

Local Enhancement in Phototransmission through Window Resonances

Master/Bachelor Thesis project at MPIK Heidelberg

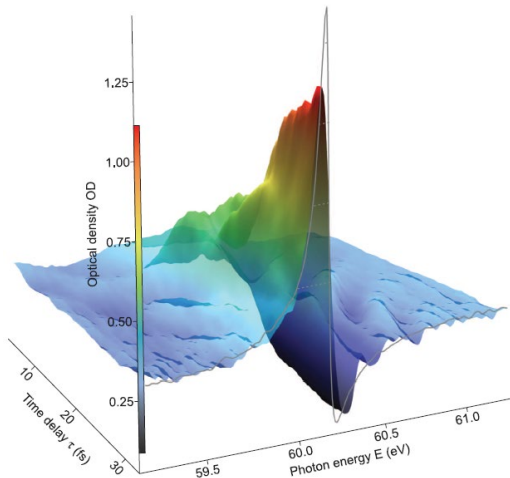


Contacts:

Yu He (yuhe@mpi-hd.mpg.de)

Christian Ott (christian.ott@mpi-hd.mpg.de)

Window-type Fano resonances exhibit inverted Lorentzian spectral profiles and can reduce photoabsorption within a narrow spectral region. Attosecond transient absorption spectroscopy enables the observation of these fast-evolving resonances in real time [1]. In this project, we will employ the time-gating approach developed in our group [2,3] to experimentally measure the ultrafast buildup of the $3s3p^6np$ (1P) Fano resonances (lifetime: from several to hundreds of femtoseconds) in Argon. In particular, motivated by our recently theoretical works [4,5], we will explore the role of pulse propagation effects in this process and demonstrate the local enhancement in phototransmission.



References:

- [1] H. Wang *et al.*, Phys. Rev. Lett. **105**, 143002 (2010).
- [2] A. Kaldun *et al.*, Science **354**, 738 (2016).
- [3] V. Stooß *et al.*, Phys. Rev. Research **2**, 032041(R) (2020).
- [4] Y. He *et al.*, Phys. Rev. Lett. **129**, 273201 (2022).
- [5] Y. He *et al.*, Phys. Rev. Research **6**, 013103 (2024)

Fig. Experimental observation of the ultrafast formation of a Fano resonance in helium [2].