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Spatiotemporal Evolution of Ar(^{3}P$_2$) Metastable Density Generated in a Pulsed DC Atmospheric Pressure micro-Plasma Jet Impinging on a Glass Plate K. GAZELI, G. BAUVILLE, ET-T. ES-SEBBAR, M. FLEURY, O. NEVEAU, ST. PASQUIERS, J. SANTOS SOUSA, LPGP,CNRS,Univ. Paris-Sud,Universite Paris-Saclay,91405 Orsay,France, LABORATOIRE DE PHYSIQUE DES GAZ ET DES PLASMAS TEAM — Atmospheric Pressure micro-Plasma Jets (APPJs) are promising tools in various domains such as biomedical and material treatments. In this work, APPJs are produced in pure argon at variable flow rates (i.e., 200, 400 and 600 sccm), by applying high voltage positive pulses (250 ns in FWHM and 6 kV in amplitude) at a repetition frequency of 20 kHz. The generated plasma impacts an ungrounded glass plate placed at a distance of 5 mm from the tube's orifice and perpendicular to the streamers propagation. At these conditions, a diffuse discharge is established resulting in a non-filamentary and reproducible plasma, in contrast with the free-jet case (no target). This allows the quantification of the absolute density of the Ar($1s_5$) metastable state by using laser absorption spectroscopy to probe the transition $1s_5 \rightarrow 2p_9$ at 811.531 nm. The experiments show the dependence on the gas flow rate and on the axial and radial positions of the maximum density (6-9x10^{13} cm^{-3}). At 200 sccm, it is obtained close to the tube's orifice, while with increasing flow rate it is displaced towards the plate. Regarding the radial variation, density maxima are obtained in a small area around the streamers propagation axis.

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