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The Effect of Non-Uniform and Finite Plasma on the Wakefield Amplitude in PWFA[1] YUN FANG, University of Southern California, PATRIC MUGGLI, Max Planck Institute for Physics, Munich Germany, WARREN MORI, University of California, Los Angeles — In the plasma wakefield experiment performed at ATF (Accelerator Test Facility) of BNL (Brookhaven National Laboratory), the plasma is generated from a capillary discharge that is 2 cm long with a radius of 500 um. The plasma density is non-uniform along the finite radius, and it has a certain density profile, e.g. cosine or parabolic profile. We study through simulation how this non-uniform and finite plasma may affect the wakefield amplitude and period driven by short electron bunches, and hence also the energy gain and loss of the drive and trailing bunch. This study is also important to understand the PWFA experiments at the Stanford Linear Accelerator Center (SLAC) with electron bunches and at the European Organization for Nuclear Research (CERN) with self-modulated proton bunches where laser-ionized plasma with radius on the order of the bunch radius or plasma skin depth will be used. The simulation are performed with particle-in-cell code OSIRIS, developed by UCLA and IST.

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