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Injection of positrons into an electron space charge in a dipole field

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Towards the goal of magnetically confined low-energy electron-positron plasmas, the APEX collaboration has already demonstrated significant progress in injecting and confining the high-flux reactor-based positron beam, produced in the NEPOMUC facility. As previous work had focused on the single-particle regime, questions on the role of collective effects on positron injection via ExB drift needed to be investigated. Therefore a thermionic source installed on the equatorial plane of the dipole trap continuously injects electrons into the confinement volume and creates a negative space potential. Around 10% of the emitted electrons are confined in the magnetic field and contribute in establishing an additional potential as low as -58V in the injection area of the 5eV positron beam. Certain potential configurations increase the parameter range that allows successful positron injection while preserving the 100% efficiency. An overview of
the APEX project, the effect of this additional potential on the injection process of positrons as well as the diagnostic system consisting of target probes, gamma detectors and an emissive probe will be presented in this contribution.

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