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**Laser-driven Beat-Wave Current Drive in Dense Plasmas with Demo on CTIX** FEI LIU, ROBERT HORTON, DAVID HWANG, BEN ZHU, RUSSELL EVANS, SEAN HONG, UC Davis, SCOTT HSU, LANL — The ability to remotely generate plasma current in dense plasmas hanging freely in vacuum in voluminous amount without obstruction to diagnostics will greatly enhance our ability to study the physics of high energy density plasmas in strong magnetic fields. Plasma current can be generated through nonlinear beat-wave process by launching two intense electromagnetic waves into unmagnetized plasma. Beat-wave acceleration of electrons has been demonstrated in a low-density plasma using microwaves [1]. The proposed PLX experimental facility presently under construction at Los Alamos offers the opportunity to test the method at a density level scalable to the study of HED plasmas. For PLX beat-wave experiments, $CO_2$ lasers will be used as pump waves due to their high power and tunability. For a typical PLX density $n_e = 10^{17} cm^{-3}$, two $CO_2$ lasers can be separately tuned to 9P(28) and 10P(20) to match the 2.84THz plasma frequency. The beat-wave demo experiment will be conducted on CTIX. The laser arrangement is being converted to two independent single lasers. Frequency-tuning methods, optics focusing system and diagnostics system will be discussed. The laser measurements and results of synchronization of two lasers will be presented, and scaling to PLX experiments will be given. [1] Rogers, J. H. and Hwang, D. Q., PRL. v68 p3877 (1992).

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