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Ultracold plasma electron source for diffractive imaging M. JUNKER, S.C. BELL, D.V. SHELUDKO, A.J. MCCULLOCH, R.E. SCHOLTEN, ARC Centre of Excellence for Coherent X-ray Science, The University of Melbourne VIC 3010, Australia — Ultracold plasmas have made the prospect of high brightness electron beams a promising alternative to conventional high temperature (10^4K) sources. We have created a Zeeman slowed MOT of ^{85}Rb atoms, which was photoionized near the ionization threshold. The pulsed electron bunches were accelerated by an electrostatic field up to 200 V/cm between parallel accelerator plates and focused using a third electrode. The electrons were characterized using a microchannel plate, phosphor screen, and CCD camera. We are investigating the coherence and brightness of the extracted electron bunches, and particularly, the effect of controlling the initial atomic spatial distribution to generate a uniform elliptical charge distribution. Such elliptical bunches intrinsically preserve their brightness, and can be refocused with conventional accelerator techniques.

Mark Junker

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