ELECTRICAL & COMPUTER ENGINEERING SEMINAR

"One in 10^{14}: Laser Spectroscopy from the Edge of Space"

by

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Engineering Building room D102

Abstract & Biography

Abstract: Laser radar systems employ laser spectroscopic techniques as remote sensing tools for studying the atmosphere. Resonance lidar is used to measure composition, temperatures and winds in the upper atmosphere at high resolution and precision. These systems transmit pulses with peak powers of Megawatts while detecting signals on the order of single photons. The receivers employ photon-counting techniques that introduce an inherent uncertainty in the lidar measurement that acts as a fundamental noise in the system. Current environmental measurements demand accurate measurements of rapidly varying quantities. Separating the instrumental variability from the geophysical variability is critical in making accurate measurements. In this talk I will discuss the principles and practices used in the design and implementation of resonance lidar systems. I will illustrate the challenges and discuss future developments by considering contemporary lidar systems and their measurements of nonlinear wave fluxes and auroral arcs in the upper atmosphere.

Bio: Richard L. Collins received a B.E. in Electronic Engineering from the National University of Ireland, Dublin. He received an M.S. in Electrical Engineering from Case Western Reserve University, where he was advised by Prabhat K. Rastogi. His M.S. thesis title was "A Fractal Analysis of Colored Noise with Application to Gravity Wave Spectra in the Middle Atmosphere." Dr. Collins received a Ph.D. in Electrical Engineering from the University of Illinois, Urbana-Champaign. His dissertation title was "Middle Atmosphere Structure and Dynamics: Lidar Studies at the South Pole, Syowa and Urban," and his advisor was Chester S. Gardner.

Since 1994 Dr. Collins has been at the University of Alaska Fairbanks in the Electrical and Computer Engineering Department and Atmospheric Sciences Program, where he is currently Associate Professor. His research focuses on lidar studies, including measurements of the mesospheric metal layers, noctilucent clouds, stratospheric and mesospheric temperatures, forest fire smoke and fish. He is currently developing lidar techniques for studying the aurorally-modified atmosphere.

Please contact Prof. Steven Reising, Steven.Reising@ColoState.edu, with any questions.