

ATTOSECOND QUANTUM DYNAMICS

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Strong field physics gives rise to a variety of phenomena, ranging from coherent electron diffraction to attosecond soft X-ray emission [1]. We have, over the years, developed intense sources of waveform- controlled mid-IR light [2] to exploit aspects such as the ponderomotive scaling, quantum diffusion, and quasi-static photoemission. I will describe how we generate isolated attosecond pulses in the soft X-ray water window [3] across the oxygen edge up to 600 eV. Furthermore, I will explain how attosecond soft x-ray science can provide an entirely new angle into the quantum many-body dynamics in real-time [4]. I will describe two applications, addressing some of the most intricate challenges in contemporary physics pertaining to solids [5] and molecular science [6].

[1] B. Wolter et al. Phys. Rev. X 5, 021034 (2015).

[2] U. Elu et al. Nature Phot. 15, 277-280 (2021).

[3] S. M. Teichmann et al. Nature Commun. 7, 11493 (2016).

[4] T.P.H. Sidiropoulos et al. Nature Comm. 14, 7407 (2023).

[5] T.P.H. Sidiropoulos et al. Phys. Rev. X. 11, 041060 (2021).

[6] S. Severino et al. arxiv:2209.04330.