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Femtosecond Comb Coherent Accumulation and Spectroscopy MATTHEW STOWE, ADELA MARIAN, JILA, University of Colorado, JOHN LAWALL, NIST, DANIEL FELINTO, Caltech, FLAVIO CRUZ, IFGW-UNICAMP, Campinas-SP, Brazil, JUN YE, JILA, University of Colorado — The development of phase stabilized modelocked lasers has enabled a revolution in the field of high precision spectroscopy. The light produced by such a broadband laser typically consists of millions of equally spaced modes spanning many tens of nanometers. Once the comb is referenced to a frequency standard the optical frequencies of the laser modes are known with excellent precision. Current applications of femtosecond frequency combs range from atomic clocks and molecular spectroscopy to frequency transfer and high field physics. The technique of multiple pulse coherent accumulation is used to conduct direct frequency comb spectroscopy via one and two photon absorption in cold Rubidium atoms. Femtosecond pulses allow more efficient frequency mixing than with comparable power cw lasers. This fact combined with the narrow comb mode linewidth enables spectroscopy and perhaps cooling of atoms on transitions at traditionally hard to reach wavelengths.

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