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CO2 Laser Beat-Wave Current Drive in an Unmagnetized Plasma[1] FEI LIU, DAVID HWANG, ROBERT HORTON, RUSSELL EVANS, ZHUO FAN HUANG, SEAN HONG, UC Davis — The ability to remotely generate plasma current in dense plasmas is a basic yet important investigation in experimental plasma physics. Plasma current can be generated through nonlinear beat-wave mixing process by launching two intense electromagnetic waves into an unmagnetized plasma. The beat wave formation process is efficient if the difference frequency of the two pump waves corresponds to the local plasma frequency. Beat wave can accelerate plasma electrons via quasi-linear Landau process, which has been demonstrated in low-density plasma using micro-waves [1]. The high tunability of the CO_2 lasers provides many options for the wave-particle interaction experiment at a variety of CTIX plasma densities. Two sections of Lumonics TEA CO_2 lasers have been modified at power over 100MW. The development of the tunable CO_2 lasers and diagnostics system will be described. A high-density plasma test source and density diagnostics system will also be presented. This line of research will impact experiment such as the PLX facility under initial operation at Los Alamos National Lab.

[1] Rogers, J. H. and Hwang, D. Q., Phys. Rev. Lett. v68 p3877(1992).

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