Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Microwave Triggered Laser Ionization of Air EHSAN VADIEE, SARITA PRASAD, C. JERALD BUCHENAUER, EDL SCHAMILOGLU, Electrical and Computer Engineering Department, University of New Mexico — The goal of this work is to study the evolution and dynamics of plasma expansion when a high power microwave (HPM) pulse is overlapped in time and space on a very small, localized region of plasma formed by a high energy laser pulse. The pulsed Nd:YAG laser (8 ns, 600mJ, repetition rate 10 Hz) is focused to generate plasma filaments in air with electron density of $10^{17}/\text{cm}^3$. When irradiated with a high power microwave pulse these electrons would gain enough kinetic energy and further escalate avalanche ionization of air due to elastic electron-neutral collisions thereby causing an increased volumetric discharge region. An X-band relativistic backward wave oscillator(RBWO) at the Pulsed Power,Beams and Microwaves laboratory at UNM is constructed as the microwave source. The RBWO produces a microwave pulse of maximum power 400 MW, frequency of 10.1 GHz, and energy of 6.8 Joules. Special care is being given to synchronize the RBWO and the pulsed laser system in order to achieve a high degree of spatial and temporal overlap. A photodiode and a microwave waveguide detector will be used to ensure the overlap. Also, a new shadowgraph technique with a nanosecond time resolution will be used to detect changes in the shock wave fronts when the HPM signal overlaps the laser pulse in time and space.

Ehsan Vadiee
Electrical and Computer Engineering Department,
University of New Mexico

Date submitted: 13 Jul 2012 Electronic form version 1.4