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O3.401 Positron confinement exceeding 1s in a magnetic dipole trap

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Magnetic dipole fields have exellent confinement properties for charged particle ensembles with an arbitrary degree of neutrality. One idea to create a magnetized low-energy electron-positron pair plasma pursued by the APEX/PAX collaboration relies on the initial formation of a non-neutral plasma in the confining magnetic field and hence the dipole geometry is a promising candidate to study such a system. While electron injection and confinement have been readily achieved in a magnetic dipole trap the positron counterpart is more challenging due to the limited positron flux provided even by world class positron sources such as NEPOMUC (Neutron-Induced Positron Source Munich).
In this contribution we present results from recent positron confinement experiments conducted with a supported magnetic dipole trap at the NEPOMUC facility. After suppressing parallel losses onto the magnet surface by applying a positive electrostatic bias to the magnet we have observed positron confinement in a magnetic dipole field in excess of 1 s. Supported by single-particle simulations we identify transport due to scattering off of neutrals as the dominant mechanism limiting confinement. The importance of the results for the electron-positron pair plasma experiment will be discussed.

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