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Laser Plasma Acceleration Experiment at the Naval Research Laboratory. D. KAGANOVICH, A. TING, D. GORDON, R. HUBBARD, T. JONES, A. ZIGLER, P. SPRANGLE, Naval Research Laboratory — The traditional long term strategy for producing high quality electron beams in a single stage LWFA involves three elements: operation in the resonant or standard regime, the use of optical guiding to extend the acceleration region, and external injection of a precisely-phased, high quality injection electron bunch. The standard regime and optical guiding has been studied by many research groups and promise good results for the acceleration. The creation of the electron beam for external injection is still a very problematic issue. Most experiments to date have operated in the self modulated (SM) regime, which produces very large accelerating gradients but poor quality electron beams with large energy spread. More recently, quasi-monoenergetic acceleration of particles from the background plasma has been observed in simulations and experiments operating in a shorter pulse regime. Such quasi-monoenergetic electrons could be a candidate for injection into a following stage of standard LWFA if not for the relatively poor shot to shot reproducibility. We are in the initial stage of experiments to generate injection electrons using the HD-LIPA schemes with a 10 TW 50 fs laser system. The second stage accelerator will be a capillary discharge plasma channel for extended acceleration distance. Preliminary results, including statistics on the stability of quasi-monoenergetic acceleration, will be presented. Supported by DOE and ONR.

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