

Abstract Submitted
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Theory, Simulation and Design of High-Brightness, Space-Charge-Dominated Electron and Ion Beams¹ CHIPING CHEN, TOM BEMIS, RONAK BHATT, JING ZHOU, MIT Plasma Science and Fusion Center — A method is presented for the generation, matching and transport of a high-brightness, space-charge-dominated circular electron or ion beam which maintains almost uniform density transversely. In particular, a circular diode theory is applied to design the electrodes for the diode. A theory is developed for the design of the ideal matching of the beam from the diode to a periodic permanent magnet (PPM) or periodic solenoidal magnetic focusing field. The magnetic focusing field is designed using OPERA3D. The beam formation and transport from the particle emitter to the periodic magnetic focusing channel is simulated using OmniTrak. Examples of high-brightness electron and ion beams are presented. Potential applications of such beams are discussed.

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