Implementing HELIPORT for complex workflows at the TELBE user facility

Tuesday 13 June 2023 09:00 (30 minutes)

The terahertz (THz) facility TELBE at HZDR provides intense THz sources uniquely suited for the study of nonlinear light-matter interactions. The TELBE THz sources are driven by the ELBE electron accelerator and provide frequency-tunable THz pulses with field strengths of several 100 kV/cm, pulse durations of a few picoseconds and a repetition rate on the order of 100 kHz. These light pulses can be used to excite multiple low-energy degrees of freedom in matter, such as spins, lattice dynamics or collective quasiparticle oscillations. The resulting dynamics are typically probed with femtosecond time resolution using optical lasers. Achieving this time resolution requires strategies to overcome the intrinsic time jitter between the accelerator-based THz pulses and the optical pulses generated by table-top laser systems. We use a measure-and-sort approach that achieves the required time resolution, but requires the measurement of precise time stamps for each individual light pulse in the experiment. The corresponding high data rates of several GB/min require a fast network and computing infrastructure as well as sustainable concepts for data management and metadata generation. This is all the more important as TELBE is a user facility requiring rapid visualisation and sharing of data and associated metadata. A central hub for planning, monitoring, documenting and archiving the complex workflows at TELBE is therefore highly desirable. The implementation of HELIPORT at TELBE will therefore be a major improvement in terms of automation and meeting the requirements of the FAIR principle.

Туре

Talk

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Session Classification: Use-cases

Track Classification: Use-cases