



28th January 2014 - 03:30 p.m.
Building 99, seminar rooms I - III

Jungwon Kim

Korea Advanced Institute of Science and Technology, Daejeon

Attosecond-jitter mode-locked lasers and their microwave photonic applications

I will introduce our most recent progress in the development of attosecond-timing-jitter mode-locked lasers and their applications in microwave photonic systems. Some key results in diode-pumped, attosecond-jitter fiber and solid-state lasers include (a) 14-attosecond-level jitter from nonlinear-polarization-rotation-based Yb-fiber lasers [1], (b) sub-500-attosecond jitter from self-starting, CNT-mode-locked, all-fiber Er lasers [2], and (c) 700-attosecond jitter, 1.2-GHz repetition rate optical pulse trains from Yb:KYW lasers [3]. Using such low-jitter mode-locked lasers, we further show some new microwave photonic systems, including (d) ultralow phase noise 10-GHz microwave generation directly from Er-fiber lasers with sub-500-attosecond jitter and -157 dBc/Hz phase noise at 100 kHz offset frequency [4], (e) sub-femtosecond drift laser-microwave synchronization [5], and (f) frequency-comb-based microwave transfer over fiber approaching 10⁻¹⁹-level instability [6]. Finally, recent applications of our laser-microwave synchronization technique for few-femtosecond ultrafast electron diffraction (UED) sources will be introduced.

[1] H. Kim et al, IEEE J. Sel. Top. Quantum Electron. 20, 2298454 (2014)

[2] C. Kim et al, Opt. Express 21, 26533 (2013)

[3] H. Yang et al, Opt. Lett. 39, 56 (2014)

[4] K. Jung et al, IEEE Photon. J. 5, 5500906 (2013)

[5] K. Jung et al, Opt. Lett. 37, 2958 (2012)

[6] K. Jung et al, arXiv:1312.7161.