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# Characterization of Pollen Particles Using LIDAR

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*We have observed pollen in the local troposphere using the depolarization capabilities of a LIDAR (Light Detection and Ranging) system. The polarization characteristics of the received LIDAR signal, along with supplemental pollen forecast data, allowed me to characterize the shape of the pollen particles. Supported by NSF*

## EARL Lidar System

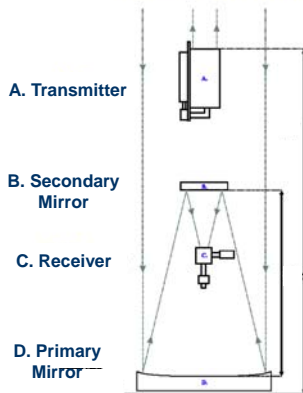
- Eyesafe Atmospheric Research Lidar with 523.5 nm frequency doubled Nd:YAG pulsed laser

- Measures clouds, pollen, volcanic ash and aerosols

- Heights of measured phenomena are calculated from the time elapsed between the transmitted and received laser pulse

- FAA regulations requires a lidar operator to be present at all times while the laser is running

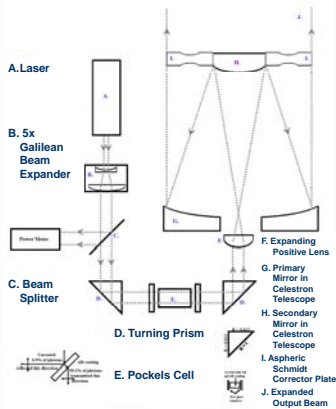
Overall E.A.R.L. Diagram



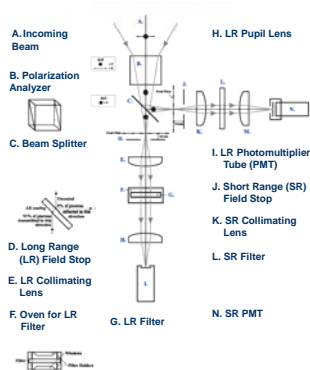
## Coaxial Setup

- Transmitter and Receiver positioned along the same vertical axis
- Transmitter expands beam to a 200 mm diameter “doughnut” for eye safety purposes
- Pockels Cell define alternates linear polarization of transmitted light.
- “Co-polarization” refers to the light oriented to the polarization that the Polarization Analyzer Cube (PAC) detects and “Cross-Polarization” refers to the light oriented in the polarization that is not transmitted through the PAC
- Receiver collects light from atmosphere and filters out anything but 523.5 nm light

E.A.R.L. Transmitter

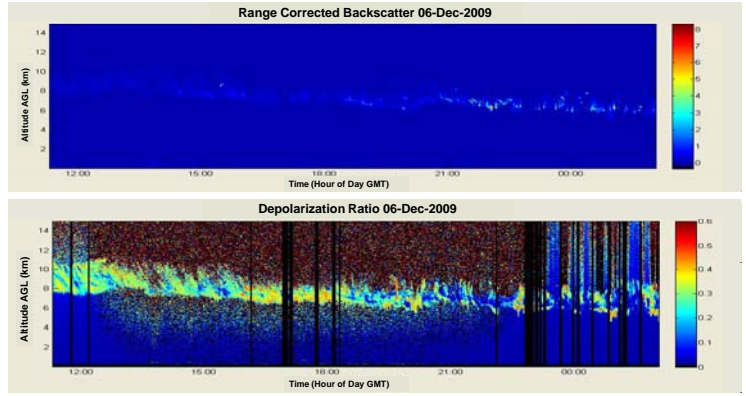


E.A.R.L. Receiver



## Data Processing

- All data is processed using Matlab
- Range Corrected Backscatter plot shows the relative amount of light returned to the system
- Depolarization Ratio plot shows the ratio of “Cross-polarization” to “Co-polarization”



## Pollen

