**Abstracts for NAPAC2022**

**Improved Electrostatic Design of the Jefferson Lab 300 KV DC Photogun and the Minimization of Beam Deflection**

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**ABSTRACT**

Electron beam with high bunch charge and high repetition rate is required for electron cooling of ion beam to achieve the required high luminosity of proposed electron-ion colliders. Improved design of the 300 kV DC high voltage photogun at Jefferson Lab was incorporated toward overcoming the beam loss and space charge current limitation as experienced in the original design. To reach the bunch charge goal of ~ few nC within 75 ps bunches, the existing DC high voltage photogun electrodes and anode-cathode gap were modified to increase the longitudinal electric field (Ez) at the photocathode. The anode-cathode gap was reduced to increase the Ez at the photocathode and the anode aperture was spatially shifted with respect to the beamline longitudinal axis to minimize the beam deflection introduced by the geometric asymmetry of the inverted insulator photogun. The electrostatic design and the beam dynamics simulations were performed to determine the required modification. Beam based measurement from the modified gun confirmed the reduction of the beam deflection which is presented in this contribution.

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Main Classification: 06. Beam Instrumentation and Controls

**TE011 Cavity for Monitoring Magnetic Momentum of a Magnetized Beam**

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Future Electron-Ion Colliders relies on cooling of the ion beam to achieve the high luminosity requirement. A bunched beam cooler uses magnetized electron beam from the injector for which a non-invasive measurement of the magnetic momentum is highly desired. The electric field of a passive copper RF cavity in TE011 mode has only azimuthal component. TE011 mode in an ideal pillbox cavity will have energy exchanging interaction with the azimuthal motion of a particle which makes it an ideal candidate for magnetic momentum monitor. This contribution presents beam based test results from a 2994MHz TE011 pillbox cavity with 3mm wall thickness.

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