Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Recent Progress with Brookhaven's ATF LWIR Laser and Future Experimental Plans MARCUS BABZIEN, Brookhaven National Laboratory, MICHAEL C. DOWNER, Univ of Texas, Austin, MIKHAIL FEDURIN, Brookhaven National Laboratory, PIETRO IAPOZZUTO, PRABHAT KUMAR, VLADIMIR N. LITVINENKO, State Univ of NY, Stony Brook, MARK A. PALMER, IGOR POGORELSKY, MIKHAIL POLYANSKIY, Brookhaven National Laboratory, ROMAN V. SAMULYAK, State Univ of NY, Stony Brook, JAMES R. WELCH, Univ of Texas, Austin, JIAYANG YAN, State Univ of NY, Stony Brook, RAFAL ZGADZAJ, Univ of Texas, Austin — Recent interest in driving laser wakefield acceleration (LWFA) with mid- and long-wave infrared sources at plasma densities of 10^{15} to 10^{17} cm^{-3} has been motivated by the advantages of high ponderomotive potential, larger critical density bubble volume, and relaxed phasing/staging tolerances. The highest energy drivers in the LWIR regime are large-aperture CO_2 lasers capable of producing several joules and few picosecond pulse duration. The Brookhaven ATF LWIR laser has continuously evolved to deliver higher peak powers benefiting a range of experiments, including LWFA. Up to 5 TW in a 2 ps pulse at 9.2 micron is presently available for experiments in combination with synchronized electron bunches and NIR laser pulses. Techniques used to achieve the current operating parameters will be described, compared with laser simulations, and highlighted by comparison with requirements for LWFA experiments underway at the facility. CO_2 laser-driven LWFA plasma measurements using both optical and electron probes will be presented and compared with numerical simulations.

Marcus Babzien
Brookhaven National Laboratory

Date submitted: 03 Jul 2019 Electronic form version 1.4