Contribution ID : **3** Type : **Oral presentation**

# The FELBE THz/IR FEL : Overview of the Facility and User Activities

The FELBE User Facility at the ELBE Center for High-Power Radiation Sources offers a pair of FELs that deliver beam to eight different user labs. The FELs are driven by a two-stage Superconducting RF (SRF) linac, which produces a quasi-CW beam (13 MHz/1 mA) at an energy of up to 36 MeV. The tuning range spanned by the two FELs extends from the mid IR to THz (5 – 250 μm). The spectral range and ultrashort pulse width ($\tau p \approx 0.7 - 25$ ps) are ideal for time-resolved measurements of many types of transient processes in low-dimensional materials [1], quantum structures [2], and correlated systems [3]. The high pulse energy can also drive nonlinear phenomena [4] and strong coupling [5] in light-matter interactions. The FELBE User Labs are equipped with instrumentation and synchronized ultrashort table-top lasers (i.e. Ti:Sa oscillators, regens, OPAs, SFG/DFG) which facilitate various classes of degenerate (single-color), and non-degenerate (two-color) pump-probe experiments. Optical cryostats and an 8 T split coil magnet are also available for low temperature and magnetic field dependent studies. Furthermore, the FELBE beamline extends into the adjacent High Field Magnet Lab (HLD) for performing magneto-optical spectroscopy measurements at fields up to 70 T [6]. The high repetition rate and tunability of the FELBE beam has uniquely enabled revolutionary methods in scattering-Scanning Nearfield Optical Microscopy (s-SNOM) to image novel light-matter interactions with resolution far below the diffraction limit [7]. Proposals for beamtime on FELBE and the other secondary sources at ELBE are invited from users twice a year.

(https://www.hzdr.de/FELBE).

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**Session Classification :** Tue 05/07 Morning/ Change Abstract ID