

Master and Engineer Internship: 2018-2019

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Research group : THz Photonics

Title : PHOTONICS TERAHERTZ EMITTER BASED ON A HIGHLY DISTRIBUTED PHOTOMIXER

Abstract :

A large number of chemical species have absorption lines lying in the Terahertz frequency range, which is thus a very interesting spectral range for molecular spectroscopy applied to earth, planetary, and space science.

One of the most promising THz continuous-wave (CW) sources working at room temperature is based on the photodetection of the beating frequency generated by two spatially overlapped infrared lasers. It is the so called photomixing THz source. This down converting between very high frequency (~300 THz) infrared lasers is intrinsically wideband.

In the framework of a project granted by the french research national agency, in collaboration with the Physics Institut of Rennes, a new architecture of photomixers is studied by the THz photonics group in order to develop a wideband and powerful photomixing source. It is based on a highly distributed photoconductor (HDP) in which the optical pump propagates in the same direction as the generated THz waves. A constructive interference of the THz waves generated along the photodetector occurs if the velocity of the optical wave and the THz wave are equal. The goal of this internship is to perform firstly the electromagnetic design of these two coupled waveguides by means of simulation softwares such as CST microwave studio, Comsol or lumerical. In a second step, the trainee will be involved in the fabrication and the characterization of the waveguides.