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Preliminary investigation of an atmospheric microplasma using Raman and Thomson laser scattering[1] BRADLEY SOMMERS, STEVEN ADAMS, Air Force Research Laboratory, Wright-Patterson AFB — A triple grating spectrometer system has been coupled with an ultraviolet laser at 266 nm for the purpose of investigating Rayleigh, Raman, and Thomson scattering within atmospheric plasma sources. Such laser interactions present a non-invasive diagnostic to investigate small scale atmospheric plasma sources, which have recently garnered interest for applications in remote optical sensing, materials processing, and environmental decontamination. In this work, the laser scatter and temperature relationship were calibrated with a heated nitrogen cell held at atmospheric pressure while subsequent scattering measurements were made in atmospheric discharges composed of nitrogen and air. An adjustable electrode configuration and dc circuit were assembled to produce a microdischarge operating in normal glow mode, thus providing a non-thermal plasma in which the translational, rotational, vibrational and electron temperatures are not in equilibrium. Preliminary results include measurements of these temperatures, which were calculated by fitting simulated scattering spectra to the experimental data obtained using the triple grating spectrometer. Measured temperatures were also compared with those obtained using standard optical emission spectroscopy methods.

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