



**Master thesis  
Master Recherche / PFE  
(5 to 6 month)**

**Micro-heaters for integrated laser tuning**

IMEP-LaHC is working on integrated optics since a few decades and is one of the leading laboratories in the field of photonics on glass. A current objective of the team "PHOTO" of this institute is to fabricate carriers of GHz to THz frequencies for future telecommunication systems and THz spectroscopy. The carrier signal is produced by the interaction on a rapid photodetector of two integrated optics lasers fabricated on the same substrate.

Such a device has already been demonstrated in a previous PhD thesis carried out at IMEP-LaHC [1]. The GHz or THz frequency is fixed by the design of the laser cavities and cannot be modified once the device has been fabricated. This internship is dedicated to obtaining a variable-frequency output by varying the temperature of one of the lasers. This temperature variation will be achieved by integrating a micro-heater on the device.

There are two parts to this internship:

- The first task is to use the existing literature and Comsol simulations to design the thin metallic layer which will constitute the micro-heater. Simulations will also be used to predict the temperature increase on the waveguide and the tunability of the produced carrier that can be expected.
- The second task is to fabricate the micro-heaters in a clean-room environment. Electrical and optical characterizations of the fabricated heaters will then be carried out by the intern and compared with the expected behavior of the device.

This internship thus requires a student with an inclination for both simulations and experimental work. Some knowledge about integrated optics and an experience with clean room environment will be appreciated.

This Master's subject thesis is a preliminary work for a future PhD subject on the same topic, but could also lead to a PhD thesis on another subject within the PHOTO team of IMEP LaHC.

[1] N. Arab, "Optique intégrée sur verre pour la génération de fréquences radio", PhD Thesis at Grenoble-INP, <http://www.theses.fr/2018GREAT102>

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