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Electron properties of the plume of an atmospheric pressure helium plasma jet WAMEEDH ADRESS, ELENA NEDANOVSKA, GAGIK NERSISYAN, DAVID RILEY, WILLIAM GRAHAM, Centre for Plasma Physics, Queen's University Belfast, UK — Atmospheric pressure plasma, APP, jets, are now attracting great interest because of their potential uses in many applications; for example surface modification and plasma medicine. These applications require an insight into their plasma chemistry, which is strongly influenced by the electron energy distribution function. Here we report the use of Thomson scattering to measure the electron properties in the plume created by a 20 kHz, 2mm diameter helium APP jet operating into the open air. A 532nm Nd:YAG laser beam is focussed into the plasma plume. The temporally and spatially resolved spectra of light at 90° to the laser direction is detected. The spectra contain light from Thomson Scattering from electrons, along with Rayleigh and Raman scattering from atoms and molecules. These components are resolved in a manner similar to that described in ref 1. Our measurements reveal a "ring-like" radial distribution of both the electron density and temperature, with outer values of $\sim$ 7 x 10^{13} cm^{-3} and 0.4 eV and inner values of $\sim$ 2 x 10^{13} cm^{-3} and 0.1 eV respectively at 4 mm from the end of the quartz tube.

[1] A. F. H. van Gessel et al. Plasma Sources Sci. Technol. 21 (2012) 015003
[2] D.Breden et al Appl. Phys. Lett. 99 (2011) 111501

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