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Experimental Demonstration of 1 GeV Energy Gain in a Laser Wakefield Accelerator ANTHONY GONSALVES, KEI NAKAMURA, CSABA TOTH, CARL SHROEDER, ESTELLE CORMIER-MICHEL, WIM LEEMANS, LBNL, D. BRUHWILER, JOHN CARY, Tech-X, SIMON HOOKER, ERIC ESAREY, DMITRIY PANASENKO, LBNL, LOASIS TEAM, TECH-X TEAM, OXFORD UNIVERSITY TEAM — GeV-class electron accelerators have a broad range of uses, including synchrotron facilities, free electron lasers, and high-energy particle physics. The accelerating gradient achievable with conventional radio frequency (RF) accelerators is limited by electrical breakdown within the accelerating cavity to a few tens of MeV, so the production of energetic beams requires large, expensive accelerators. One promising technology to reduce the cost and size of these accelerators (and to push the energy frontier for high-energy physics) is the laser-wakefield accelerator (LWFA), since these devices can sustain electric fields of hundreds of GV/m. In this talk, results will be presented on GeV-class beams using an intense laser beam. Laser pulses with peak power ranging from 10-40TW were guided in gas-filled capillary discharge waveguides of length 15mm and 33mm, allowing the production of high-quality electron beams with energy up to 1 GeV. The electron beam characteristics and laser guiding, and their dependence on laser and plasma parameters will be discussed and compared to simulations.

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