Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Measurements of atomic nitrogen distributions in a radio-frequency atmospheric-pressure plasma jet ERIK WAGENAARS, KARI NIEMI, DEBORAH O'CONNELL, TIMO GANS, York Plasma Institute, Department of Physics, University of York, York, YO10 5DD, UK — Radio-frequency (RF) driven atmospheric-pressure plasma jets (APPJs) are expected to have a range of new healthcare applications. To guarantee the effectiveness and safety of these devices, a thorough understanding of the physics and chemistry of these plasmas is needed. We studied an RF-APPJ in helium with small admixtures of nitrogen and/or oxygen. The low-temperature APPJ effluent contains high concentrations of reactive species such as atomic nitrogen and oxygen. The N and O radicals play a crucial role in the plasma chemistry and discharge dynamics, but are unfortunately difficult to measure experimentally. We present a two-photon absorption laser-induced fluorescence (TALIF) technique for measuring atomic nitrogen species, which uses 207 nm photons for excitation of ground-state N atoms and observes time-resolved fluorescence at 745 nm. With this diagnostic we directly measure the spatial and temporal evolution of atomic nitrogen species, and compare these to the results of a numerical model based on hydrodynamic equations with a semi-kinetic treatment of the electrons.

Erik Wagenaars
York Plasma Institute, Department of Physics,
University of York, York, YO10 5DD, UK

Date submitted: 20 Jul 2011 Electronic form version 1.4