DAMOP10-2010-000026

Abstract for an Invited Paper
for the DAMOP10 Meeting of
the American Physical Society

Coherent frequency combs and spectroscopy[1]

JUN YE, JILA, NIST and Univ. of Colorado

Optical frequency combs possessing precise phase coherence across the entire visible spectrum have profoundly changed optical frequency metrology and ultrafast science, with breakthrough developments in optical atomic clocks, optical frequency synthesis, direct frequency comb spectroscopy (DFCS), high-resolution quantum control, coherent pulse synthesis and amplification, and control of sub-femtosecond electron dynamics in atoms and molecules. DFCS [1] is a new spectroscopic approach that embraces simultaneously broad spectral coverage, fine spectral resolution, numerous detection channels, ultrahigh sensitivity, and real-time analysis [2]. These powerful capabilities have been demonstrated in a series of experiments where identification and quantification of many different molecular states or species are achieved in a massively parallel fashion [3]. A range of interesting scientific applications will be discussed.

[1] A. Marian et al., Science 306, 2063 (2004).
[2] M. J. Thorpe et al., Science 311, 1595 (2006).
[3] M. J. Thorpe & J. Ye, Appl. Phys. B 91, 397 (2008).

[1]Work supported by AFOSR, NIST, DTRA, and Agilent.