



## Seminar

### An Orchestra of Light: Advanced Timing Distribution and Light Wave Synthesis



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Time: 11:00am, June 28, 2013 (Friday)

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Venue: Conference Room 607, Science Building 5

地点: 理科五号楼607会议室

#### Abstract

Kilometer scale free-electron lasers will reach their full potential in providing molecular movies if all laser and rf-sources involved in the facility can be timed and synchronized to at least 10-fs precision with scalability to potentially 100 attoseconds in the future. A set of ultrafast optical techniques for long-term stable femtosecond synchronization of large-scale X-ray free-electron lasers will be presented and performance scaling towards sub-femtosecond precision will be demonstrated.

Sub-cycle optical waveforms with spectra spanning multiple octaves are desired for efficient attosecond pulse generation and multi-wavelength spectroscopy. It turns out that some of the techniques invented for large scale timing distribution can be used to coherently stitch few-cycle optical pulses together. Progress towards a multi-Joule optical waveform synthesizer covering 500 nm – 2.5  $\mu$ m will be presented and potential applications are discussed.

#### About the Speaker

Franz X. Kärtner received his Diploma and Ph.D. degree in Electrical Engineering from Technical University Munich in 1986 and 1989, respectively and a Habilitation degree in Experimental Physics at ETH-Zürich in 1997. After faculty positions at University of Karlsruhe (TH) and MIT, he joined in 2011 the Center for Free-Electron Laser Science (CFEL) at DESY, and is Professor of Physics at University of Hamburg, and Adjunct Professor of Electrical Engineering at Massachusetts Institute of Technology (MIT). His research is focused on few-cycle and ultralow jitter femtosecond lasers for optical metrology, attosecond science and compact x-ray source technology. He is a fellow of the IEEE and OSA.