

THE USE OF TWO ANGLE ELASTIC AND RAMAN SCATTERING
TO OBTAIN MOLECULAR DENSITY PROFILES

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ABSTRACT

The method of dual angle, multiple wavelength lidar interrogation to affect a radiative separation of the scattering produced by aerosols and molecules is extended. A given wavelength is transmitted, and the Raman shifted return from nitrogen as well as the elastically scattered transmitted wavelength are both interrogated. This procedure is carried out in the backscatter mode at the zenith and one other slant path at some angle from the zenith. The only required approximation is that the total scattering cross section for the aerosol population is relatively insensitive to wavelength. For a typical case of a fundamental wavelength of $.503 \mu\text{m}$ (frequency doubled Nd), the Raman line is displaced to $.576 \mu\text{m}$ which is a small enough shift so that the approximation, which affects only the transmission coefficients, should be quite valid.