

## O 1: Overview Talk Bärbel Rethfeld

Time: Monday 9:30–10:15

Location: S054

**Invited Talk**

O 1.1 Mon 9:30 S054

**Laser-excited electrons: how hot are they?** — •BAERBEL RETHFELD — Department of Physics and Research Center OPTIMAS, TU Kaiserslautern, Germany

Hot electrons play an important role in surface science. They are responsible for the functionalization of solar cells and the emission of intense THz beams, they drive chemical reactions at surfaces and are utilized in biosensing methods. Excitation and decay as well as transport of laser-excited electrons are fundamentally studied in pump-probe experiments using photoemission methods.

The term “hot electrons” is, however, not well-defined. It is used for single laser-excited electrons, for non-equilibrium electron distributions, and for Fermi distributions at elevated temperature. In all

cases, the relaxation of such electrons towards an equilibrated situation is of interest. Its dynamics may be complex, since several scattering mechanisms act on different timescales. Therefore, athermal electron distributions as well as highly excited electrons can exist much longer than the single-electron lifetime predicts.

In this presentation, I introduce the calculation method of Boltzmann collision integrals, allowing to study the effect and mutual influence of different scattering mechanisms. I further show how such intertwined relaxation processes affect measurable macroscopic quantities on ultrafast timescales, particularly in multiband materials. Examples include the electrical conductivity in highly excited noble metals, spin and charge transport in magnetically ordered systems and the non-thermal electron-phonon coupling strength in metals and dielectrics.