Preparing electron diffraction at the ELBE SRF gun II

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Institute of Radiation Physics / Institute of Ion Beam Physics and Materials Research · Louis Stein · PhD student · l.stein@hzdr.de · www.hzdr.de

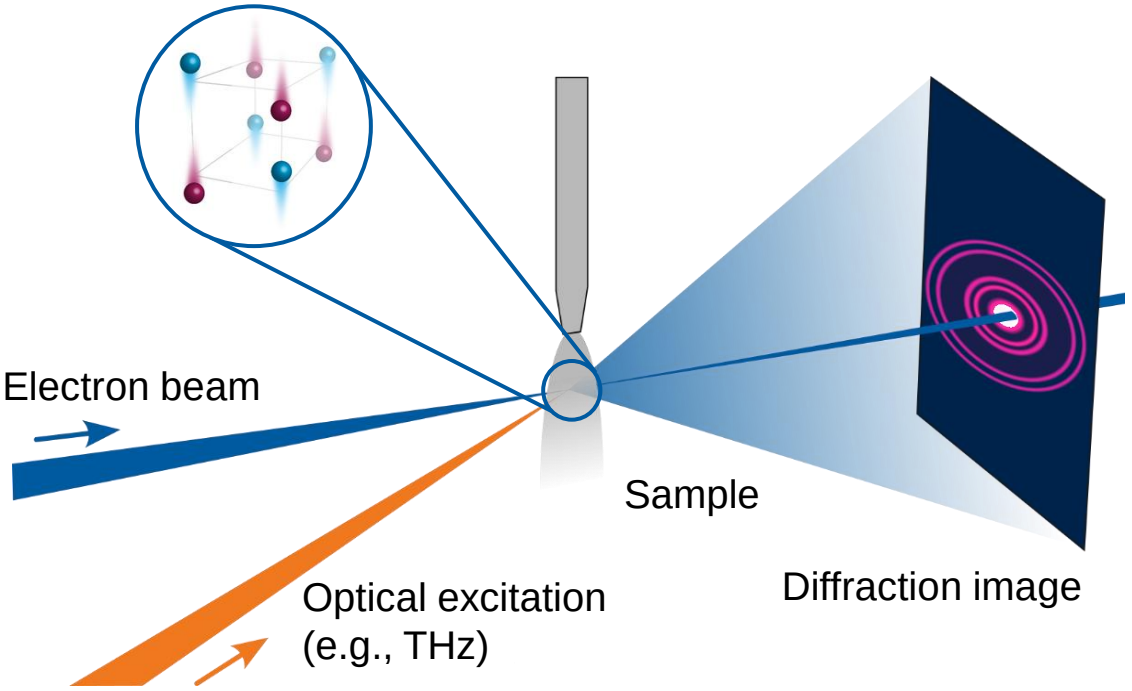
Motivation:
MeV Ultrafast Electron Diffraction (UED) and its role in DALI

- UED: observation of **structural dynamics** on the **fs timescale**

- Operates as a **pump-probe technique**:
  - Pump pulse: excitation
  - Time-delayed **probe** pulse → diffraction pattern
  - Delay variation

- **DALI (Dresden Advanced Light Infrastructure)**

→ **cutting-edge materials and life sciences research**

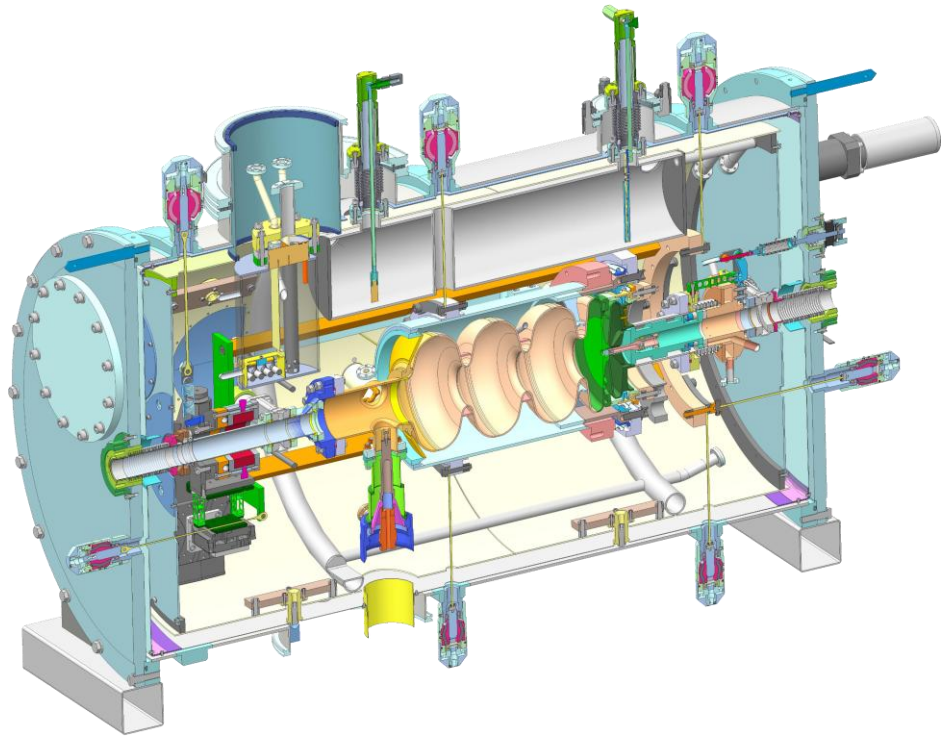


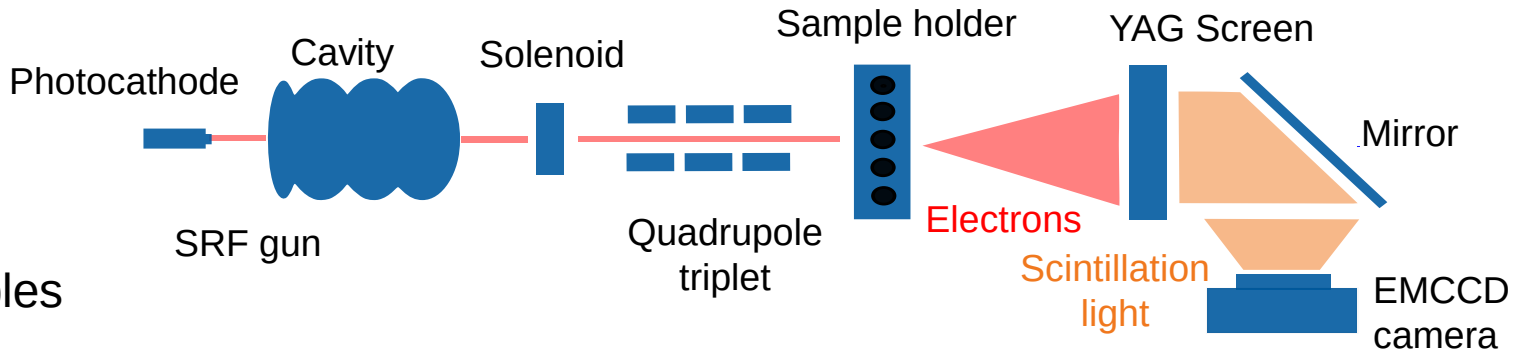
First Demonstration:
Static Electron Diffraction at ELBE

- **SRF gun** foreseen for MeV-UED:
  - MeV electron beams
  - High beam coherence
  - Short electron pulses

- First **static diffraction** experiments:
  - Adjusting cathode laser for SRF gun II
  - Sample stage
  - Screen station
  - EMCCD Camera

- Benchmark tests with known samples





Outlook:
Ultrafast Electron Diffraction at ELBE and DALI

- Static electron diffraction: beam **diagnostics**
- **Pump-probe** experiments with photocathode laser
- Gain experience in:
  - MeV electron diffraction
  - Pump-probe experiments
  - Data analysis
- Planned **DALI:** pumping with THz radiation source

  → **Worldwide unique MeV-UED setup**

ELBE.
CENTER FOR HIGH-POWER RADIATION SOURCES

DALi