

## **Novel approaches for high-order harmonic spectroscopy of atoms and molecules**

Caterina Vozzi

Istituto di Fotonica e Nanotecnologie, Consiglio Nazionale delle Ricerche (CNR-IFN), Italy

Attosecond science aims at the study of ultrafast dynamics occurring in atoms and molecules. This study is based on high-order harmonic generation (HHG), a highly nonlinear process taking place in materials interacting with ultrashort laser pulses. HHG is a sensitive probe of atomic and molecular structures with extreme temporal and spatial resolution. Recently this research field greatly benefited from the exploitation of mid-IR driving pulses that allowed the extension of the harmonic emission to higher photon energies, giving access to several phenomena previously unexplored.

In this seminar, I will first describe some recent technical developments we implemented for the extension of HHG and attosecond science in the soft X spectral region, such as the development and optimization of high-energy few-cycle optical parametric amplifiers in the mid-IR and HHG in femtosecond laser-micromachined devices. Then I will discuss some applications to HHG spectroscopy for the study of atoms and small molecules.