Bachelor/Master Project: THz radiation on demand

In the PSN group we are interested in the strong interaction between light and matter. This is a quickly evolving field of research in which new materials, experimental techniques and theories are realized continuously. In our group, we have developed a unique near-field microscope that can generate and detect radiation in the deep infrared region of the electromagnetic spectrum, i.e., the terahertz (THz) frequency range. This region holds great promise for applications in non-invasive testing, imaging and spectroscopy, as well as high speed wireless communication. These applications will benefit greatly from the development of structures that could achieve switching on ultra-fast timescales. We work with resonant structures that can strongly couple THz radiation with matter to achieve this ultra-fast switching. Our unique microscope can map the local electric field vectors near these structures (see Figure), thereby gaining new insight into the fundamental processes in these strongly coupled systems. Project goal: Design a resonant system that can capture, hold and release THz radiation on demand, showing ultimate control over the propagation of radiation through that system. This research will provide new ways to store and process information without the need of converting it to electrical signals.

Skills that you will acquire: working with (ultra-fast) laser systems, working with optics, simulate, create and measure your own photonic structures.

Further information: If you are interested in this project, please contact Prof. Jaime Gomez-Rivas (j.gomez.rivas@tue.nl) or Niels van Hoof (n.j.j.hoof@tue.nl).

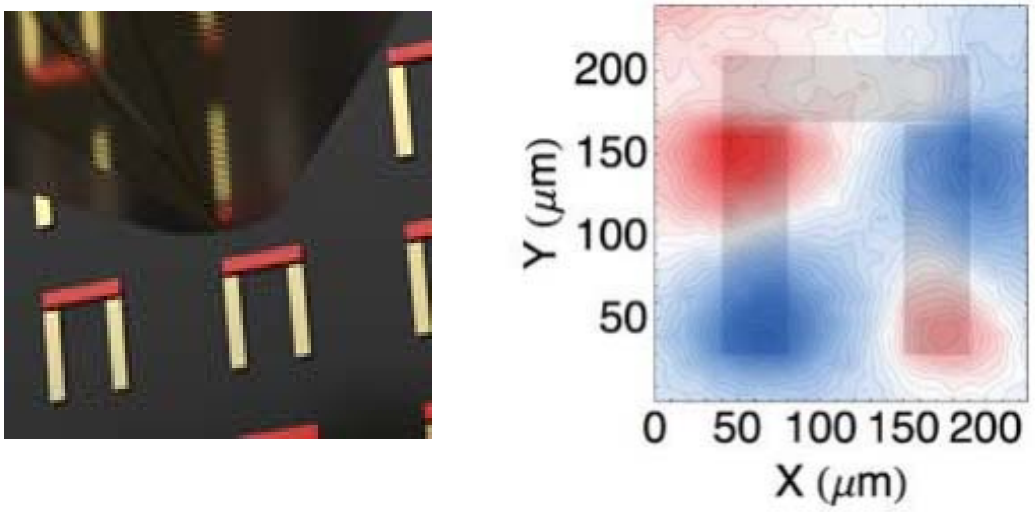

Figure 1:(left) Schematic representation THz near-field measurement. (right) Resonant THz near-field amplitude measured on a dolmen structure formed by a horizontal gold rod and two vertical gold rods.