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**Radial profile of micro-discharge temperature measured by ultraviolet laser Rayleigh scattering**[1] STEVEN ADAMS, Air Force Research Laboratory, JAMES CAPLINGER, Wright State University — Air micro-discharge temperature profiles have been derived from measurements of elastic Rayleigh scatter of an ultraviolet laser pulse. Rayleigh scatter images have been recorded to measure spatially resolved translational temperatures along the radial dimension of the dc micro-discharge at various currents. The scatter image intensity along the laser beam axis is proportional to the background gas target density and thus, according to the ideal gas law, is inversely proportional to gas translational temperature. By measuring the scatter image with and without a discharge, the temperature was determined in one-dimension along the laser beam passing radially through the discharge. This laser scatter technique was compared to the technique of measuring rotational and vibrational temperatures by passive optical emission spectroscopy (OES) of the $N_2$ second positive system. Results were generally consistent with the common assumption that $T_{vibrational} >> T_{rotational} = T_{translational}$. Slight differences between $T_{rotational}$ and $T_{translational}$ measured by laser scatter and OES techniques respectively are discussed.

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