



# › Allgemeines Physikalisches Kolloquium

› **Donnerstag, 17.11.2016 um 16 Uhr c.t.**

*Prof. Dr. Martin Koch*

Department of Physics, Philipps University Marburg



## Terahertz Spectroscopy: from basic research to real world applications

In the last few years spectroscopy at terahertz (THz) frequencies, i.e. in the range between 0.1 and a few THz has enjoyed increasing interest for two reasons. Firstly, a lot of fundamental excitations in matter have transition energies in the meV range. Hence, they can be excited by THz photons. Examples include molecular vibrations, phonons in crystalline solids and intra-excitonic transitions; to name only a few. Secondly, a multitude of applications have been discussed for THz systems, ranging from medical diagnostics and security applications to the monitoring of industrial production processes.

In this talk we first will give examples for basic research applications of THz spectroscopy systems. In particular we study the density dependence of exciton formation in bulk germanium using optical pump-THz probe spectroscopy. Besides, we show that the 1s- 2p transition has a shoulder and is composed of two distinct resonances which arise from the mass-anisotropy of L valley electrons.

Furthermore, we will discuss several real-world applications of THz spectroscopy systems and the recent progress in the development of these systems.