MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Friday, September 29, 2017
4:10 – 5:00 PM
Barnard Hall/EPS 108

Diode-laser-Based Remote Sensing of the Lower Troposphere

Kevin S. Repasky,[1,2,3] Scott. Spuler,[2] Matthew Hayman,[2] and Catharine Bunn[3]
[1]Electrical and Computer Engineering, Montana State University, Bozeman, MT,
repasky@montana.edu
http://www.ece.montana.edu/directory/faculty/1524511/kevin-repasky
http://www.montana.edu/krepasky/research.html
[2]National Center for Atmospheric Research, Boulder, Colorado
[3]Physics Department, Montana State University, Bozeman, MT

Abstract:

Atmospheric water vapor is a greenhouse gas that is known to be a significant driver of weather and climate. Several National Research Council (NRC) reports have highlighted the need for improved water vapor measurements that can capture its spatial and temporal variability as a means to improve weather predictions.

Researchers at Montana State University (MSU) and the National Center for Atmospheric Research (NCAR) have developed an eye-safe diode laser based micro-pulse differential absorption lidar (MP-DIAL) for water vapor profiling in the lower troposphere. The MP-DIAL is capable of long term unattended operation and is capable of monitoring water vapor in the lower troposphere in most weather conditions.

Two MP-DIAL instruments are currently operational and have been deployed at the Front Range Air Pollution and Photochemistry Experiment (FRAPPE), the Plains elevated Convection at Night (PECAN) experiment, the Perdigão experiment, and the Land Atmosphere Feedback Experiment (LAFE). For each of these field experiments, the MP-DIAL was run unattended and provided near-continuous water vapor profiles, including periods of bright daytime clouds, from 300 m above the ground level to 4 km (or the cloud base) with 150 m vertical resolution and 5 minute temporal resolution. Three additional MP-DIAL instruments are currently under construction and will result in a network of five eye-safe MP-DIAL instruments for ground based weather and climate research experiments.

Taking advantage of the broad spectral coverage and modularity or the diode based architecture, a high spectral resolution lidar (HSRL) measurement capabilities was added to the second MP-DIAL instrument. The HSRL capabilities will be operational during the deployment at the LAFE field experiment. The instrument architecture will be presented along with examples of data collected during recent field experiments.

Host: Rufus Cone

**** Refreshments served in the Barnard Cove opposite Barnard 264 at 3:45 ****

**** Come early to get a seat – we are not able to be in BH 103 this year ****