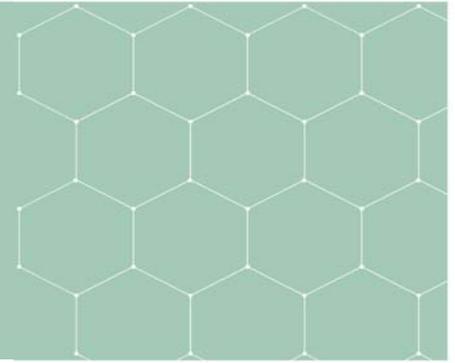




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Frequency Combs for Precise Atmospheric Measurement

Ian Coddington
The National Institute of Standards & Technology (NIST)

August 27, 2018 at 4 p.m.
120 Engineering (Hammond Auditorium)

Abstract

Frequency combs are a novel laser source that have historically been exploited in an exciting range of laboratory-bound precision measurements. This talk will discuss the development of a fieldable frequency combs and high precision field measurements with these devices focusing in particular on remote sensing. Using frequency combs in pairs we can create high-resolution broadband spectrometers that can see small changes in gas concentrations over kilometer paths. In the near-IR this unique capability allows a host of new sensing modalities for detection and quantification of greenhouse gasses. For instance methane leaks as small as 6 scfh ($\sim 1/4$ the respiration rate of a human being) can be detected from over 1 kilometer away potentially allowing for simultaneous leak monitoring of hundreds of oil and gas assets from a single spectrometer. Similarly, novel mid-IR frequency combs should allow for detection of more complex industrial pollutants in the open air. With the current rapid evolution of infrared laser technology this application space is will continue to expand.



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Biography

Dr. Ian Coddington received the B.A. degree in physics from Reed College, Portland, OR, in 1998 and the Ph.D. degree in physics from University of Colorado, Boulder, CO, in 2004. At JILA/University of Colorado, he conducted research on Bose-Einstein Condensates under Dr. Eric Cornell. From 2005–2007, he was an NRC Postdoctoral Associate in the Fiber Optics and Components Group at the National Institute of Standards and Technology (NIST), Boulder, CO, working toward the development of dual comb spectroscopy in the near-IR and toward coherent frequency transfer. Since that time he has stayed on as a staff Physicist at NIST continuing the development of comb systems for LIDAR, time-transfer and greenhouse gas spectroscopy in the NIST Quantum Electronics and Photonics group. In his time at NIST Dr. Coddington has received a Silver medal from the Department of Commerce in 2011 and a Presidential Early Career Award for Scientists and Engineers (PECASE) in 2012 for his pioneering work with frequency combs and dual-comb spectroscopy.