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Electron Energization During Reconnection in High-Beta Laser-Produced Plasma[1] GENNADY FIKSEL, Univ of Michigan - Ann Arbor, W. FOX, J. MATTEUCCI, D.B. SCHAEFFER, PPPL, Princeton NJ, M.J. ROSENBERG, LLE, Rochester NY, K. GERMASCHEWSKI, J. DONAGHY, U New Hampshire, Durham NH, A. BHATTACHARJEE, PPPL, Princeton NJ — We report on experiments conducted on the Omega and Omega EP laser facilities of the Laboratory for Laser Energetics (LLE), Rochester, NY, USA. Two neighboring plasma bubbles are produced by intense laser beams and the self-generated Biermann fields reconnect in the process of the bubbles' expansion and collision. In a typical shot, two oppositely directed magnetic fields, each of about 15 T, reconnect in a fraction of a nanosecond within a 50 μm-wide current sheet. The reconnection-induced electric field of about 10^7 V/m - 10^8 V/m can potentially accelerate the plasma electrons to a high energy. We present measurements of the electron energy spectra obtained in a series of shots that are carefully designed to reduce the effect of other sources of hot electrons, like LPI (Laser-Plasma Interactions). To isolate the reconnection as an acceleration source, the spectra obtained from two-bubble reconnecting shots are compared to the spectra from single-bubble, non-reconnecting shots. The results are compared with numerical PIC simulations and theoretical models.

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