



Contribution ID: 330

Type: talk

## Generation and characterization of attosecond micro-bunched electron pulse trains via dielectric laser acceleration

*Monday, 16 September 2019 18:00 (20 minutes)*

Dielectric laser acceleration is a versatile scheme to accelerate and control electrons with femtosecond laser pulses in nanophotonic structures. We show recent results of the generation of a train of electron pulses with individual pulse durations as short as  $270 \pm 80$  attoseconds. We achieve these attosecond micro-bunch trains based on two subsequent dielectric laser interaction regions connected by a free-space electron drift section, all on a single photonic chip. In the first interaction region (the modulator), an energy modulation is imprinted on the electron pulse. During free propagation, this energy modulation evolves into a charge density modulation, called ballistic bunching. The resulting density modulation is probed in the second interaction region (the analyzer). This work represents a crucial step for dielectric laser accelerators, namely to enable phase synchronous acceleration of a significant fraction of electrons injected into the device. In addition, ultrafast experiments with these attosecond electron pulse trains come to mind.

**Primary authors:** SCHÖNENBERGER, Norbert (Friedrich-Alexander-Universität Erlangen-Nürnberg); Mrs MITTELBACH, Anna (Chair for Laserphysics, FAU); YOUSEFI, Peyman (Friedrich Alexander University of Erlangen Nürnberg); MCNEUR, Joshua (Friedrich Alexander University); NIEDERMAYER, Uwe (TU-Darmstadt); HOMMELHOFF, Peter (University of Erlangen and Max Planck Institute of Quantum Optics)

**Presenter:** SCHÖNENBERGER, Norbert (Friedrich-Alexander-Universität Erlangen-Nürnberg)

**Session Classification:** WG3 - Dielectric Acceleration

**Track Classification:** WG3 - Electron beams from electromagnetic structures, including dielectric and laser-driven structures