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Temporal evolution of the EVDF in a ns-pulsed APPJ in Helium
UWE CZARNETZKI, CHRISTIAN SCHREGEL, DIRK LUGGENHÖLSCHER, Institute for Plasma and Atomic Physics, Ruhr-University Bochum — The temporal evolution of the EVDF in a ns-pulsed jet-discharge operated in Helium is measured by Thomson scattering. Further, spatially and temporally resolved emission spectra and current and voltage waveforms are measured. The discharge consists of two molybdenum electrodes of 20 mm length which form a 1.5 mm high and 0.95 mm wide gap between two glass plates. A 150 ns long voltage pulse of 1-2 kV (5 kHz) is applied. A Nd:YAG laser provides an 8 ns laser pulse at 532 nm and the scattered light is detected by a gated ICCD camera connected to a TGS. Up to three orders of magnitude dynamic range for the absolutely calibrated EVDF are archived in the range 0.5 eV to 12 eV. A 60 ns Townsend pre-phase is followed by a 90 ns long DC-like discharge showing strong atomic emission lines. The 1,000 ns long afterglow is characterized by initial recombination of cold electrons and Helium excimer formation, predominately in Rydberg states, which slowly relax to lower states radiating in the visible range of the spectrum. Rydberg states are probed by ionization with an intense laser pulse and subsequent detection of the additional free electrons by Thomson scattering. This work was funded by the DFG Research Group FOR1123.

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