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Design of a Retractable Electron Emitter for the Columbia Non-neutral Torus¹ JOHN BERKERY, JASON KREMER, REMI LEFRANCOIS, QUINN MARKSTEINER, THOMAS PEDERSEN, Columbia University — One goal of the Columbia Non-neutral Torus (CNT) research program is to investigate enhanced confinement in stellarators due to high electric fields. Non-neutral plasmas have high electric fields and consequently are predicted to have very long confinement times. Such plasmas have recently been created in the CNT stellarator. However, the presence of a probe array and an electron emitter in the plasma appears to dominate the losses of electrons. Although this setup allows a detailed study of the plasma equilibrium, it cannot be used to study the enhanced confinement due to the strong electric fields. Therefore, in order to realize the possible enhanced confinement times, a retractable electron emitter will be employed. The electron emitter must be able to retract from the core of the plasma to the edge in a fraction of a second. At the same time, the emitter must be robust enough to handle the stresses of acceleration and deceleration during retraction. A design of the retractable electron emitters that addresses all of these issues will be presented, and key elements of the relevant plasma physics will be discussed.

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John Berkery
Columbia University

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