ID: 1740 **REDESIGN OF THE JEFFERSON LAB -300kV DC PHOTOGUN FOR HIGH BUNCH CHARGE OPERATIONS**

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Abstract Production of high bunch charge beams for the proposed Electron-Ion Collider (EIC) has been a challenging task. High bunch charge (a few nC) electron beam production studies at Jefferson Lab using an inverted insulator -300 kV DC photo-gun showed evidence of space charge current limitations starting at 0.3 nC and reducing the maximum delivered bunch charge to 0.7 nC. The low extracted charge is mainly due to the modest longitudinal electric field (E_z) at the photocathode as well as beam loss. Thus, to reach the few nC high bunch charge goal, the existing DC photo-gun electrode and anode-cathode gap were modified to increase E_z at the photocathode. In addition, the anode aperture was shifted with respect to the beamline longitudinal axis to correct the beam deflection exerted by the non-symmetric nature of the inverted insulator photo-gun. This contribution discusses the electrostatic design of the modified photo-gun obtained using CST Studio Suite's electromagnetic field solver and presents high voltage conditioning results. Beam dynamics simulations performed using General Particle Tracer and the new electrostatic field map obtained from the modified electrodes will also be presented.

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Type of Presentation Poster

Main Classification MC2: Photon Sources and Electron Accelerators

Sub Classification T02 Electron Sources

ID: 1743 **Space Charge Effects in Low Energy Magnetized Electron Beams**

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Abstract Magnetized electron cooling is one of the major approaches towards obtaining the required high luminosity in the proposed Electron-Ion Collider (EIC). In order to increase the cooling efficiency, a bunched electron beam with a high bunch charge and high repetition rate is required. At Jefferson Lab, we generated magnetized electron beams with high bunch charge using a new compact DC high voltage photo-gun biased at -300 kV with bialkali-antimonide photocathode and a commercial ultra-fast laser. This contribution discusses how magnetization affects space charge dominated beams as a function of magnetic field strength, gun high voltage, and laser pulse width, and

	spot size in comparison with simulations performed using General Particle Tracer.
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