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Microcoulomb electron beams from self-modulated laser wakefield acceleration at the National Ignition Facility FELICIE ALBERT, PAUL KING, NUNO LEMOS, NATHAN MEEZAN, NEIL OSE, DAN KALANTAR, DAVID ALESSI, MATT PRANTIL, BRUCE REMINGTON, STEVEN ROSS, GEORGE SWADLING, Lawrence Livermore Natl Lab, JESSICA SHAW, Laboratory for Laser Energetics, MITCHELL SINCLAIR, KYLE MILLER, KENNETH MARSH, WARREN MORI, CHAN JOSHI, UCLA — We developed a laser-wakefield electron acceleration (LWFA) experimental capability by focusing one beamlet (1 ps, 250 J) of the Advanced Radiographic Capability (ARC, LLNL) onto a gas tube target filled with helium. When a picosecond laser pulse (intensity around 10^{18} W/cm^2), is focused on a gas target with an electron density of about 10^{19} cm^{-3}, electrons are accelerated to multi-100 MeV energies by the interplay of direct laser acceleration and self-modulated LWFA. Such beams can be used for the development of x-ray sources using betatron, Compton scattering and bremsstrahlung mechanisms. Experiments were conducted at the National Ignition facility with the ARC short pulse focused at intensities around 10^{18} W/cm^2 onto 3 mm plastic gas tubes filled with helium at atmospheric pressure. The tubes are closed with 1 m thick mylar windows that are blown off with long pulses 5-10 ns before the short pulse. The newly developed W-NEPPS (Wakefield NIF Electron Proton Positron Spectrometer), measured electron energies of 10-150 MeV, with charges approaching a microcoulomb. Performed under the auspices of the U.S. DOE by LLNL under Contract No. DE-AC52-07NA27344, supported by the DOE Office Science Early Career Research Program (FES) SCW 1575-1. LLNL-ABS-811953

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