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Simulation and diagnostics of high density plasmas for multiple electron bunch wakefield generation EFTHYMIOS KALLOS, PATRIC MUGGLI, TOM KATSOULEAS, USC, VITALY YAKIMENKO, DANIIL STOLYAROV, IGOR POGORELSKY, IGOR PAVLISHIN, KARL KUSCHE, MARCUS BABZIEN, ILAN BEN-ZVI, BNL, WAYNE KIMURA, STI Optronics, Inc. — The wakefield generated in a plasma from an electron beam can be enhanced if instead of a single bunch the beam is modulated into multiple bunches. Then the wakefields generated from the microbunches can add up in phase if the plasma density is tuned precisely at the separation between them. In the experimental setup at Brookhaven's Accelerator Test Facility the 45MeV electron beam is IFEL modulated into 150 microbunches 10.6μm apart. Here we present plasma simulations that confirm the wakefield enhancement and diagnostics we performed to tune the plasma density (Stark broadening, HeNe laser interferometry).

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