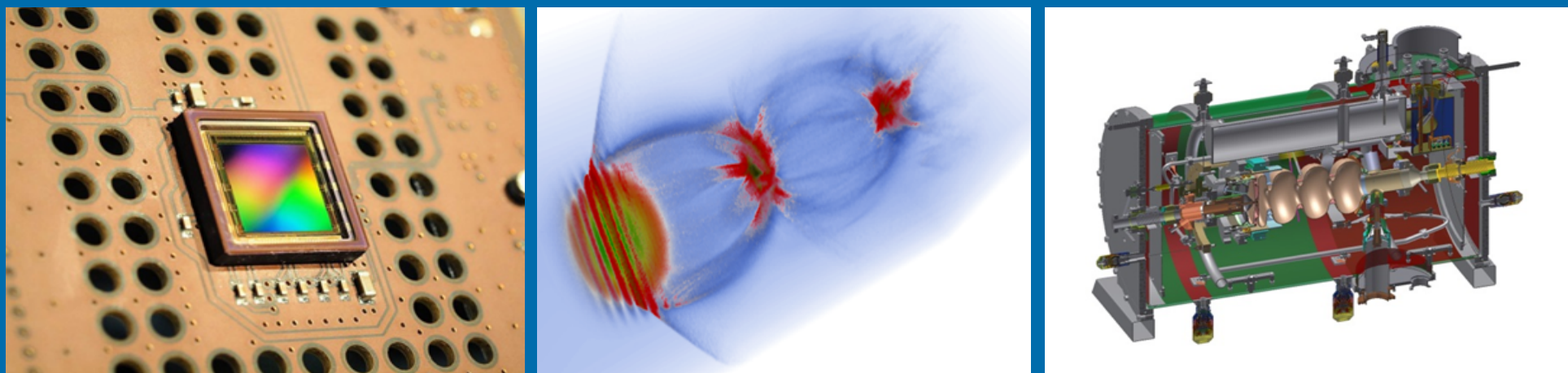


Single Shot Electro-Optical Detection of the Micro-Bunching Instability at ANKA

Nicole Hiller

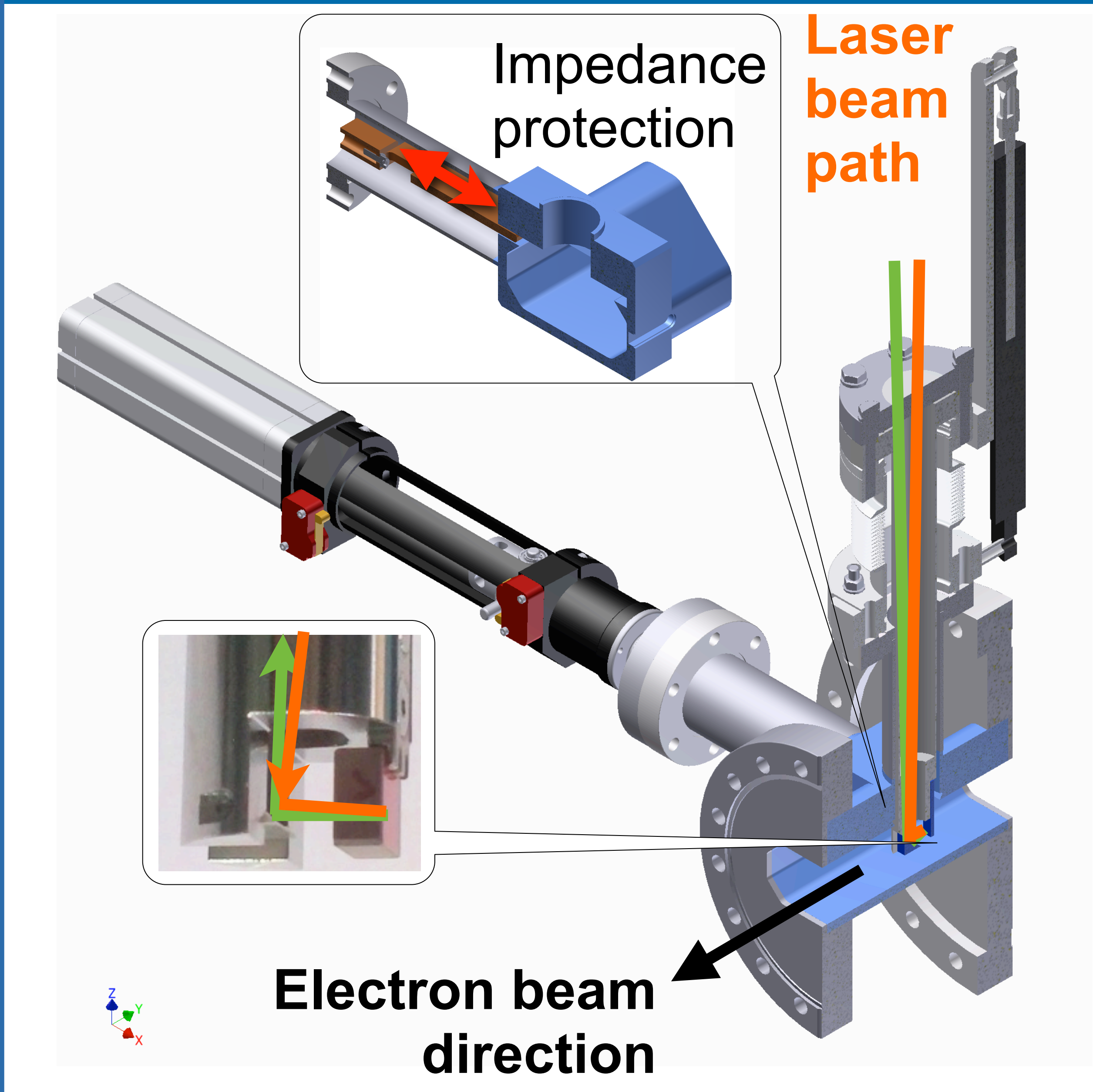
ARD - Picosecond and Femtosecond Electron and Photon Beams



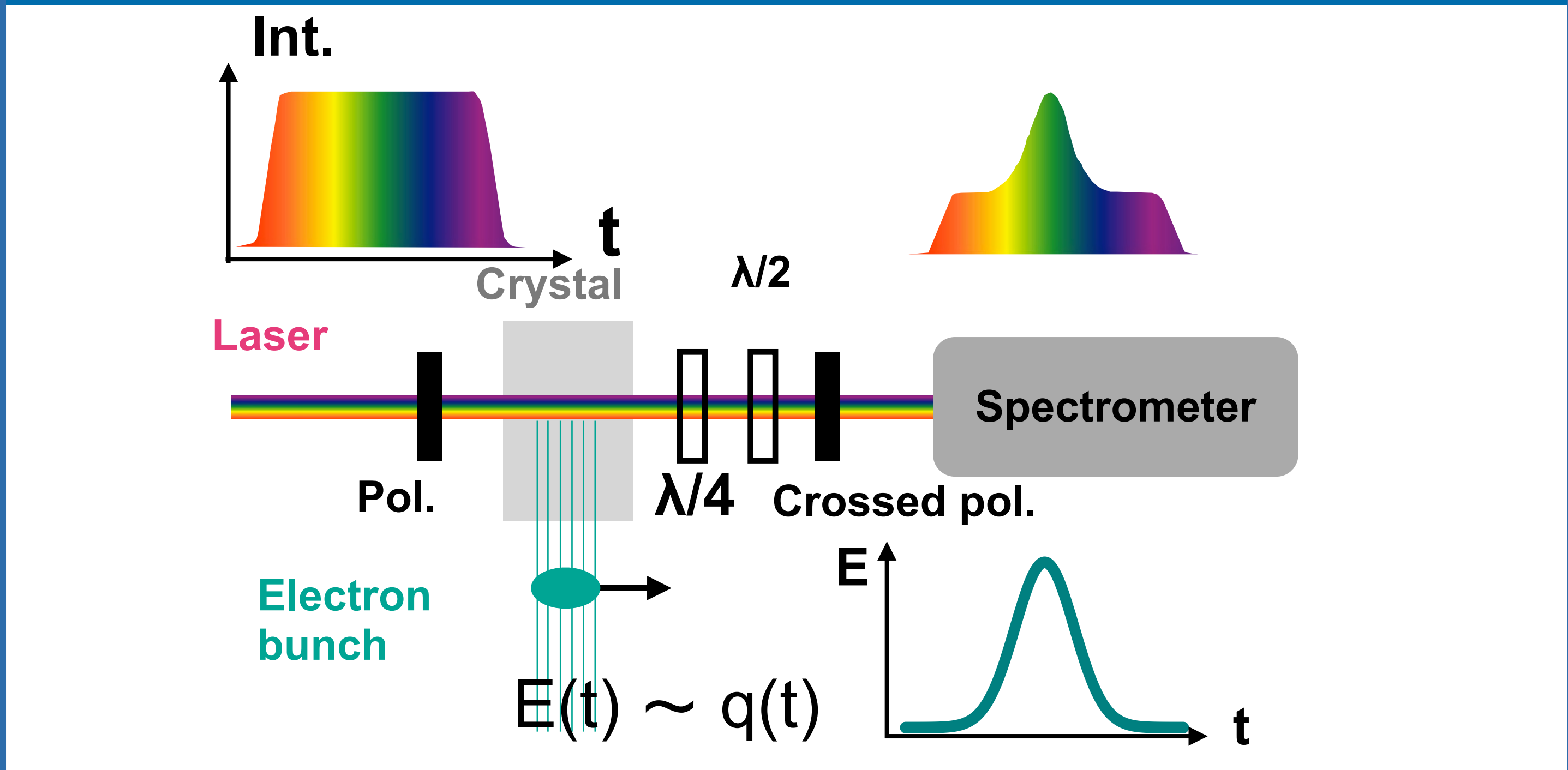
Motivation

- Aim:**
- Understanding/mapping of the short (ps) bunch beam dynamics in low-alpha and low emittance storage rings
- Observation:**
- Short bunches emit intense ‘bursts’ of coherent synchrotron radiation (CSR) in the Terahertz (THz) frequency range
 - indication of dynamic micro-bunching and deformation
- Idea:**
- Single-shot longitudinal bunch profile measurements to track bunch dynamics
- Key results:**
- Serial single shot profiles with sub-ps resolution reveal micro-bunch dynamics
 - Long-range wake-fields observation explain observed bunch-bunch correlations in THz emission
 - First time at a storage ring**

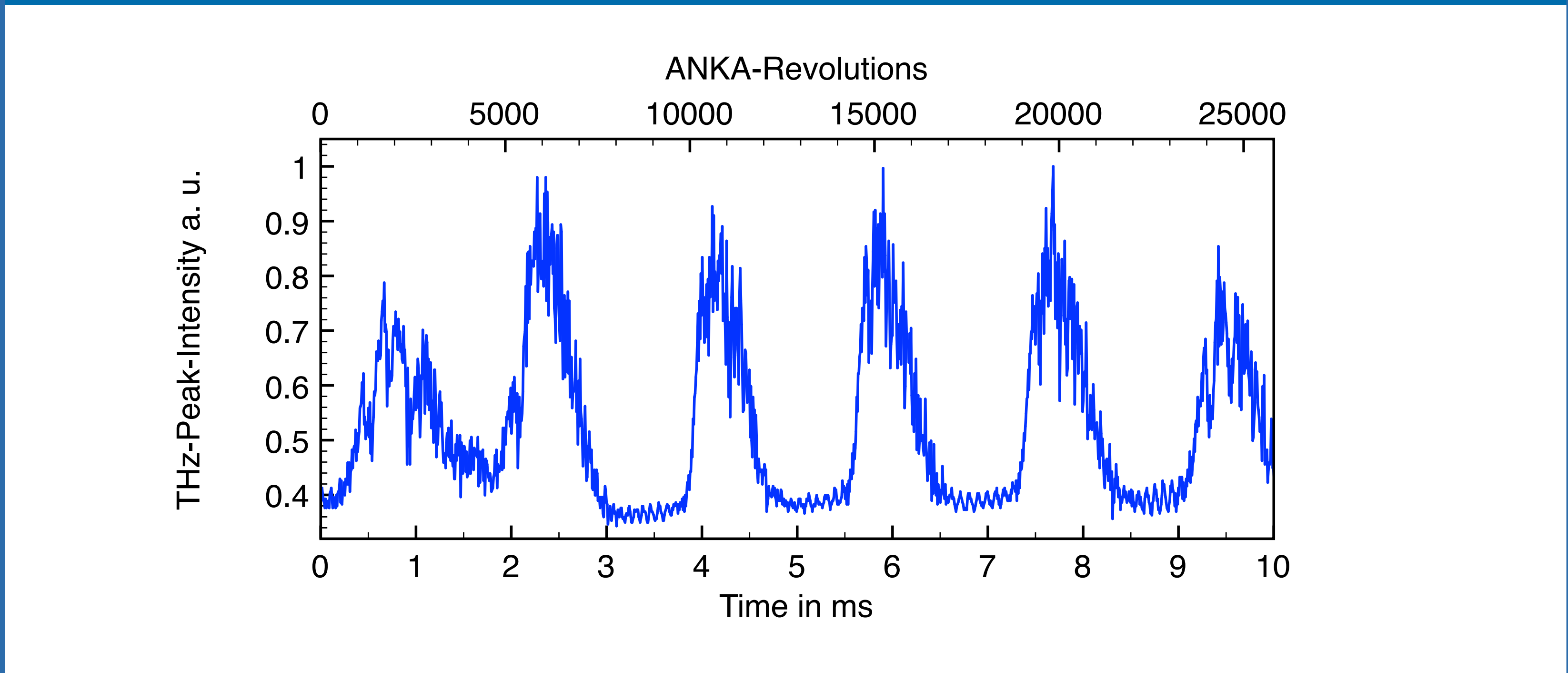
Experimental Setup



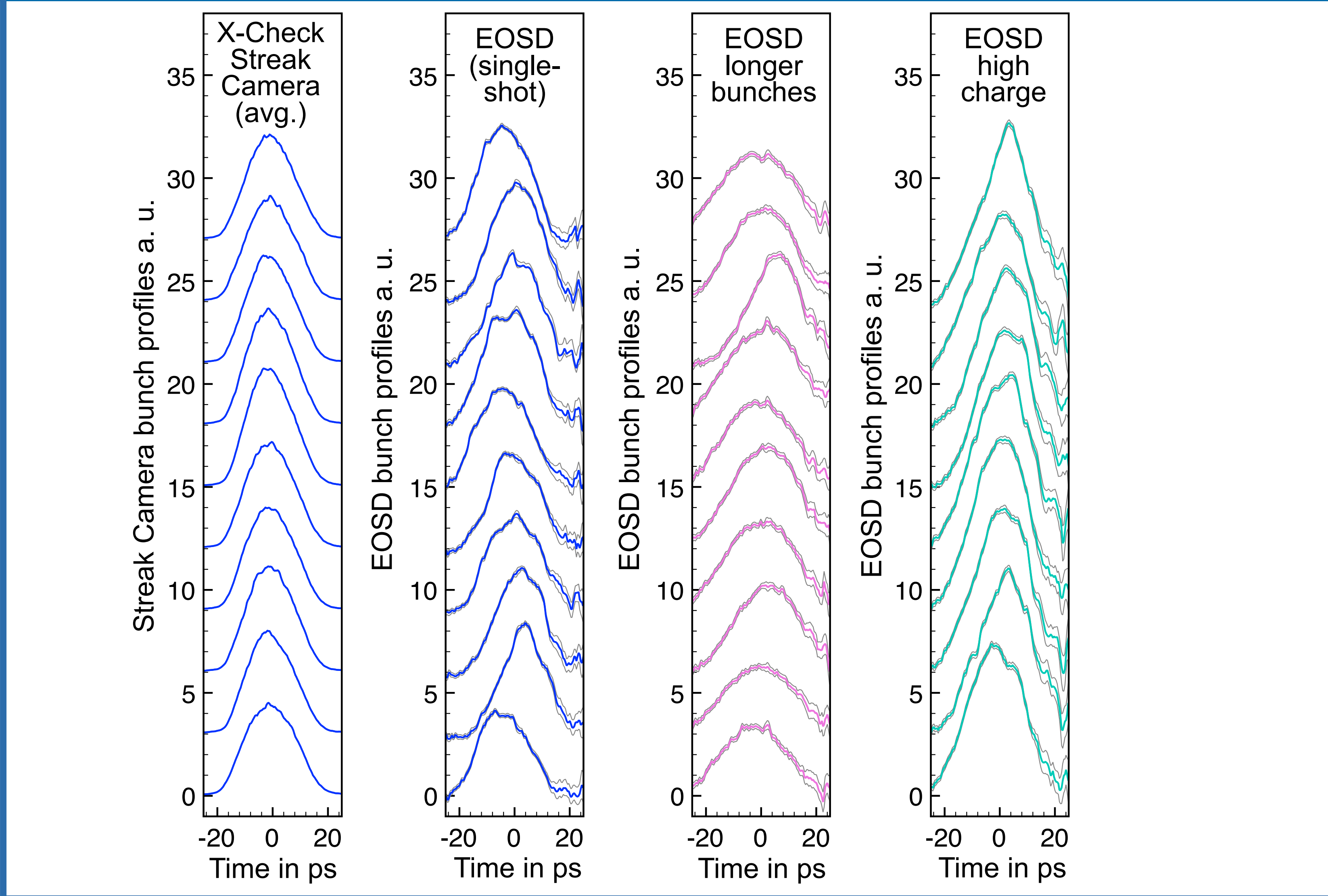
Electro-Optic Spectral Decoding



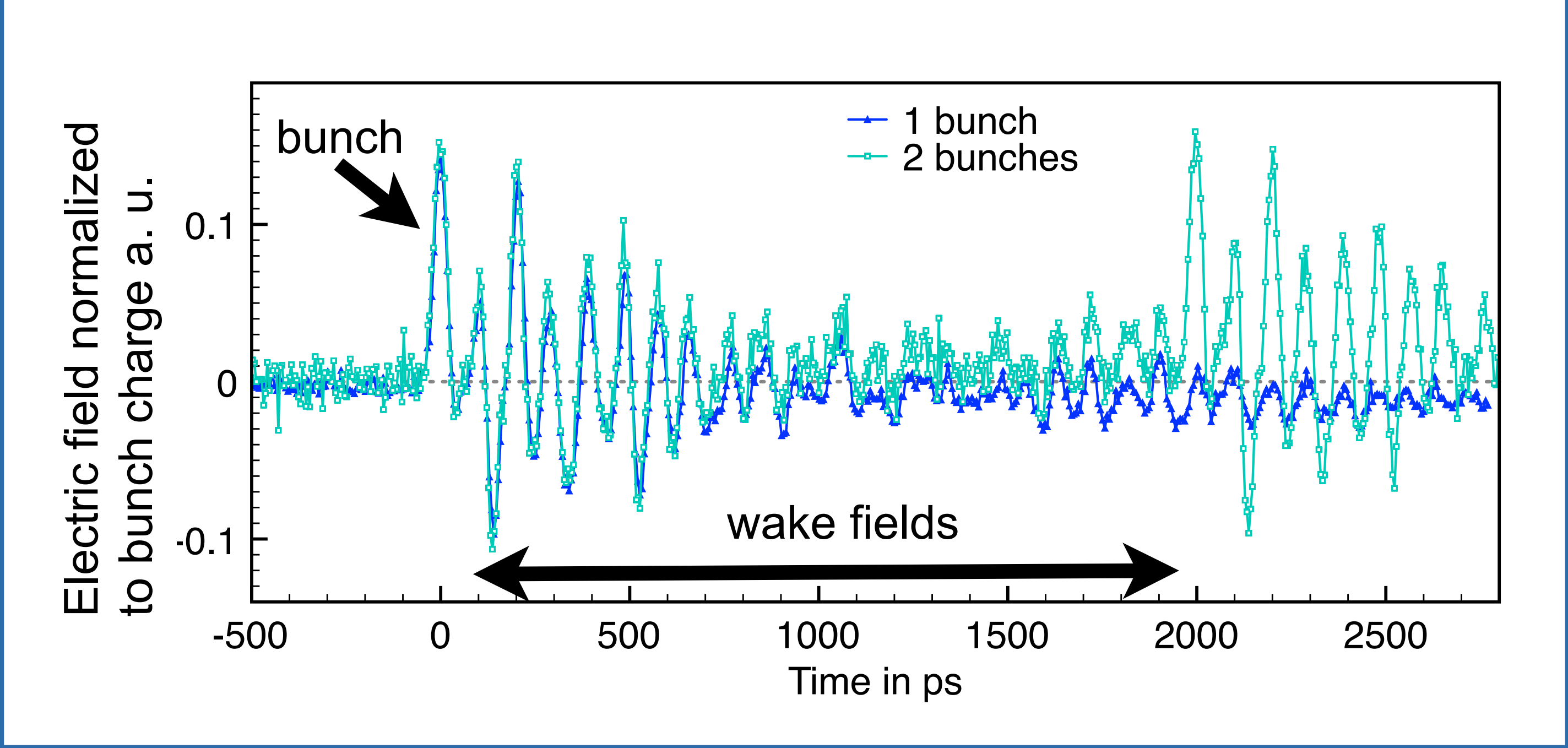
Bursting THz Radiation



Single Shot Bunch Profiles



Long-range Wake-Field



References / Acknowledgements

- [1] N. Hiller et al. Electro-optical Bunch Length Measurements at the ANKA Storage Ring, MOPME014, IPAC'13
[2] B. Kehrer et al. Numerical Wakefield Calculations for Electro-optical Measurements, MOPME015, IPAC'13
A. Borysenko, E. Hertle, E. Huttel, V. Judin, B. Kehrer, S. Marsching, A.-S. Müller, M.J. Nasse, A. Plech, M. Schuh, N. J. Smale, Karlsruhe Institute of Technology (KIT), B. Steffen, P. Peier (DESY), V. Schlott, (PSI)

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