Karlsruhe Institute of Technology

SPONSORED BY THE

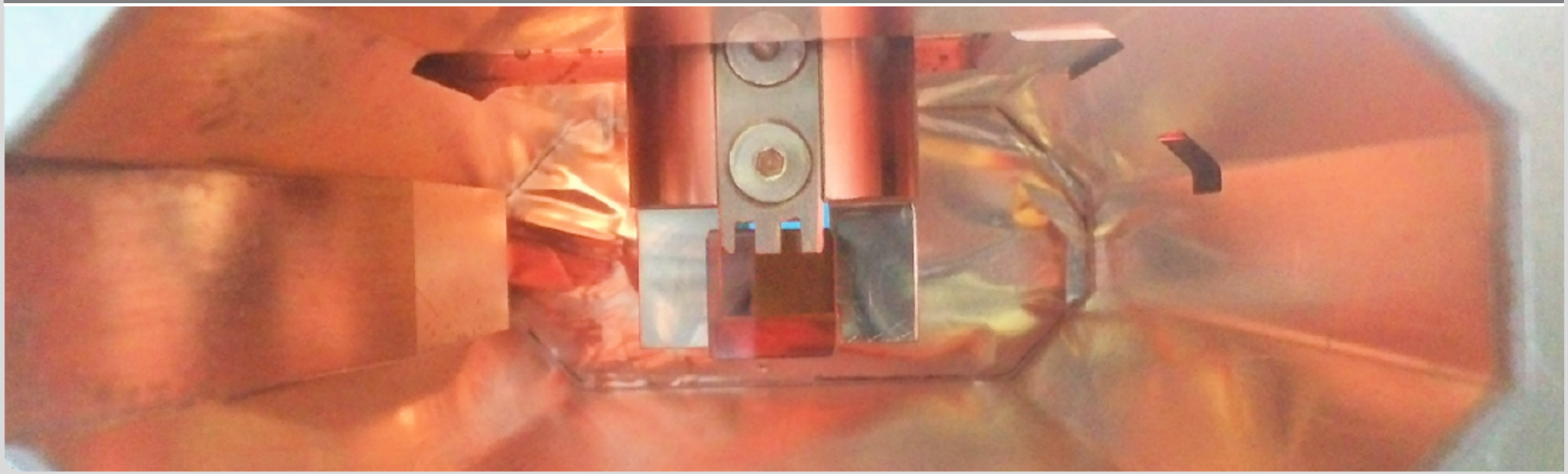
Federal Ministry of Education and Research

Status of Near-Field EO Measurements at ANKA*

Patrik Schönfeldt, Miriam Brosi, Michele Caselle, Stefan Funkner, Michael J. Nasse, Gudrun Niehues, Lorenzo Rota, and Anke-Susanne Müller

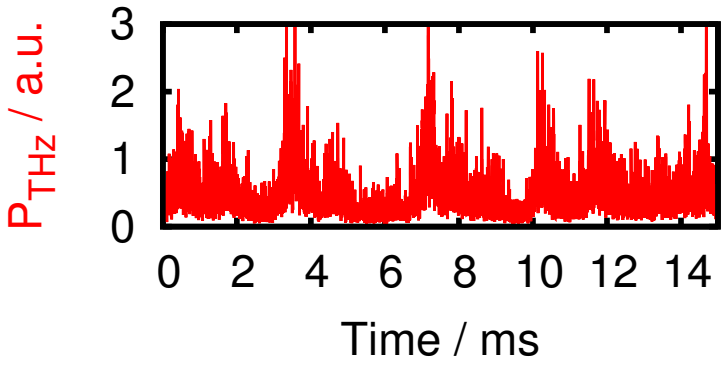
*This work is funded by the BMBF contract number: 05K10VKC

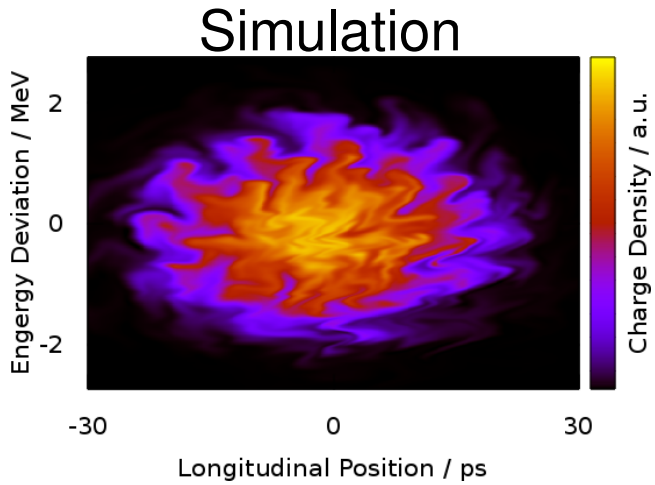
Institute for Beam Physics and Technology

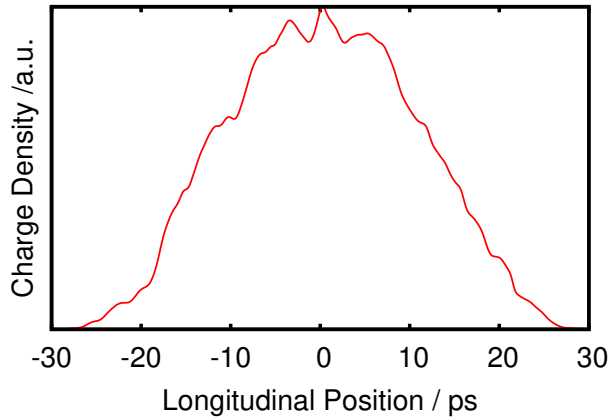


Motivation

- Short bunch operation
- Intense bursts of THz radiation
- Explained by micro-bunching
- Wanted:
  - Measurement of bunch profiles (non-averaging / single shot)
  - Individually for single bunches (in a multi-bunch environment)

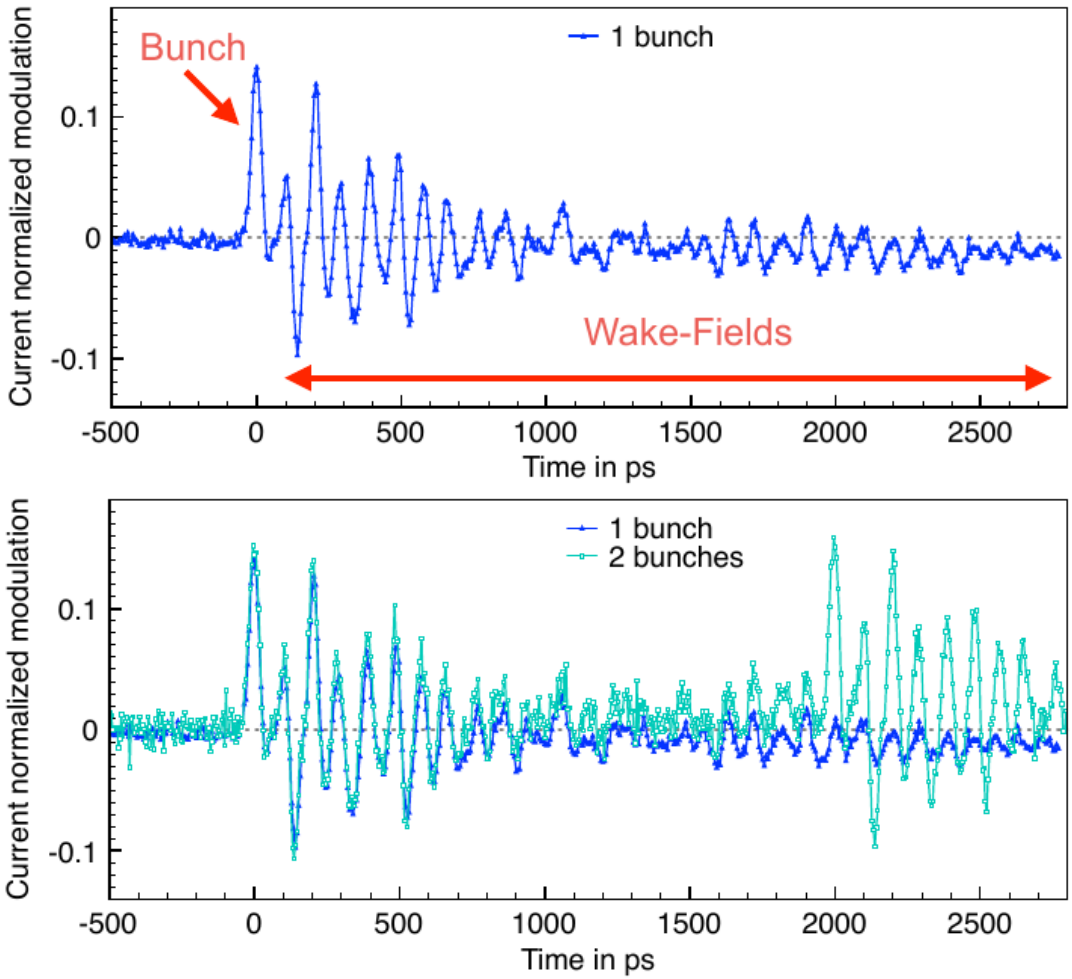






(Simulation partly based on code by M. Klein, c.f. M.Klein, Optics Calculations and Simulations of Longitudinal Beam Dynamics . . .)

Wake-Field Measurement with old EO arm

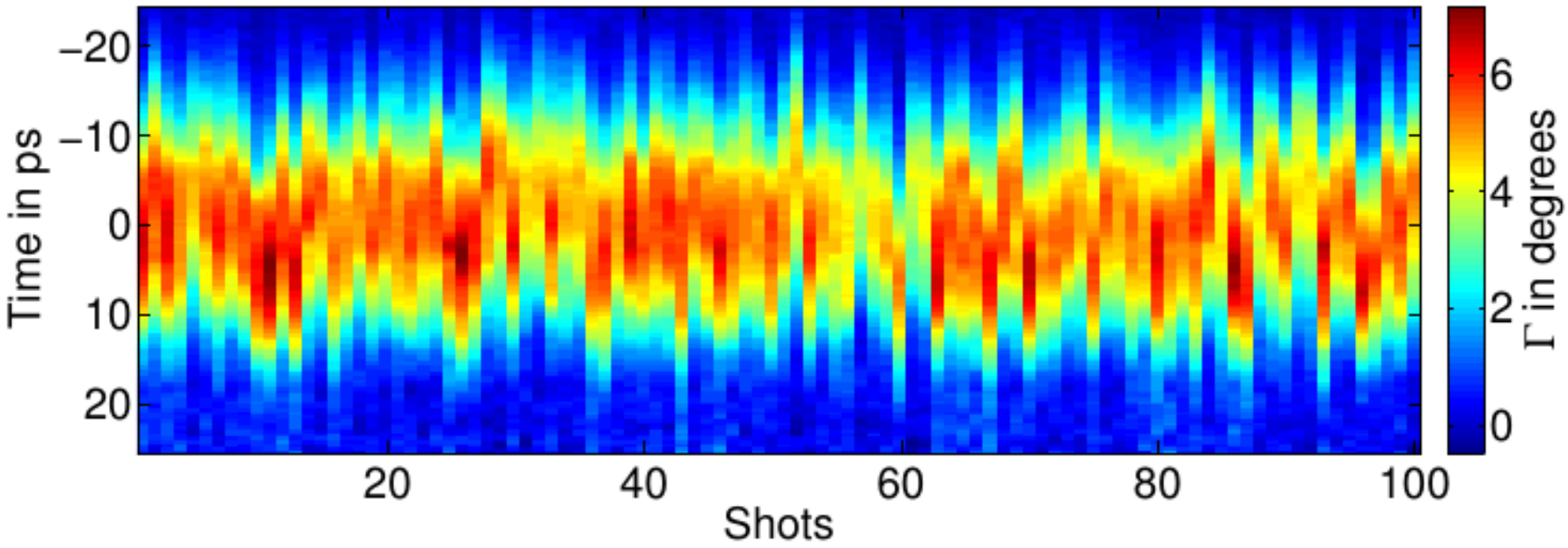


- Bunch spacing: 2 ns
- Wake lasts longer
- Measurement of trailing bunches inaccurate
- ≈ 10 W of heat load

[Nicole Hiller: Electro-Optical Bunch Length Measurements at the ANKA Storage Ring]

Bunch Profiles by Previous Spectrometer

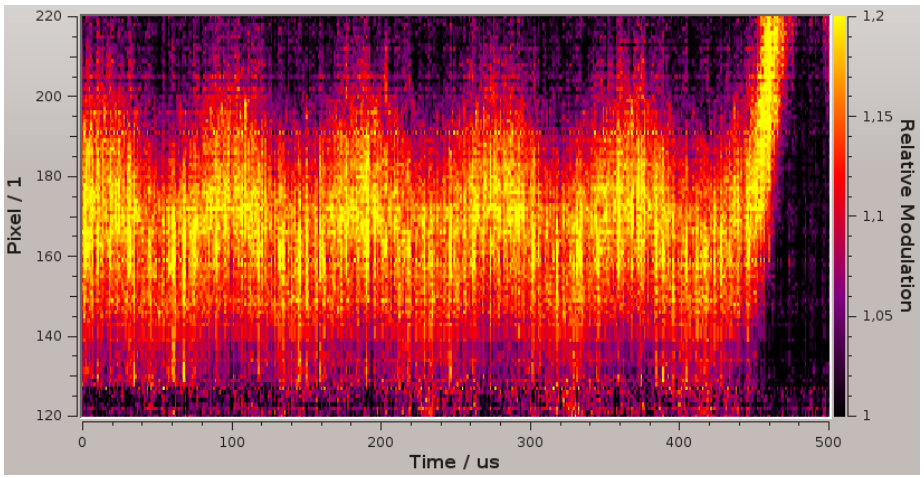
[Nicole Hiller: Electro-Optical Bunch Length Measurements at the ANKA Storage Ring]

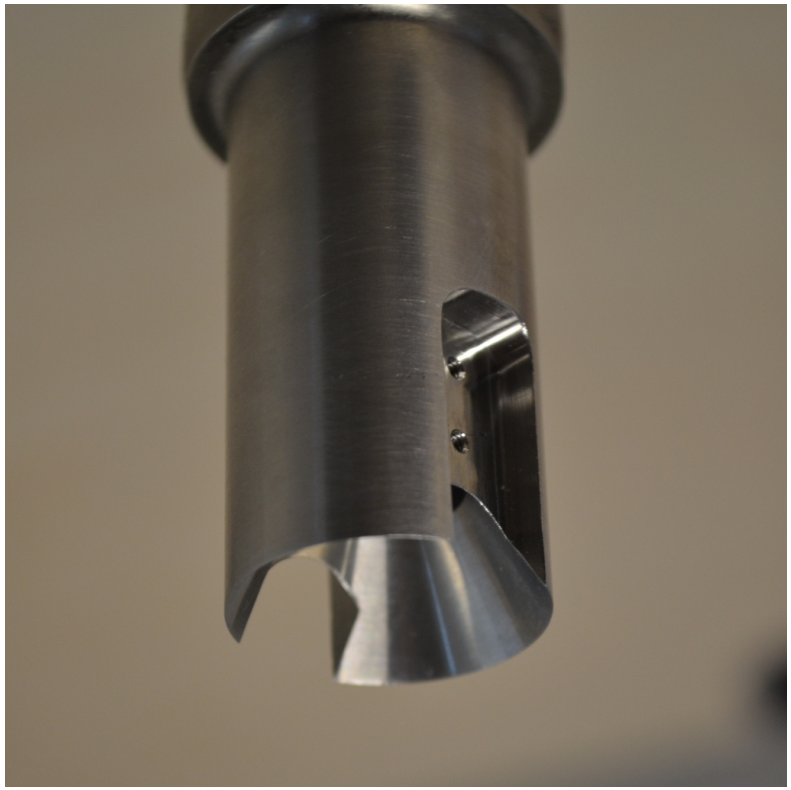


- ≈ 14 shots per second, i.e. one shot every 70 ms
- Typical time scales:
  - Fast dynamics (e.g. synchrotron motion): <1 ms
  - Slower dynamics (e.g. damping): 10 ms

Solutions

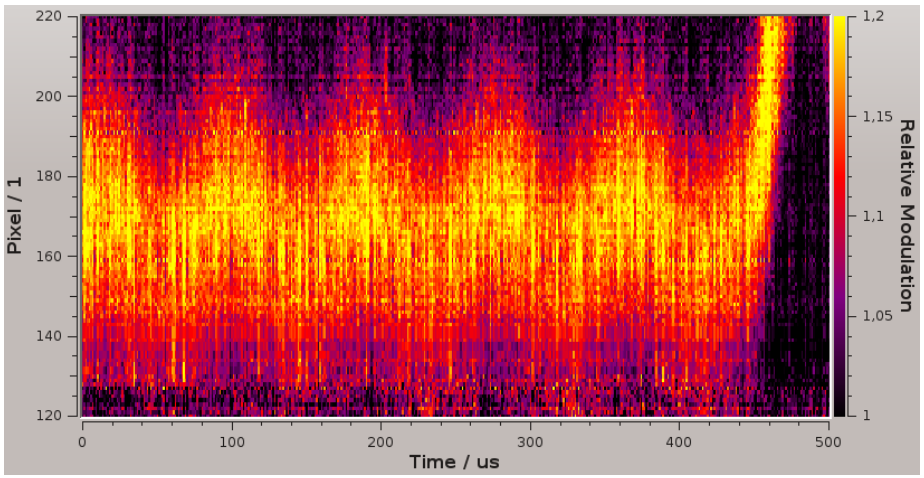
- Optimized in-vacuum geometry:
  - Low wake fields at trailing bunches
  - Heat load reduced by factor 2
  - Recently installed
- KALYPSO:
  - Continuous recordings
  - 2.7 MHz repetition rate

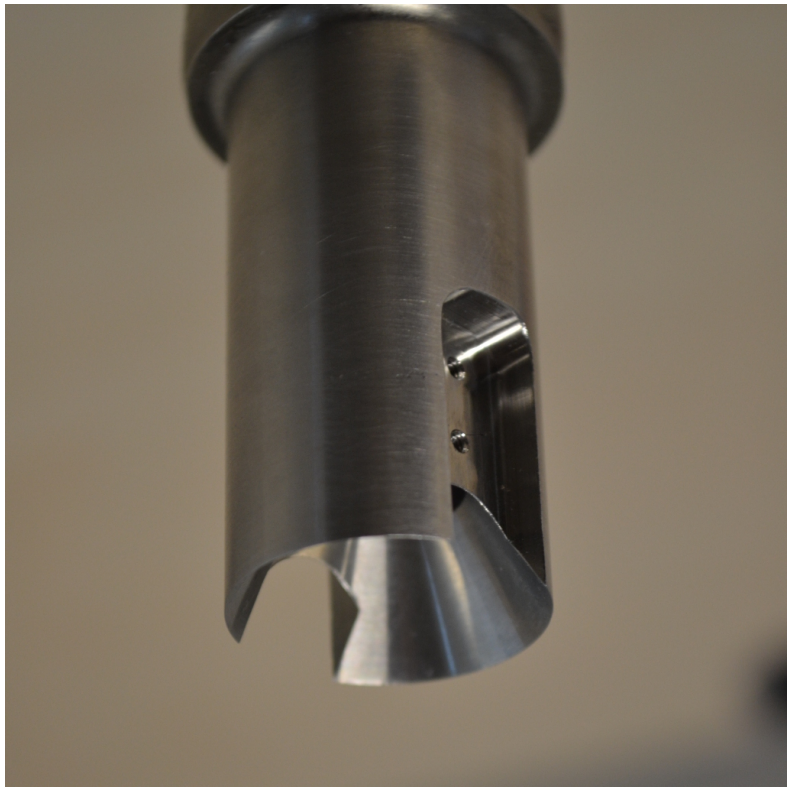




Solutions

- Optimized in-vacuum geometry:
  - Low wake fields at trailing bunches
  - Heat load reduced by factor 2
  - Recently installed
- KALYPSO:
  - Continuous recordings
  - 2.7 MHz repetition rate





See you at the poster!