

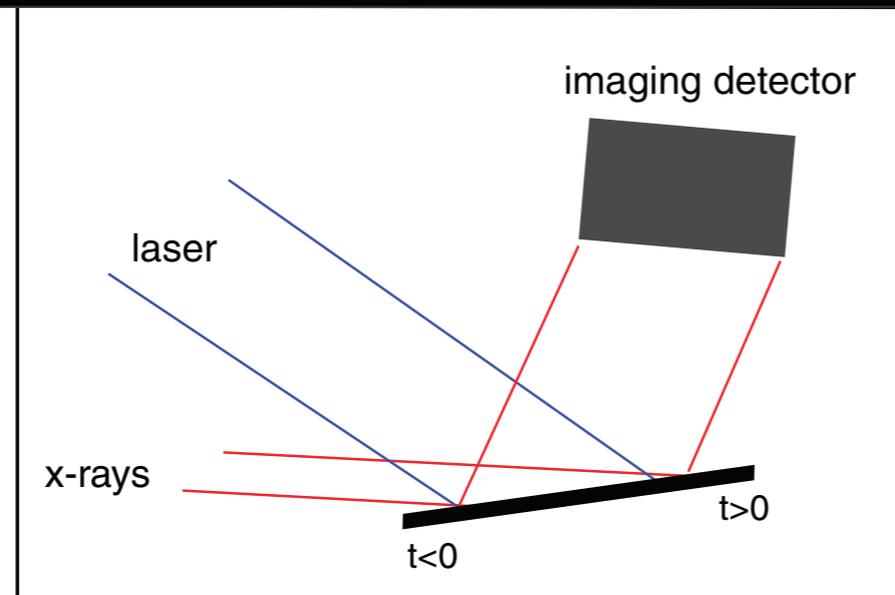
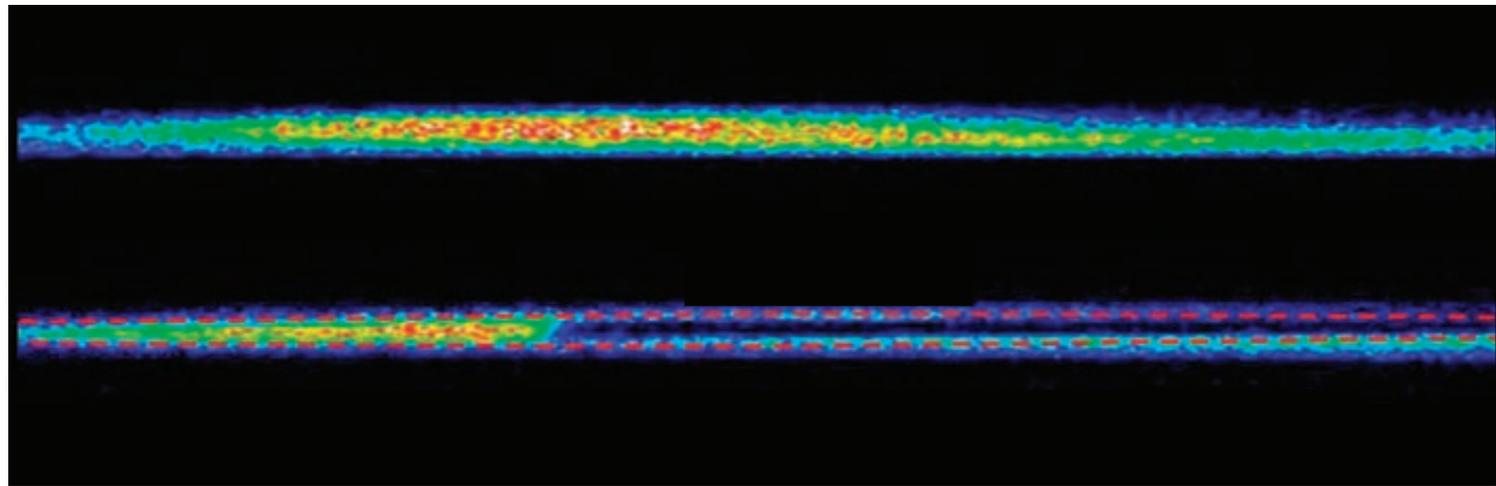
Arrival Time Measurement for Pump-Probe Experiments at SwissFEL

Rasmus Ischebeck, for the PSI Diagnostics Group

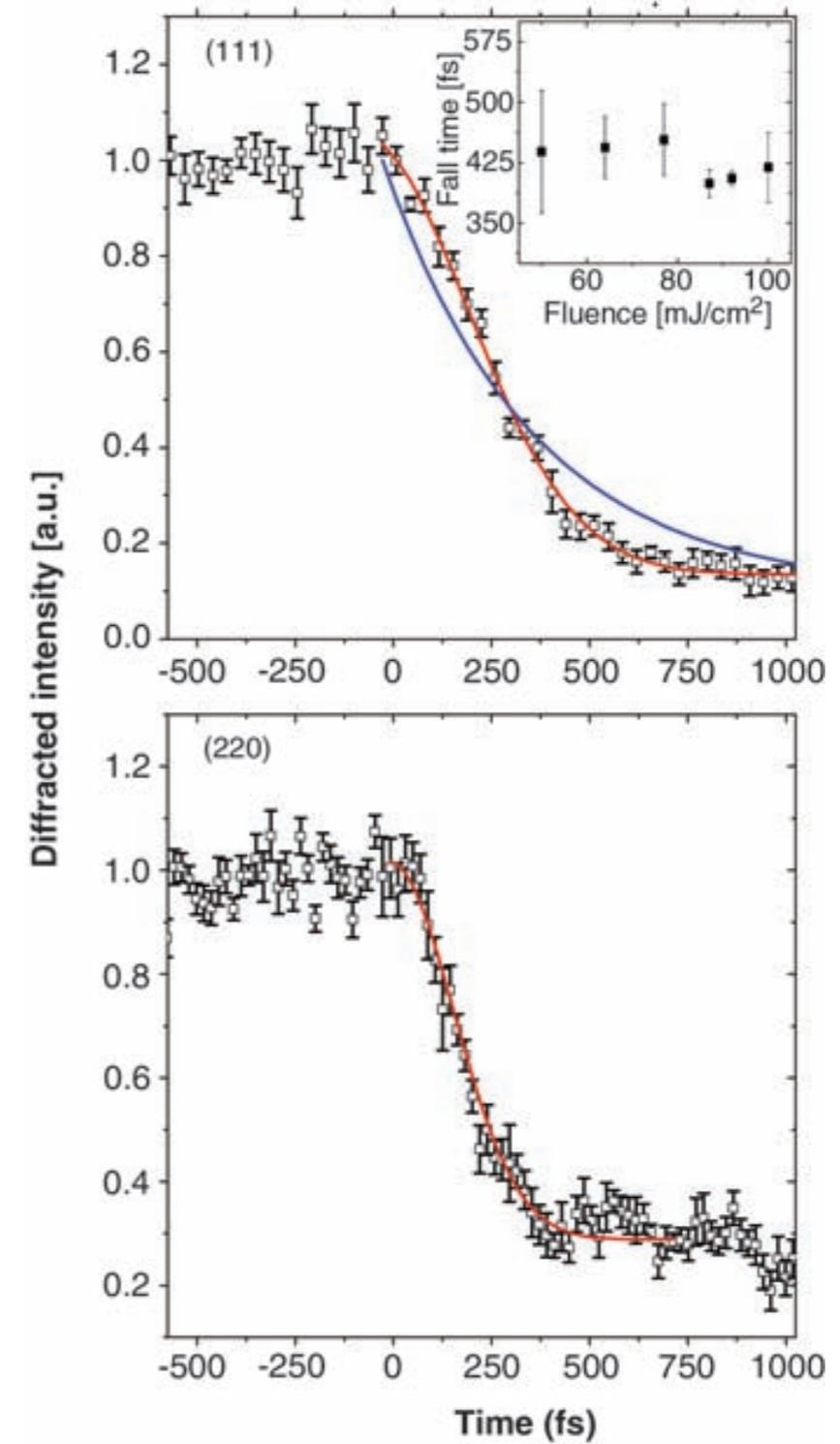
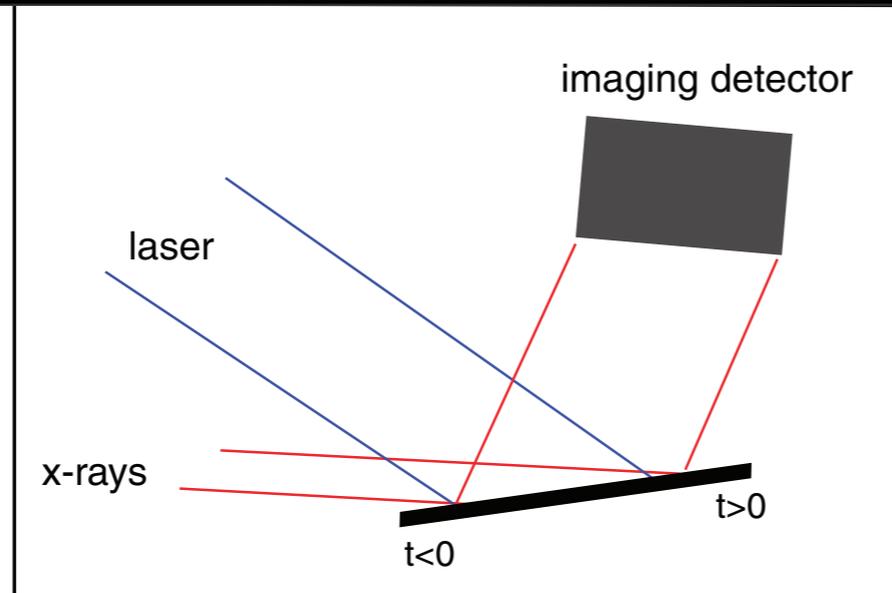
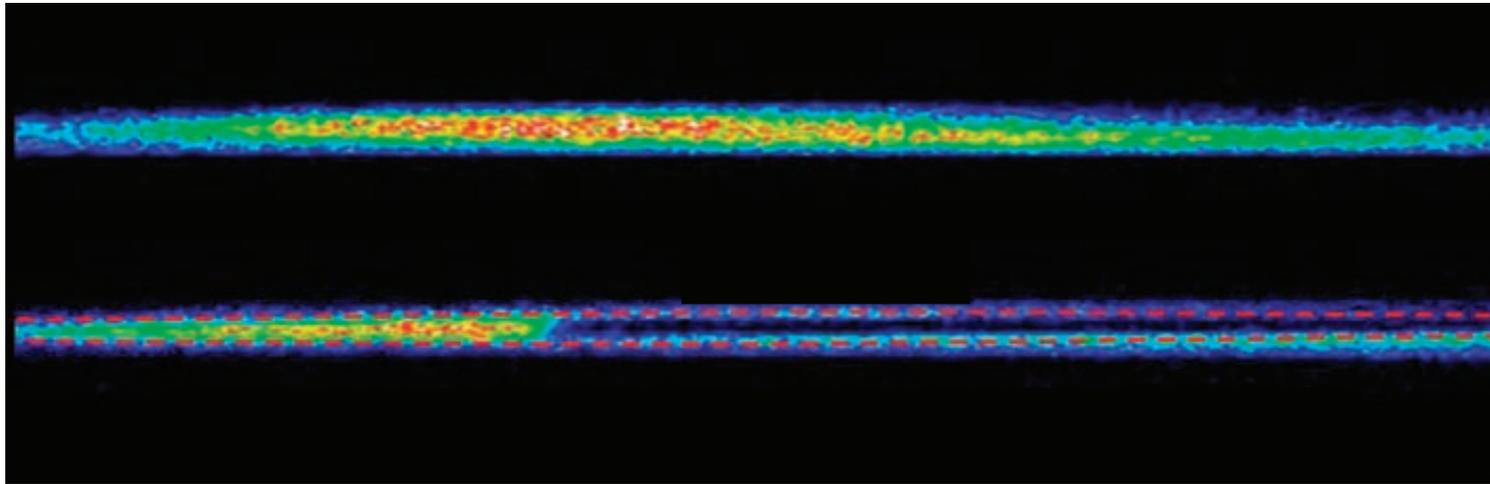
Sub-Picosecond Pulse Source



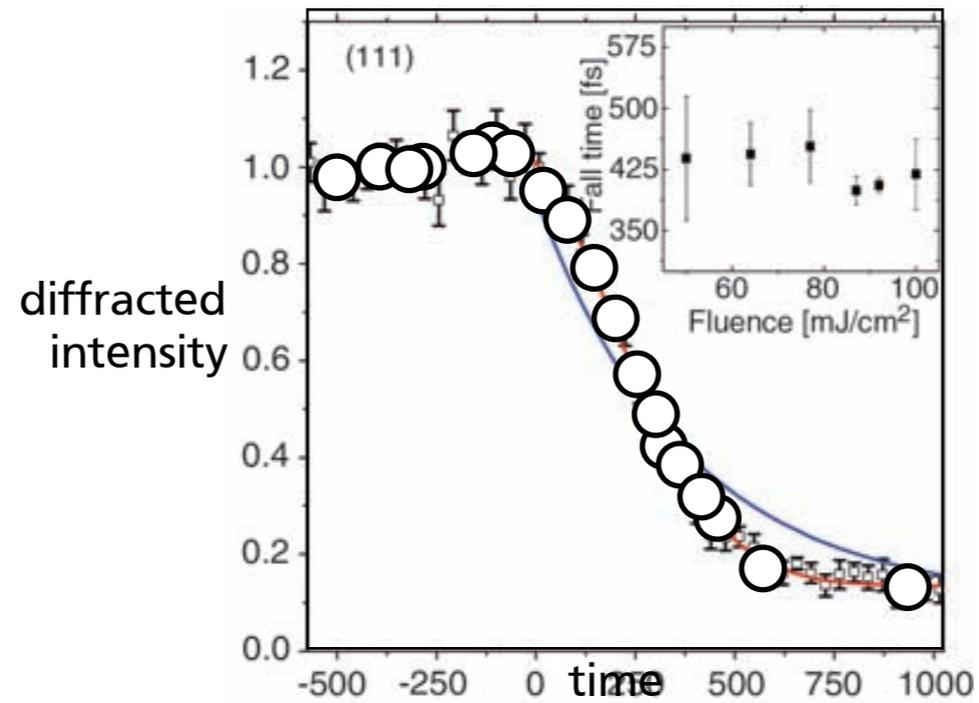
SPPS Experiment



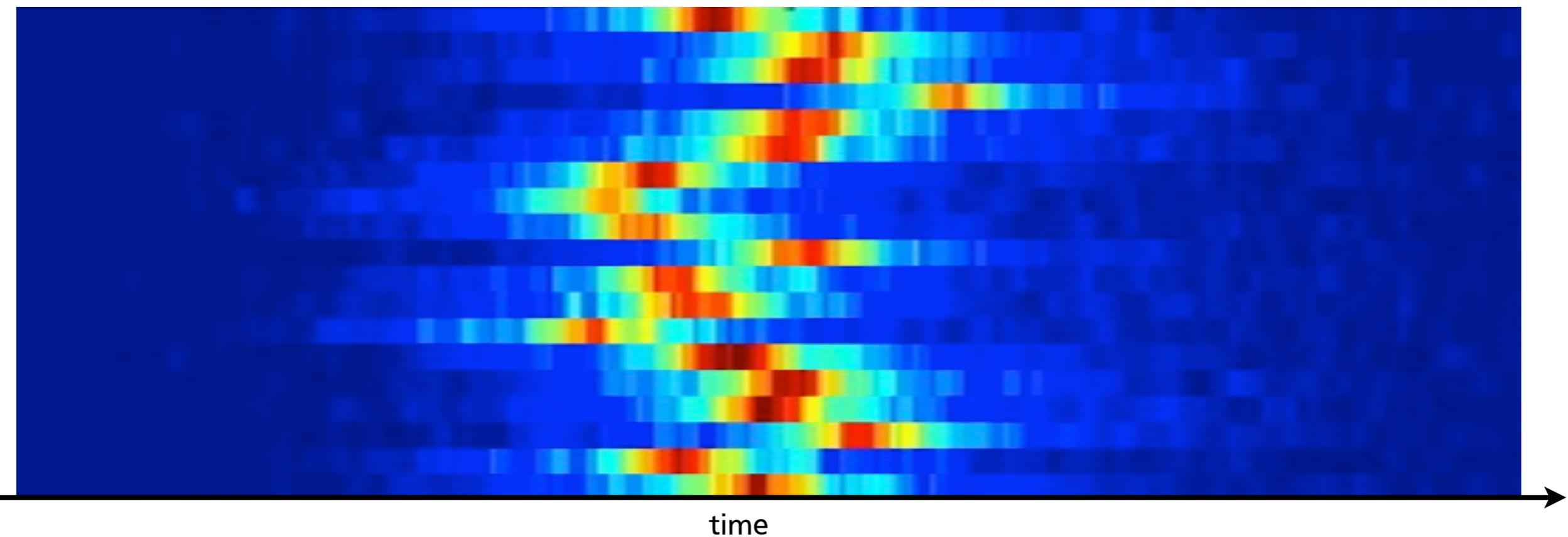
SPPS Experiment



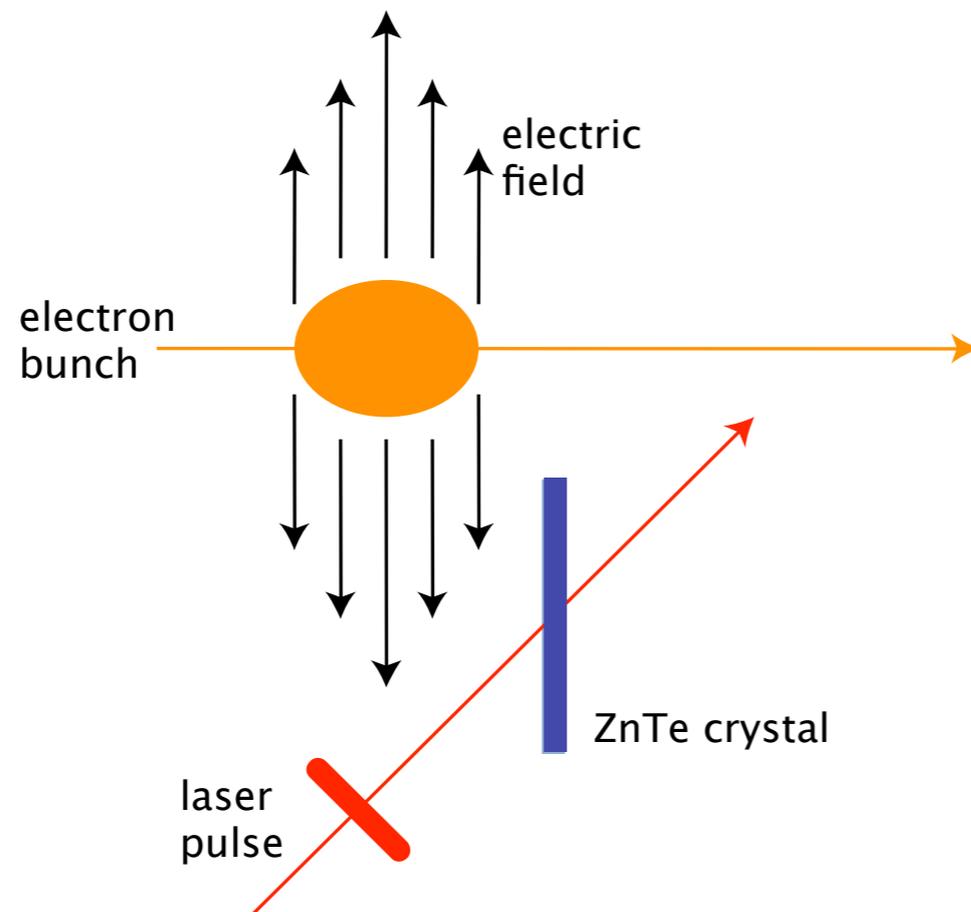
Data Binning



Schematic plot!

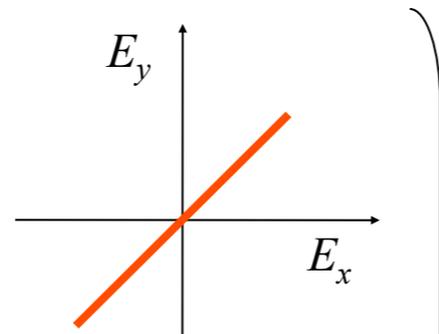


Electron Arrival Time Measurement

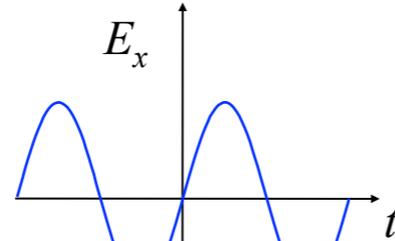


Electron Arrival Time Measurement

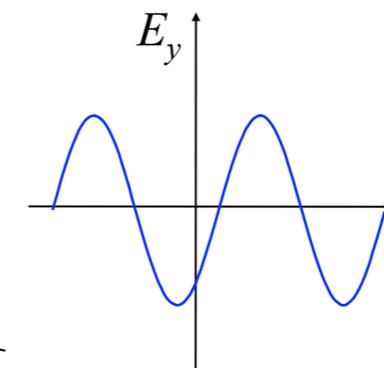
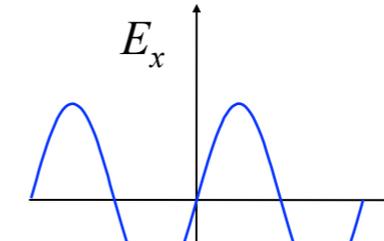
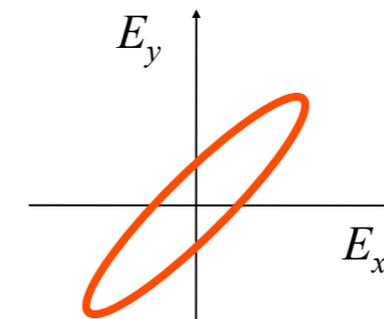
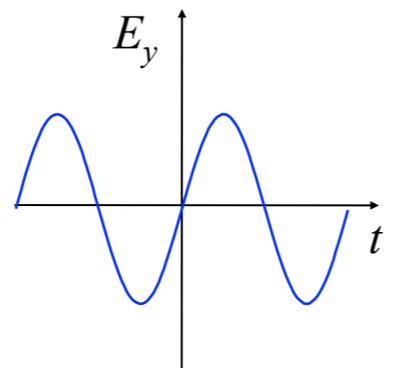
- Polarization diagram



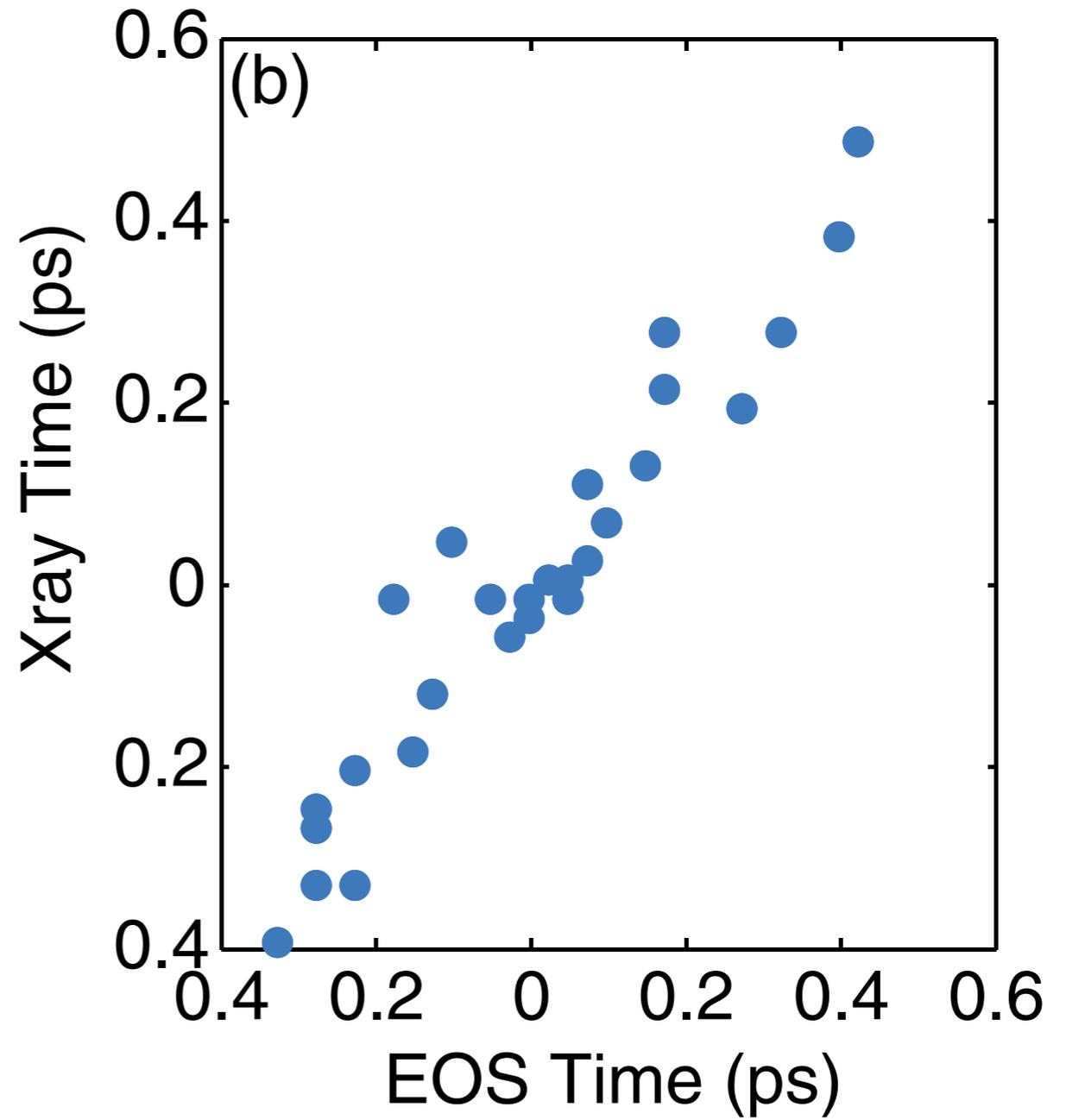
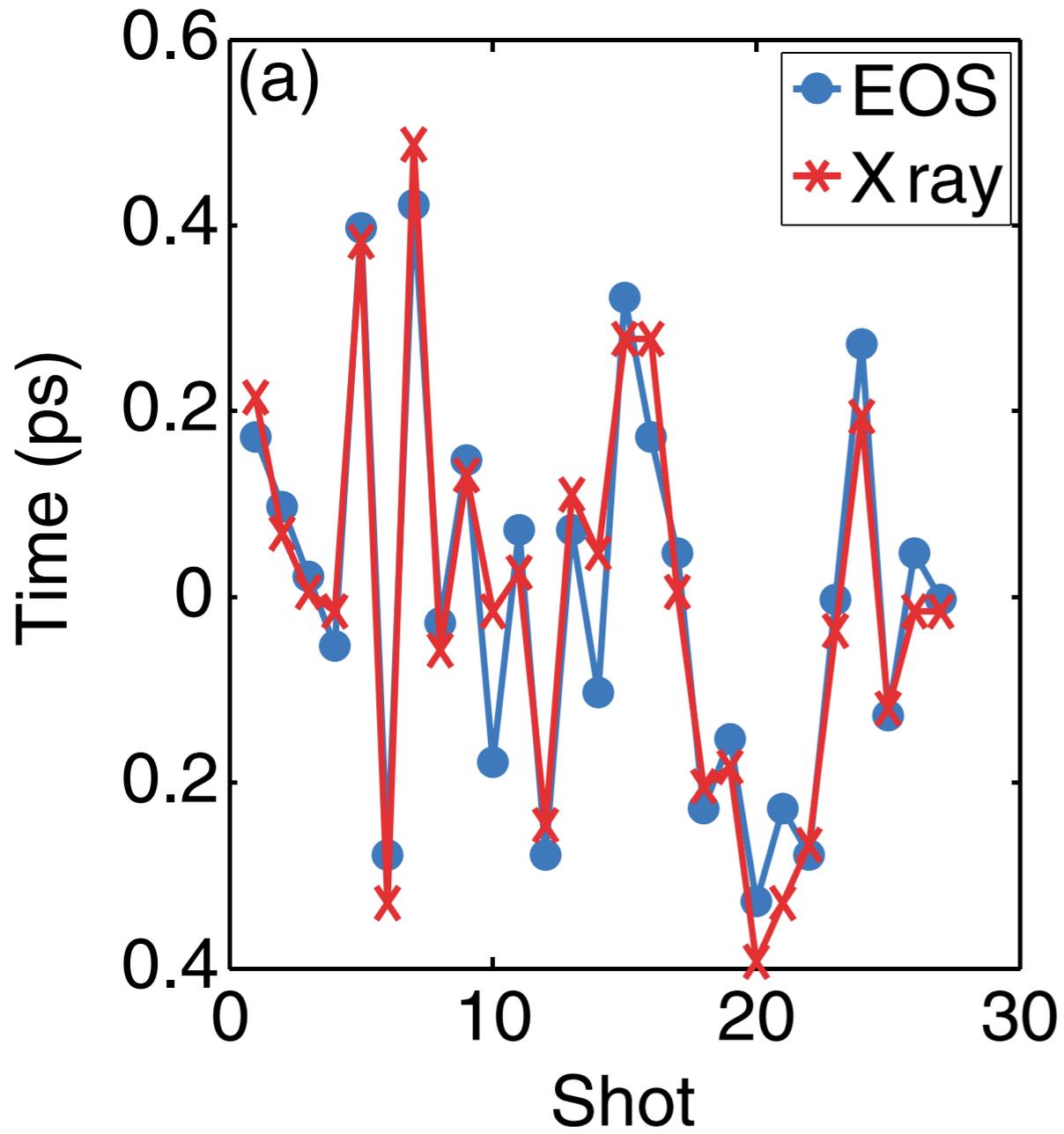
- electric field of the horizontal polarization



- electric field of the vertical polarization



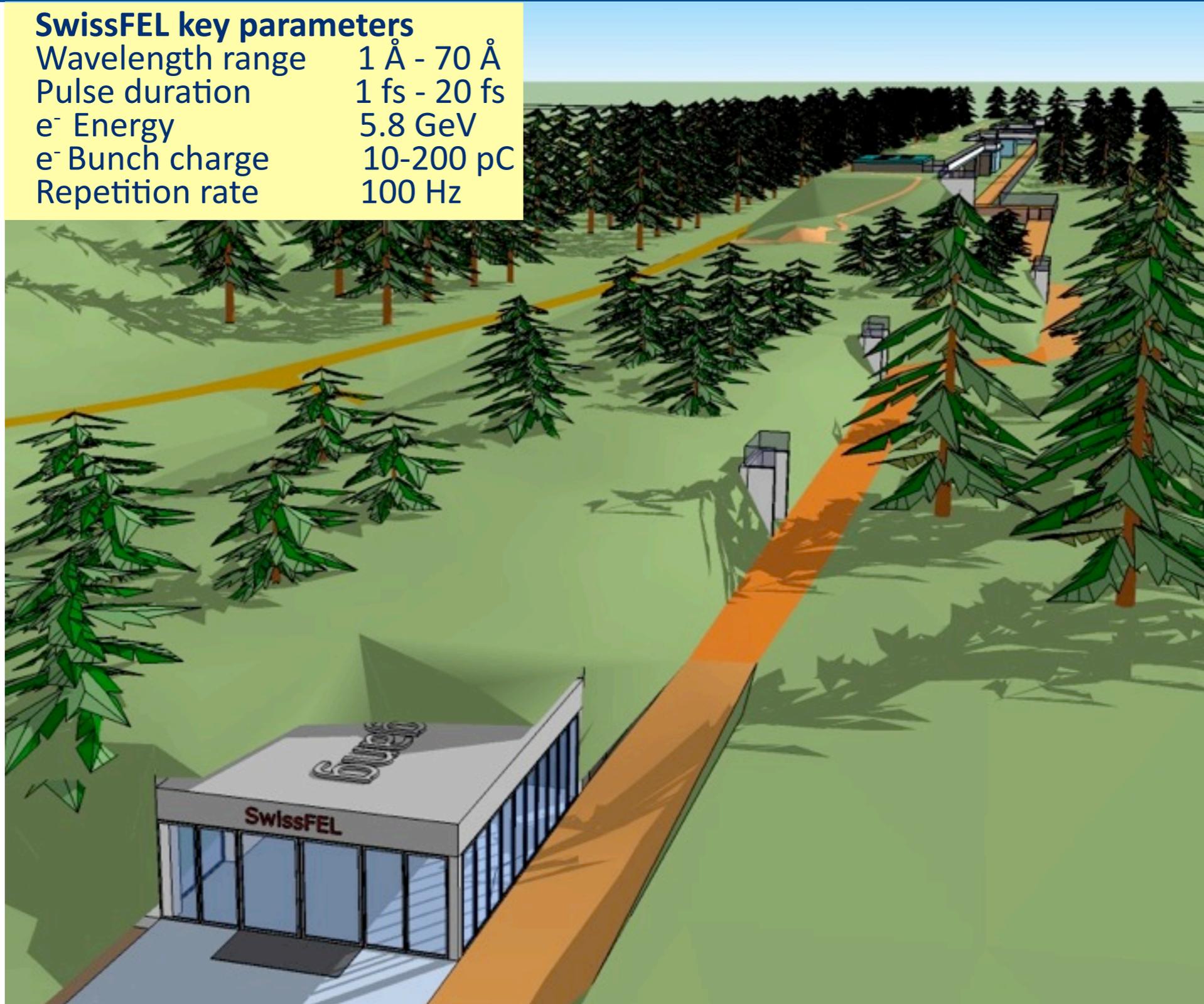
Electron Arrival Time Measurement



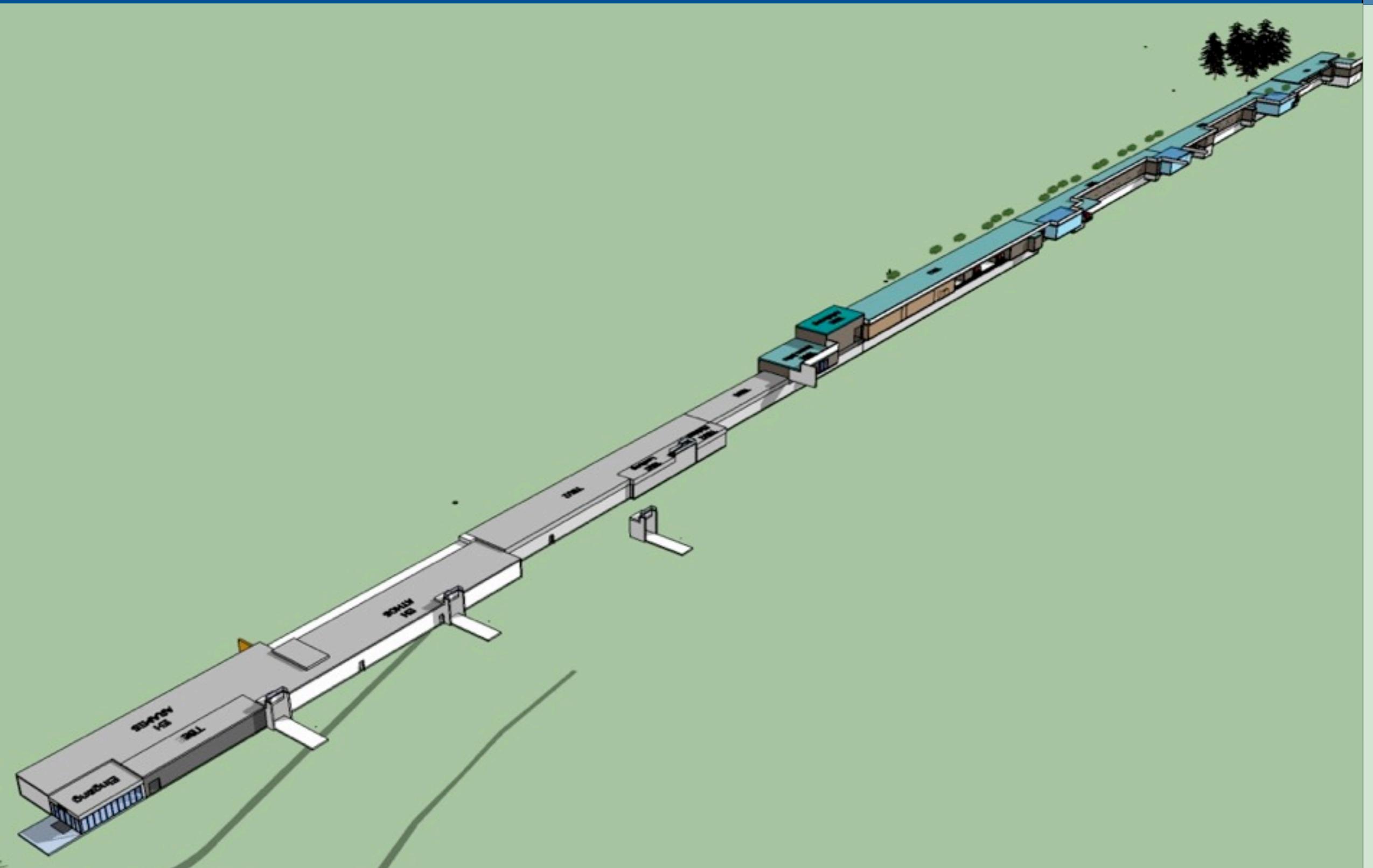
SwissFEL

SwissFEL key parameters

Wavelength range	1 Å - 70 Å
Pulse duration	1 fs - 20 fs
e ⁻ Energy	5.8 GeV
e ⁻ Bunch charge	10-200 pC
Repetition rate	100 Hz

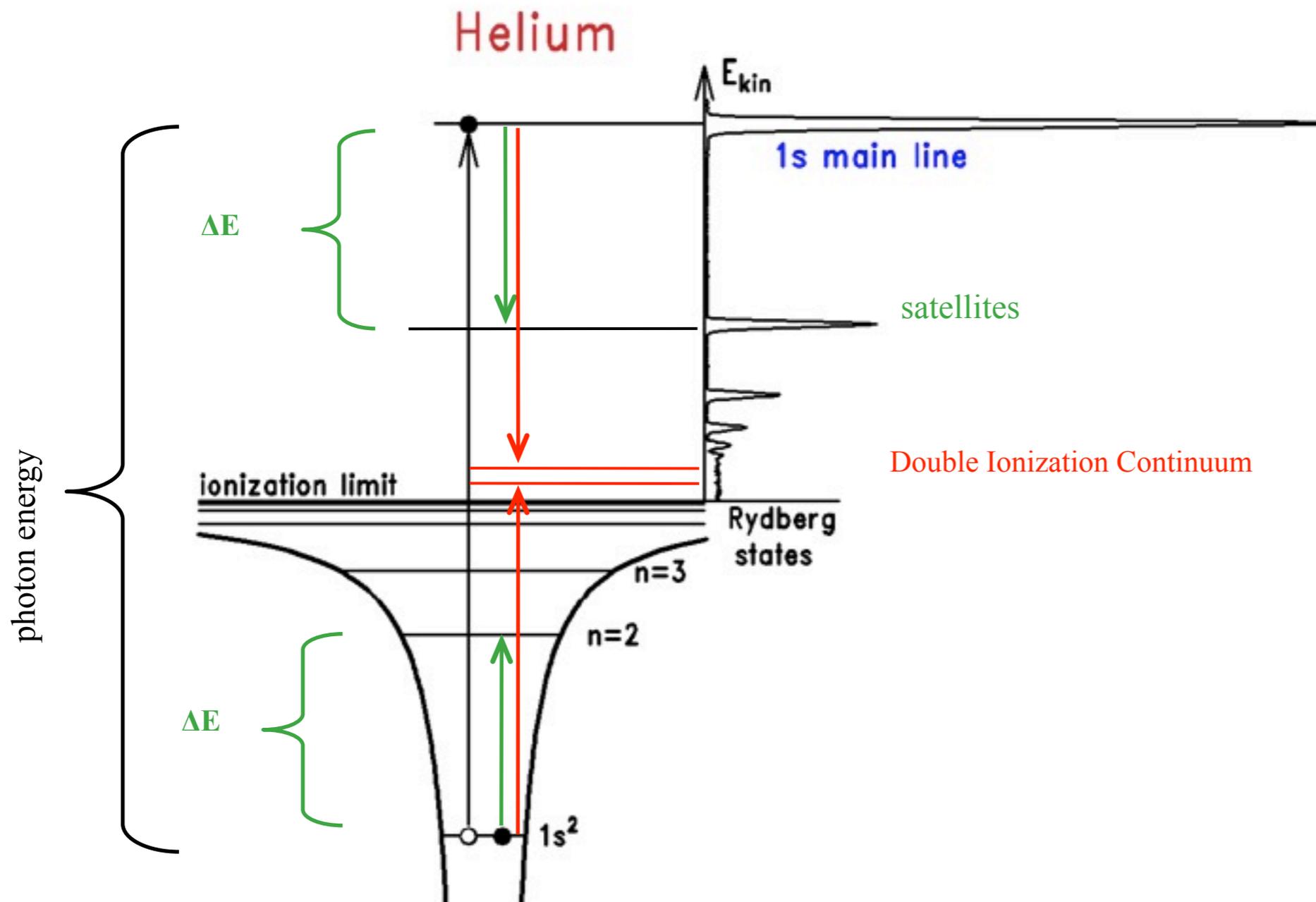


SwissFEL

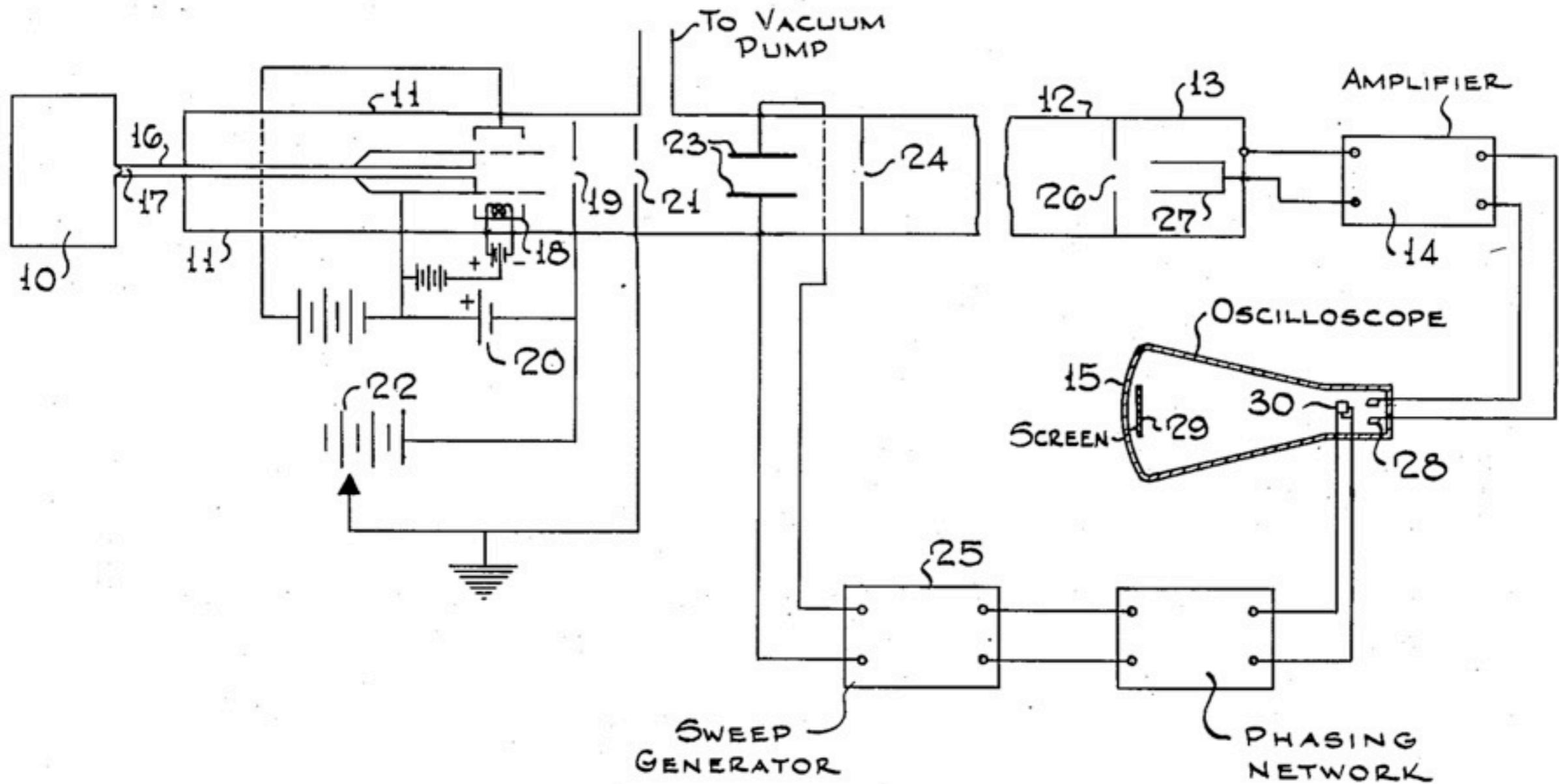


Requirements

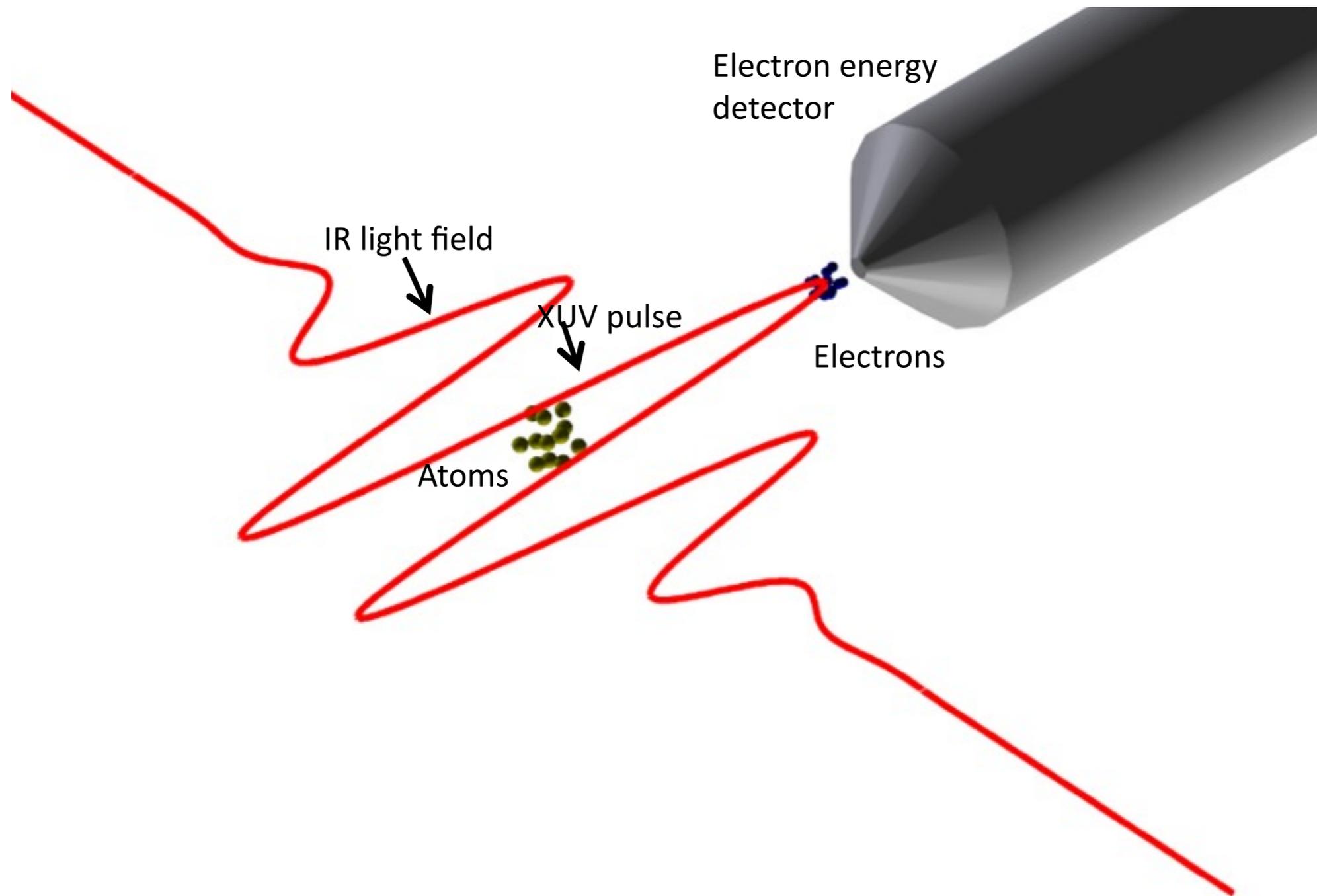
- Transparent detector



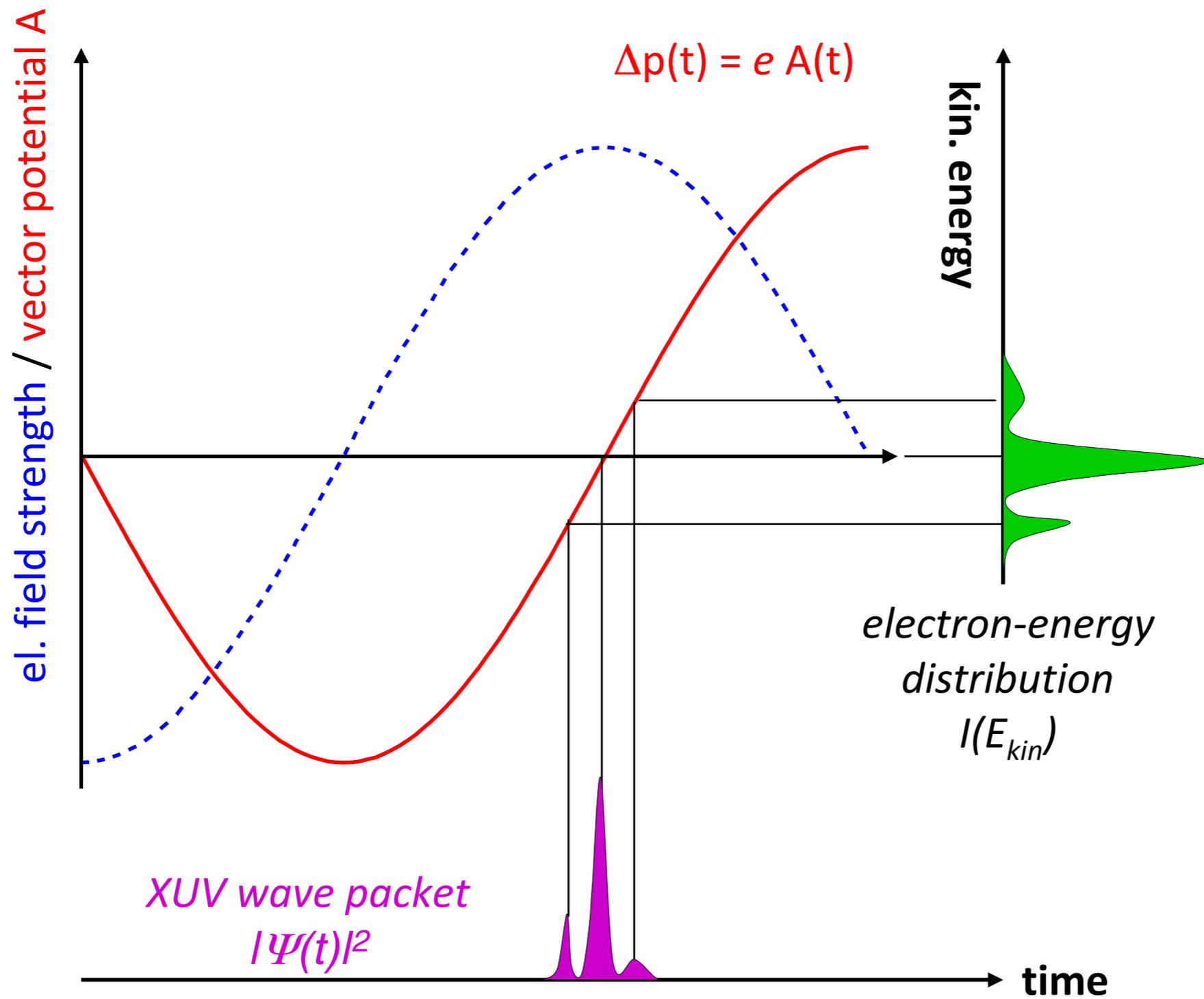
Time of Flight Spectrometer



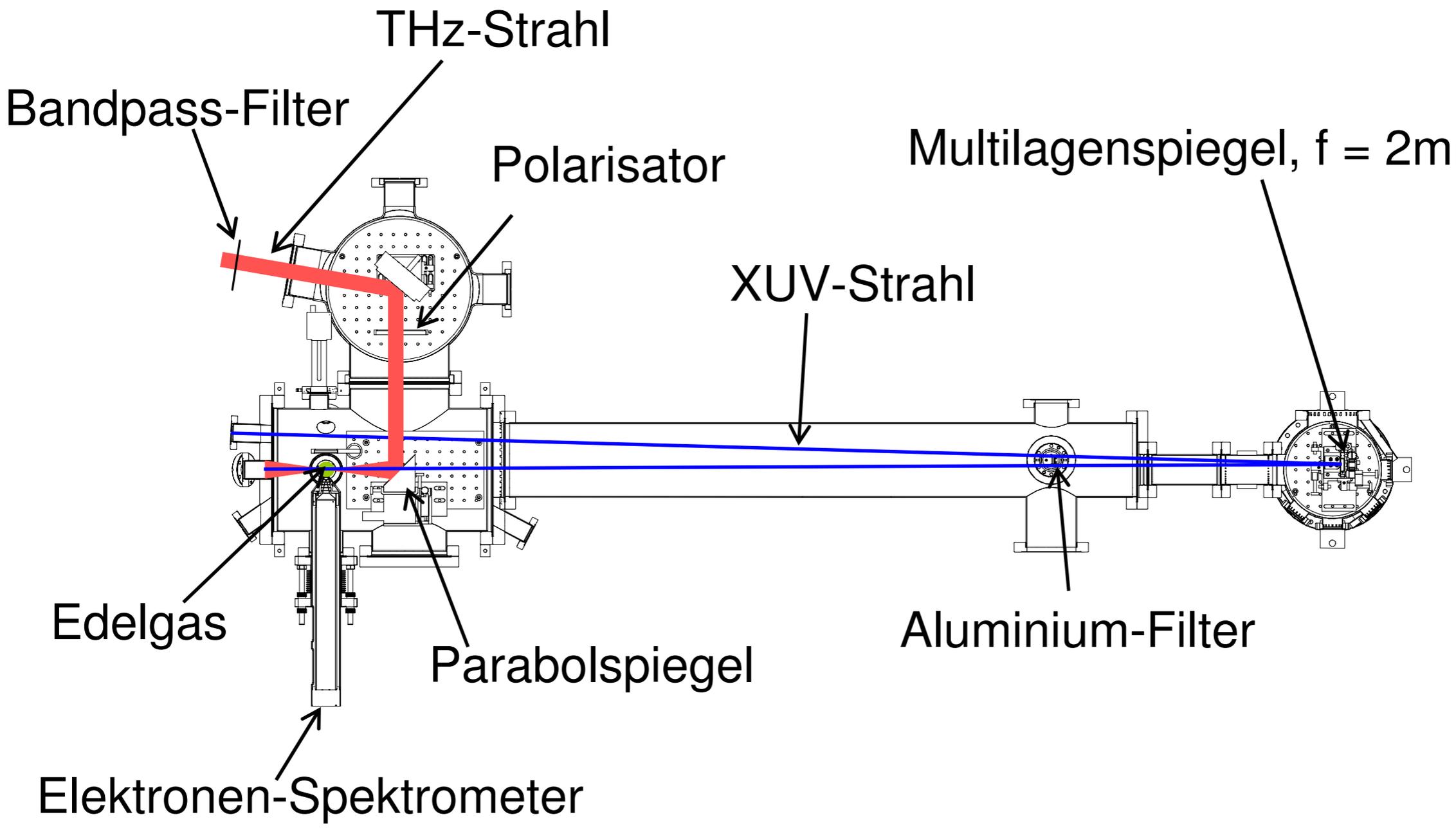
Light Field Streak Camera



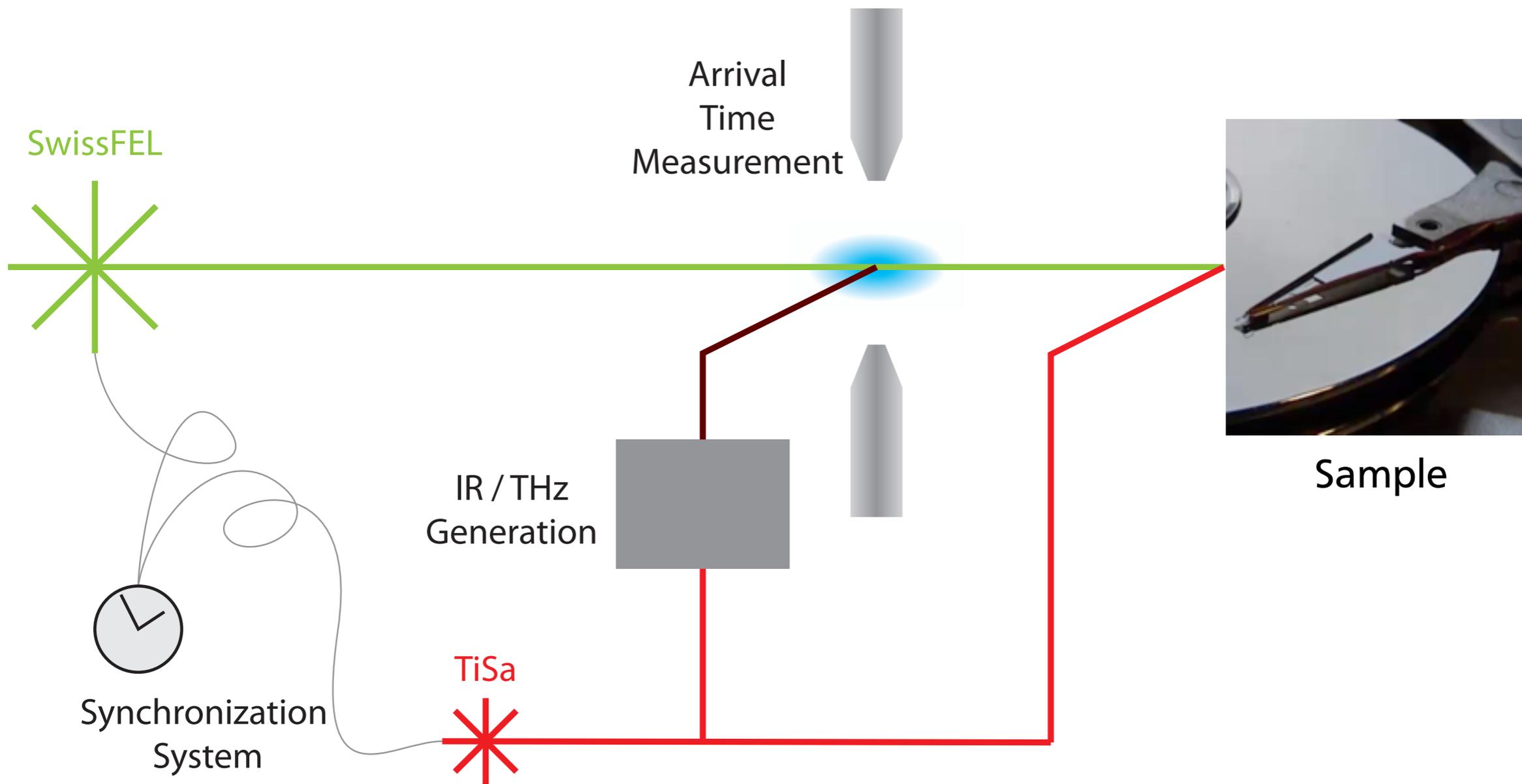
Light Field Streak Camera



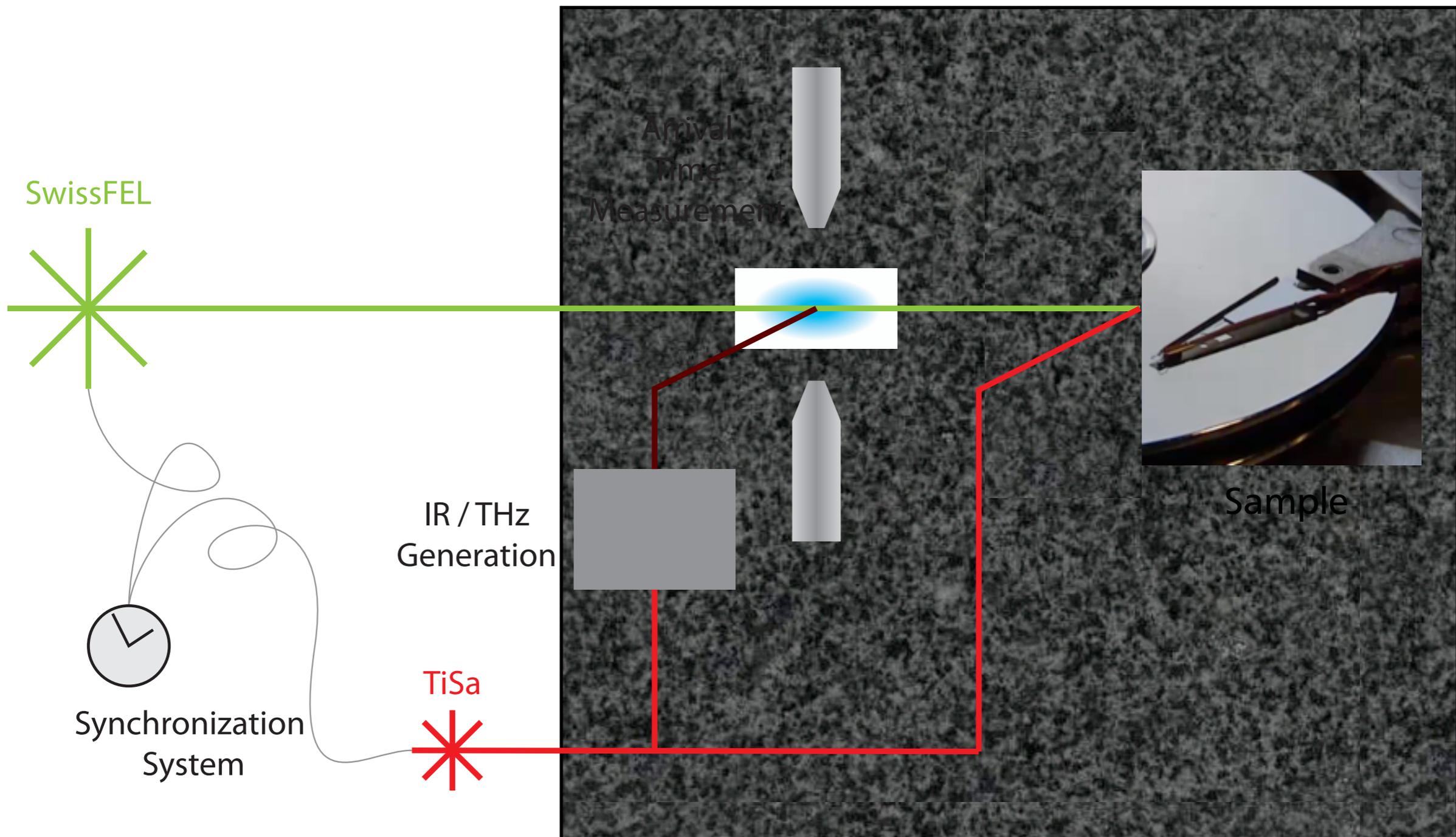
Experiment at FLASH



Suggested Setup

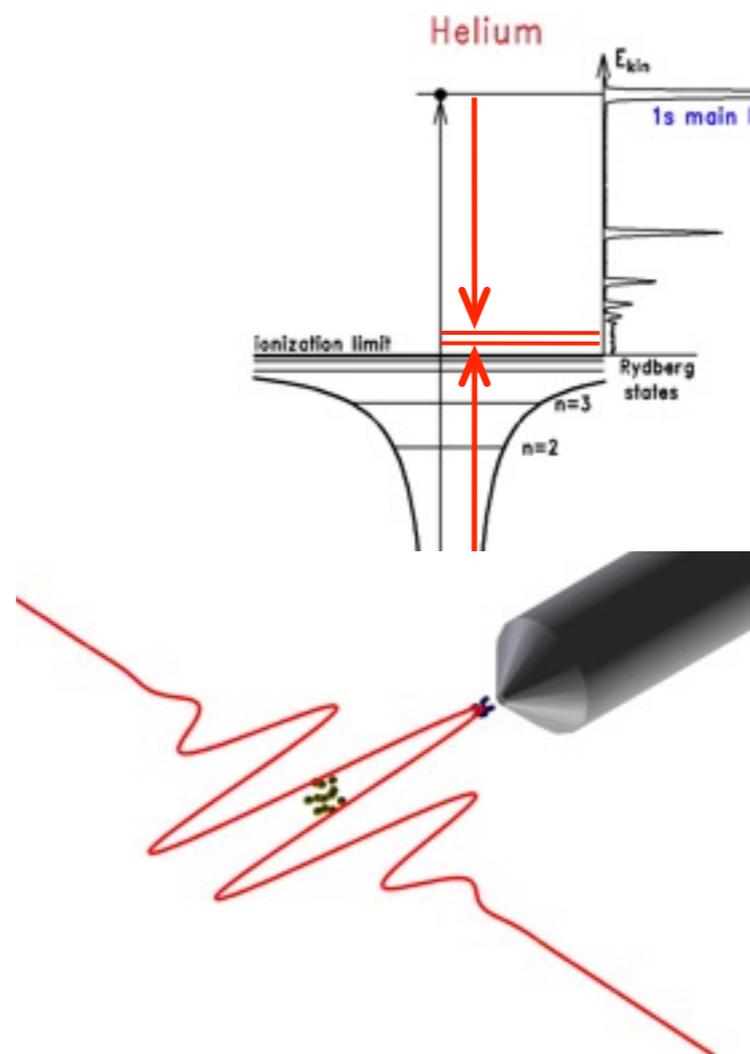
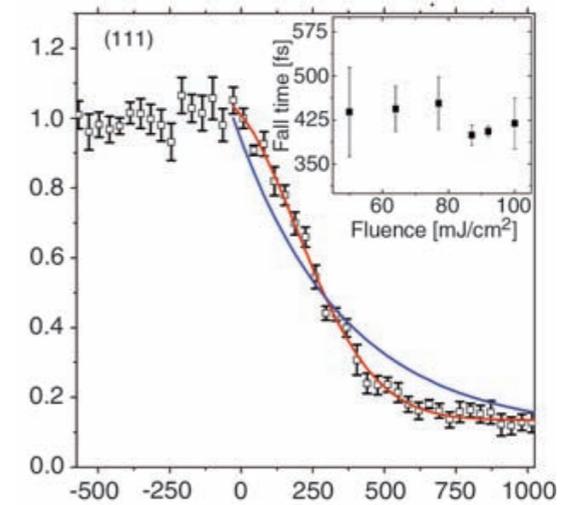


Suggested Setup

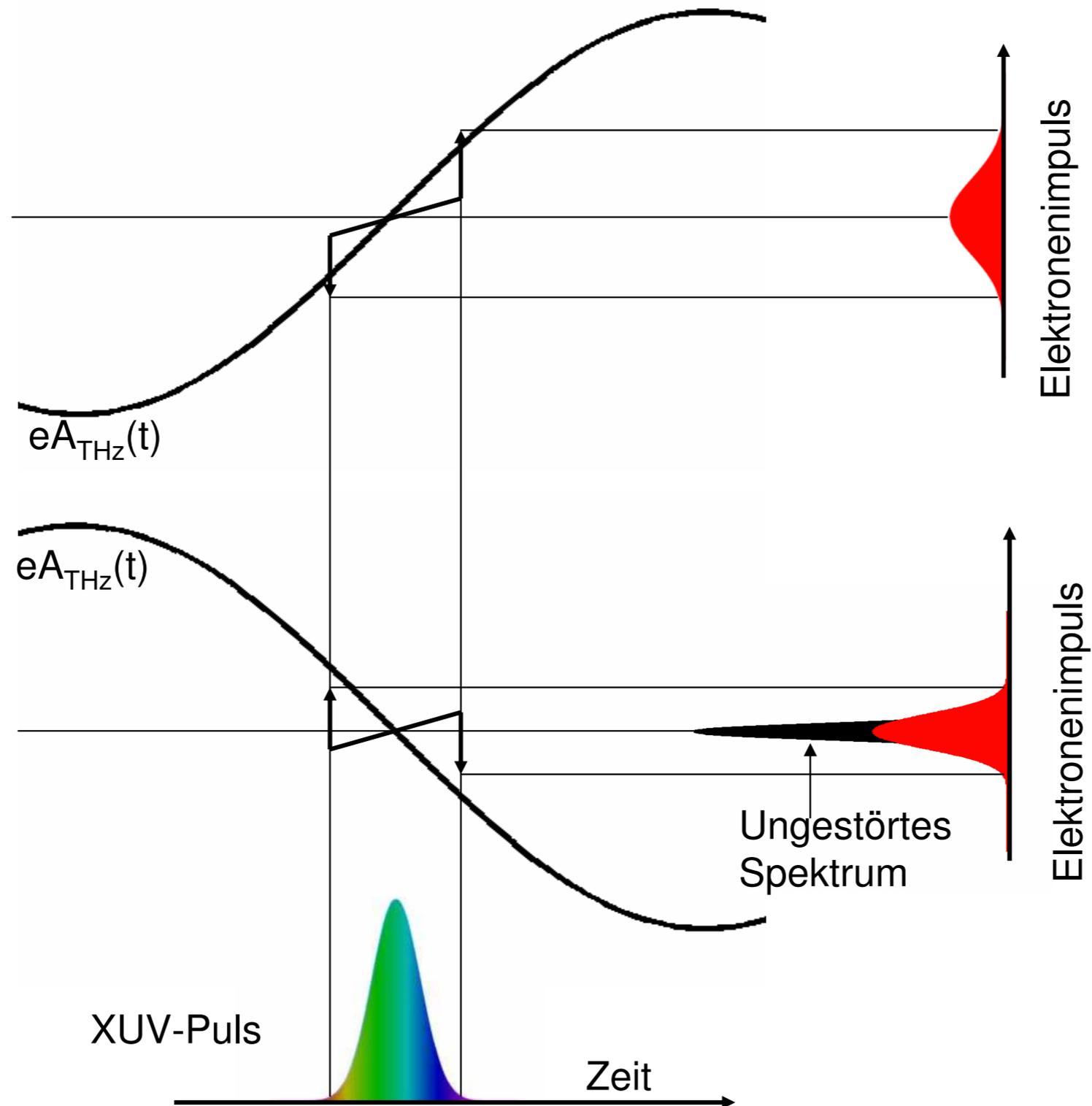


Summary

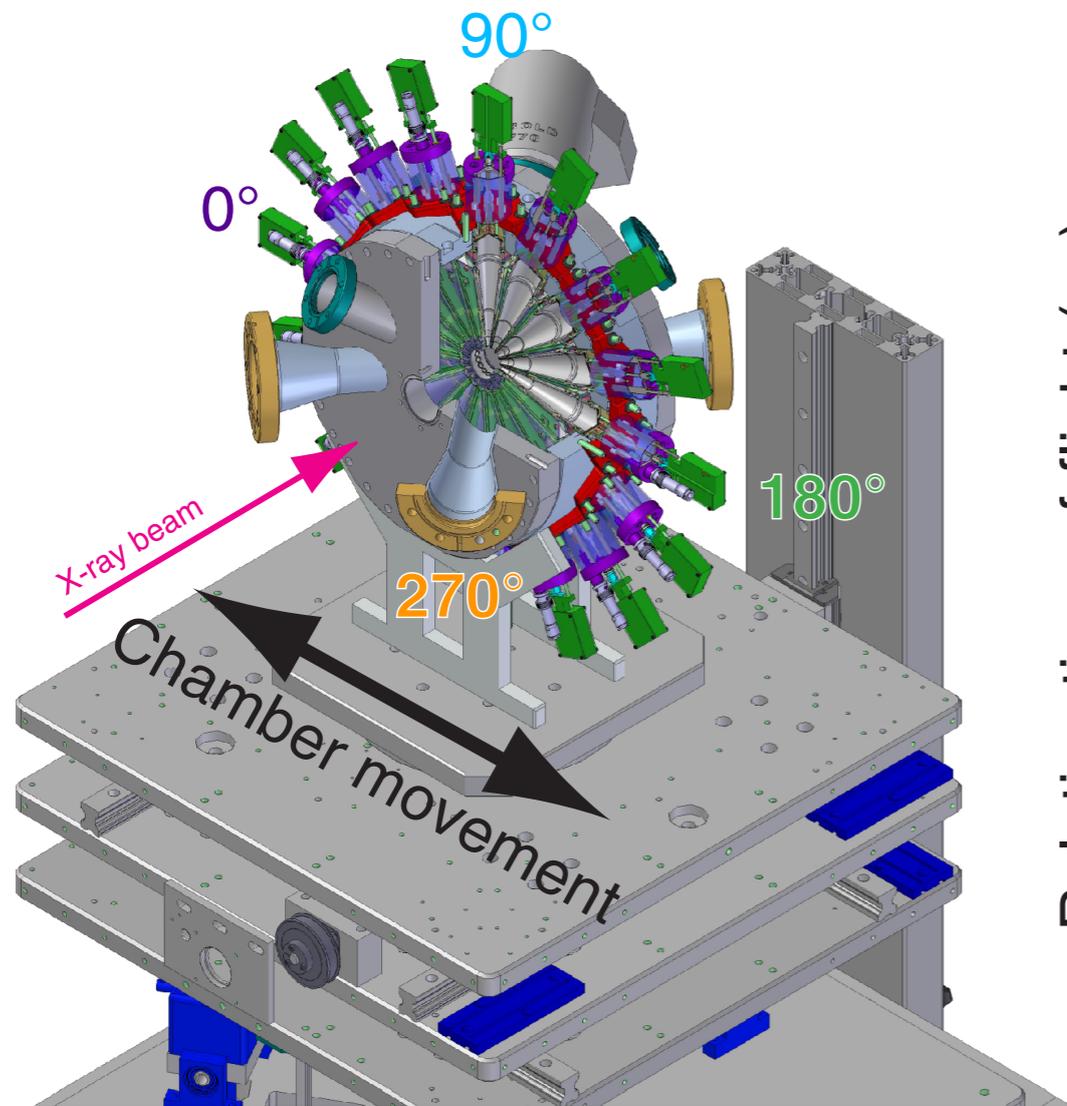
- We need to synchronize the FEL with a pump laser
- Transparent detector based on photoelectron spectroscopy
- Photoelectrons streaked by radiation from the pump laser



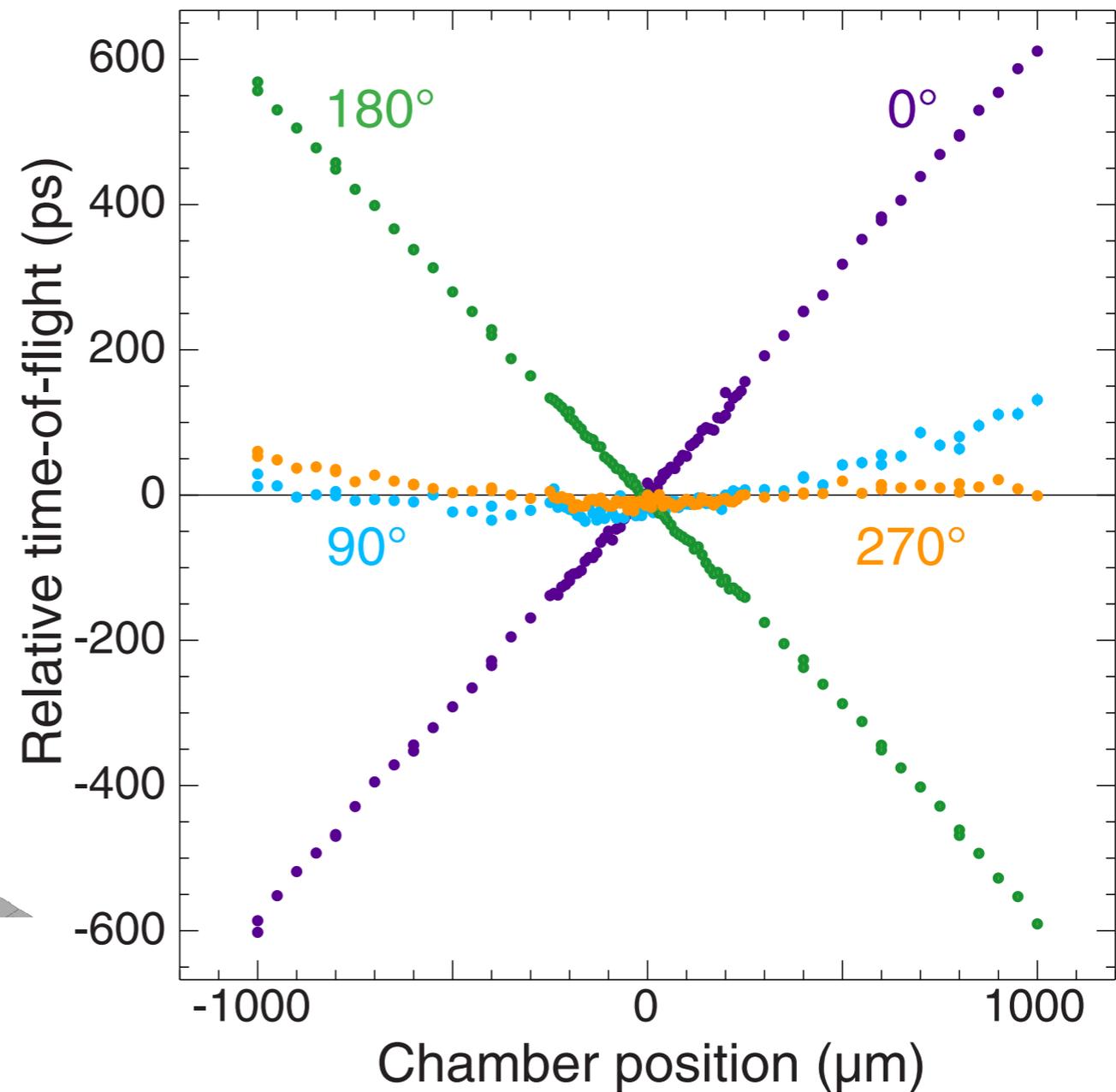
Outlook – Chirp Measurement?



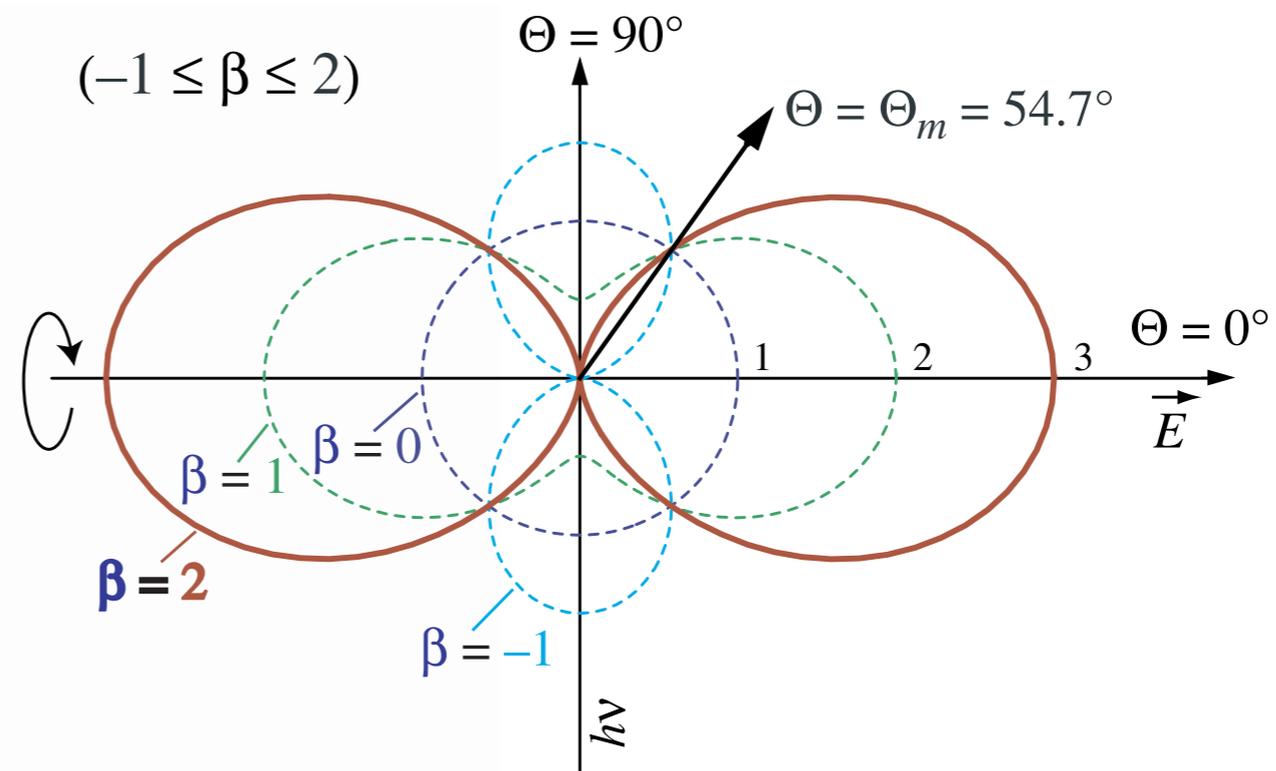
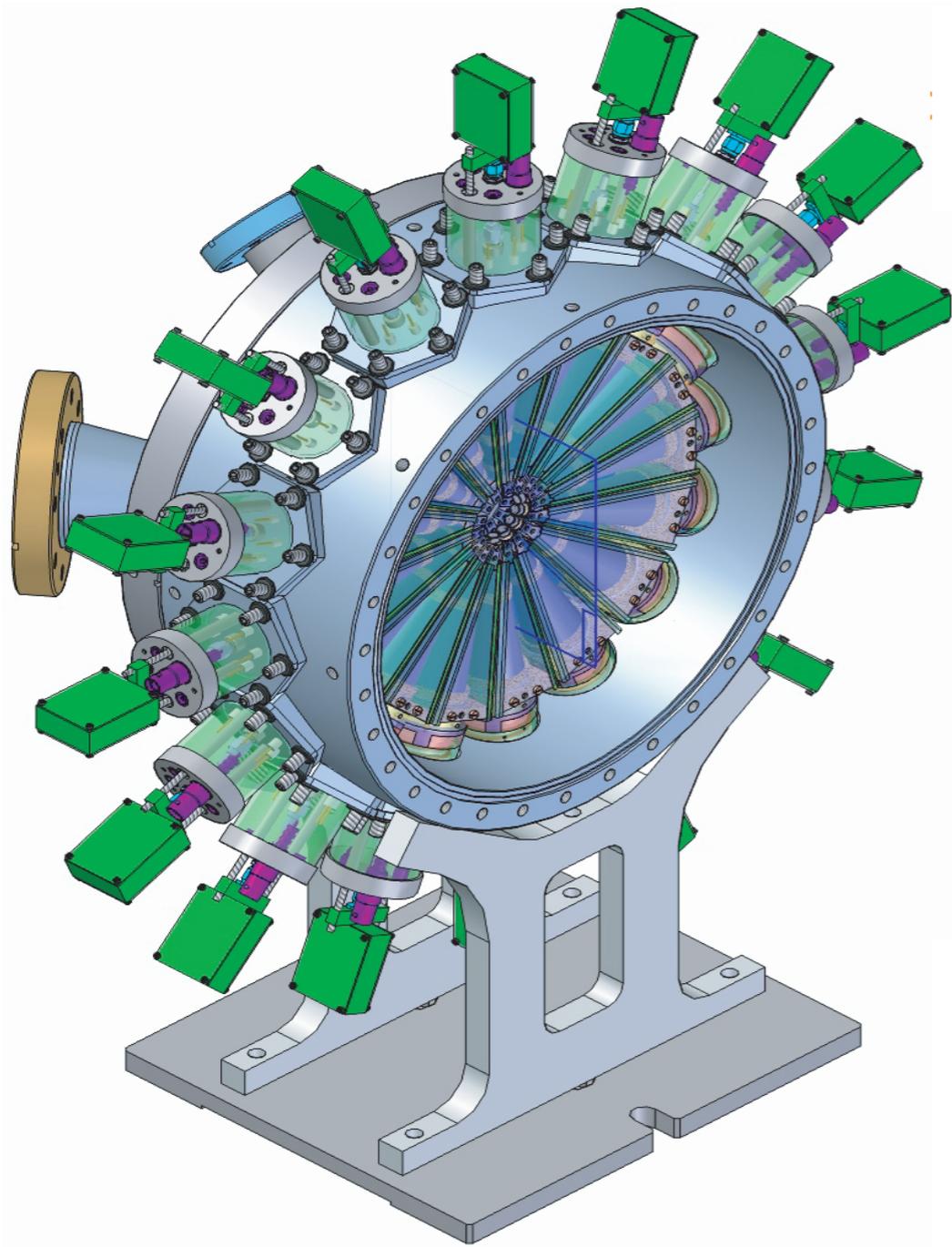
Outlook – Beam Position Measurement?



- > accuracy in the μm -range
- > improved via retardation



Outlook – Polarization Measurement?



Arrival Time Measurement for Pump-Probe Experiments at SwissFEL

Rasmus Ischebeck, for the PSI Diagnostics Group

- Special Thanks To
 - Adrian Cavalieri (DESY)
 - Aaron Lindenberg (SLAC)
 - Ulrike Frühling (DESY)
 - Jens Viefhaus (DESY)
 - Pavle Juranic (PSI*)

* soon

<http://people.web.psi.ch/ischebeck>



© 2010 Paul Scherrer Institut