

## Optical timing distribution and synchronization with ultrafast femtosecond lasers

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**Location:** Tietotalo TB109



hosted by Prof. Humeyra Caglayan

### Abstract:

In the past decade, the need for sub-femtosecond timing distribution has emerged in large-scale science facilities such as X-ray free electron lasers to synchronize various optical and microwave sources across multi-kilometer distances. Recently, optical timing distribution systems based on ultrashort and ultra-stable optical lasers have been developed and successfully employed at these facilities providing long-term sub-femtosecond timing jitter. Today, commercially-available, fully-automated optical timing distribution systems are ready to expand their application fields starting with space telescope networks and attoscience centers.

Here, I would like to present the pioneering optical timing distribution system developed and commercialized by Cycle GmbH, a spin-off company of Deutsches Elektronen-Synchrotron. The system can be referenced both to a microwave or an optical frequency standard. The timing signals are distributed via optical fibers to remote users with an unrivaled  $1\text{E}-18$  instability. The system can be easily interfaced with existing time and frequency protocols such as 1PPS, IRIG, NTP. The talk will cover scientific background of such systems together with their most recent achievements from the field.