Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Possibility of Generating Monoenergetic Electron Bunches Using Ionization Injection in a PWFA in Noble Gases NAVID VAFAEI-NAJAFABADI, UCLA, FACET COLLABORATION — It is well established that ionization of atoms within a relativistic wake can lead to efficient injection and trapping of electrons. If the ionization process can be spatially localized compared to the acceleration length, this technique can in principle lead to the generation of narrow energy spread bunches. This process is particularly well suited to the beam driven plasma wakefield acceleration scheme because the process of plasma and wake formation can be rather easily separated from the process of further ionization and injection. The initially focused drive beam has an intense enough transverse electric field to produce a singly ionized atoms. For sufficient beam density, the plasma electrons are blow out leaving an ion cavity. The strong focusing force of the ions results in the collapse of the rest of the drive electron beam, enhancing the transverse field and causing further ionization, which can be spatially localized. We are exploring this idea through experiments using noble gases using a 20 GeV drive electron beam at the FACET facility, and through simulations using a PIC code. Preliminary results will be presented. This work was supported by the DOE and the NSF.

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Date submitted: 12 Jul 2013 Electronic form version 1.4