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**Two-photon absorption laser induced fluorescence measurement of atomic oxygen density in an air atmospheric pressure plasma jet.** JIM CONWAY, GURUSHARAN GOGNA, STEPHEN DANIELS, Dublin City University — Two-photon Absorption Laser Induced Fluorescence (TALIF) is used to measure atomic oxygen number density [O] in an air Atmospheric Pressure Plasma Jet (APPJ). A novel technique based on photolysis of O2 is used to calibrate the TALIF system ensuring the same species (O) is probed during calibration and measurement. As a result, laser intensity can be increased outside the TALIF quadratic laser power region without affecting calibration reliability as any high intensity saturation effects will be identical for calibration and experiment. Higher laser intensity gives stronger TALIF signals helping overcome weak TALIF signals often experienced at atmospheric pressure due to collisional quenching. O2 photo-dissociation and two-photon excitation of the resulting [O] are both achieved within the same laser pulse. The photolysis [O] is spatially non-uniform and time varying. To allow valid comparison with [O] in a plasma, spatial and temporal correction factors are required. Knowledge of the laser pulse intensity I0(t), and wavelength allows correction factors to be found using a rate equation model. The air flow into the jet was fixed and the RF power coupled into the system varied. The resulting [O] was found to increase with RF power.

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