

## Ultrafast Nanooptics

The coherent broadband optical excitation of nanostructures forms the basis of the emerging field of ultrafast nanooptics. In metallic nanostructures and hybrid nanostructures, electromagnetic excitations tend to be highly localized and strongly enhanced. The coherent excitation of such nanostructures by ultrashort light pulses adds the temporal degree of freedom and allows for controlling the spatiotemporal properties of these nanolocalized fields. The spatio-temporal evolution of such optical near-field distributions could play a key role in a variety of important applications across the disciplines, including the realization of novel laser structures, the exploitation of optical nonlinearities for ultrasensitive chemical and biological probing, and the development of enhanced single-photon sources for quantum communication. Starting from the fundamentals of nanooptics and ultrafast optics this talk will provide an overview of recent progress in the field of ultrafast nanooptics, in particular focusing on the application of adaptive methods in nanooptics and the prospect of developing new space- and time-resolved spectroscopic methods.