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LPWA using supersonic gas jet with tailored density profile O. KONONENKO, S. BOHLEN, J. DALE, R. D'ARCY, M. DINTER, J.H. ERBE, G. INDORF, L. DI LUCCHIO, L. GOLDBERG, J.N. GRUSE, S. KARSTENSEN, V. LIBOV, K. LUDWIG, A. MARTINEZ DE LA OSSA, F. MARUTZKY, A. NIROULA, J. OSTERHOFF, M. QUAST, L. SCHAPER, J.-P. SCHWINKENDORF, M. STREETER, G. TAUSCHER, S. WEICHERT, C. PALMER, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany, TARAS HORBATIUK, Karazin Kharkiv National University, Ukraine — Laser driven plasma wakefield accelerators have been explored as a potential compact, reproducible source of relativistic electron bunches, utilising an electric field of many GV/m. Control over injection of electrons into the wakefield is of crucial importance in producing stable, mono-energetic electron bunches. Density tailoring of the target, to control the acceleration process, can also be used to improve the quality of the bunch. By using gas jets to provide tailored targets it is possible to provide good access for plasma diagnostics while also producing sharp density gradients for density down-ramp injection. OpenFOAM hydrodynamic simulations were used to investigate the possibility of producing tailored density targets in a supersonic gas jet. Particle-in-cell simulations of the resulting density profiles modelled the effect of the tailored density on the properties of the accelerated electron bunch. Here, we present the simulation results together with preliminary experimental measurements of electron and x-ray properties from LPWA experiments using gas jet targets and a 25 TW, 25 fs Ti:Sa laser system at DESY.

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