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Ultrafast photo-induced dynamics in bi-stable charge transfer materials.

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Charge transfer materials are bi-stable systems where an external stimulus that can be provided by temperature, pressure or light is capable to induce an electron transfer between two metallic atoms. The resulting change in the electronic configuration can alter the electrical, magnetic and optical properties of these materials. The use of light to trigger these changes is particularly interesting from the point of view of both fundamental science and practical applications.
In this thesis optical pump probe spectroscopy is used to study the dynamics of the charge transfer in various systems. The sample is excited using a laser pulse (pump) and the resulting change in the optical signature is measured by another pulse at a different energy (probe). By changing the optical path of one of the lasers it is possible to introduce a variable time delay between the two and thus measure the evolution of the optical properties of the sample with a time resolution in the order of hundreds of femtoseconds. By changing the pump's energy it is possible to target different absorption bands in the sample and reach different excited states; this can lead to a change in the time evolution of the system's relaxation.
Further developments for the project will include a more thorough investigation of different charge transfer materials in order to study their response as function of the excitation energy and time.

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