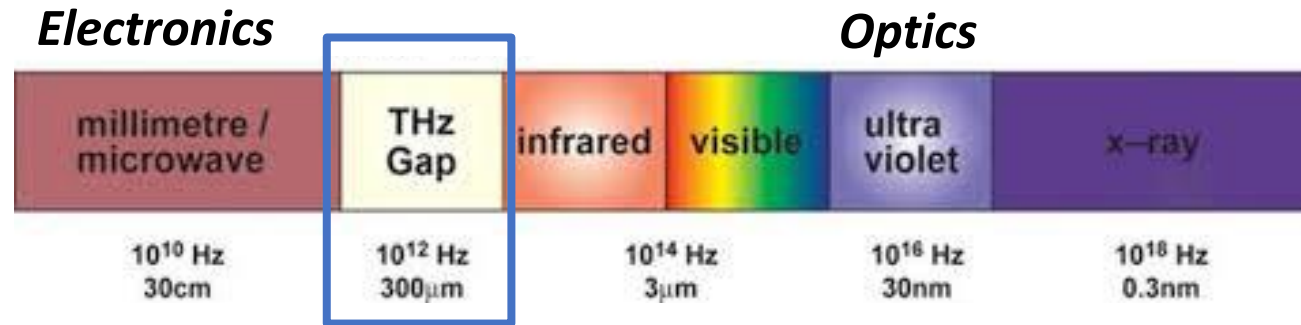


Using Terahertz radiation to probe charge carriers...



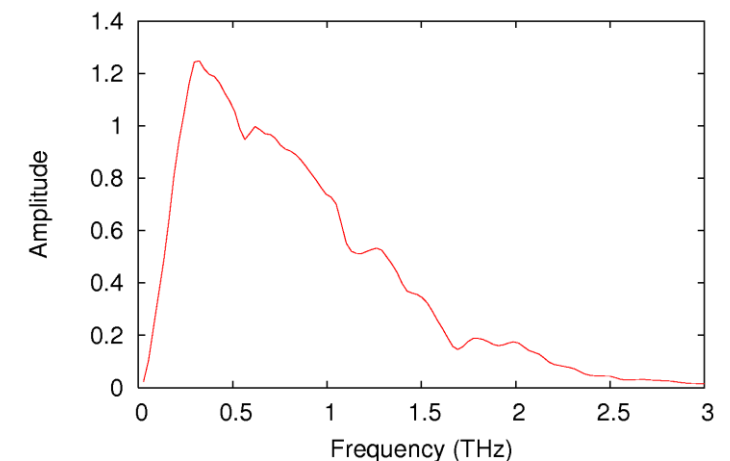
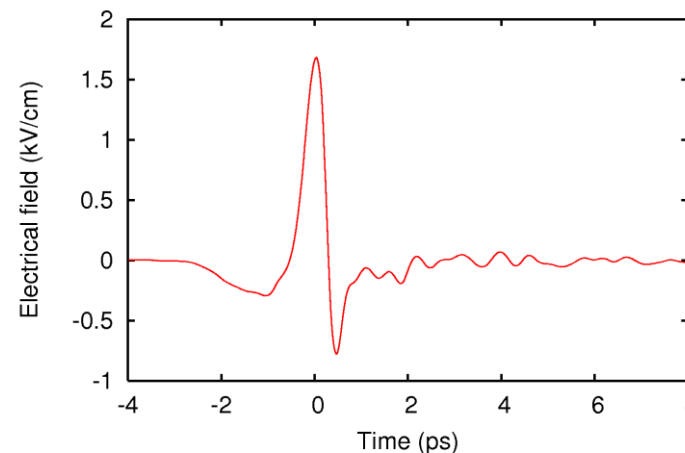
THz radiation is situated in a 'spectral gap' between electromagnetic radiation generated through electronics (to the red) and optics (to the blue)

Recent advances in ultrafast laser technology have made it possible to

Generate short (single-cycle)
pulses of THz radiation

and

Detect their electric field
(and with it the complex-valued spectrum)



... with Terahertz Time-Domain Spectroscopy

We can use THz TDS to measure *electrical conductivities by optical means* in materials as established as silicon and as exotic as graphene.

What you will learn and do:

- Generate and detect coherent THz radiation using photoconductive antennas and nonlinear optical crystals
- Build a THz TDS measurement setup
- Extract electrical conductivities of semiconductors from contact-less optical THz measurements and extract relevant parameters like charge carrier mobility

What you should bring:

- Basic knowledge of solid-state physics and (laser) optics
- Programming skills in Matlab or Python for data analysis

See also:

Reviews of Modern Physics, Vol. 83, No. 2, pg. 543 <https://www.mpip-mainz.mpg.de/en/bonn>