence between lasers of different wavelengths with a fiber-based Michelson interferometer. The principle is based on the locking of the interferometer resonance frequency onto a high coherence laser in order to create a stable passive comb to stabilize other laser wavelengths. We have already experimentally validated a technique of locking with very low noise ($<10^{-16}$ $1/Hz^{1/2}$) allowing to highlight a fundamental noise floor due to non-linear effect. The current topics of interest are to realize low noise locking of the optical interferometer length with piezo-electric and electro-optic devices, characterize the spectral transfer performance over 10 nm with a special phase modulator, understand the correlation between refractive index and dispersion fluctuations and try to probe the impact of thermodynamical noise. The objectives of your PhD, mainly experimental, will be fixed in accordance with your specific skills. Web : https://tinyurl.com/sytras

The laboratory: ARTEMIS is located about 20 km from the city center of Nice, France. It is part of the Observatoire de la Côte d'Azur and is associated to CNRS and the University Côte d'Azur. It is a member of the national network of excellence in time and frequency First-TF, of the national equipment of excellence for ultra-stable frequency transfer REFIMEVE+ and is strongly involved in the realization of the gravitational wave detector Advanced VIRGO. The laboratory members have a large expertise in ultra-low noise measurement and laser locking which has been acknowledged by the award of the highest French scientific award to its founder in 2017.

Profile of the successful candidate : You're in last year of master or engineer degree in optics-photonics, experimental physics or electrical engineering with photonics or optoelectronics knowledges, you have general knowledge of signal processing, an interest for measurement and instrumentation, physics systems and experiments, you are persevering and able to work in team. Speaking French is not required.

How to apply? If you are interested by this research topics and motivated by preparing a PhD, please send an e-mail, in English or French, with your CV and motivation letter to: Dr Fabien Kéfélian : fabien.kefelian @ oca.eu .

What are the financial aspects? Funding for a 3-years PhD has been granted by the Excellence network in Time and Frequency FIRST-TF. The net salary will be between 1460 €/month and 2100 €/month depending on cofunding and +200 €/month with teaching activity.