

Abstract Submitted
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The Development of a Passive Electrostatic Electron Recycling System (ERS). DAVID TESSIER, YING NIU, DOMINIC SECCOMBE, TIMOTHY REDDISH, University of Windsor, Canada, AARON ALDERMAN, BEN BIRDSEY, PETER HAMMOND, University of Western Australia, Australia, FRANK READ, University of Manchester, U.K. — The development of a completely new type of electron spectrometer, an “Electron Recycling Spectrometer” (ERS) is described in which low energy ($< \sim 50$ eV) electrons are passively stored in a ‘desktop’ sized ring. The orbital path for the electrons is 0.65 m long with a race-track geometry and is defined through the application of design voltages to two series of cylindrical electrostatic lenses inserted between two identical hemispherical deflector analyzers. The ERS design concept exploits the very low scattering cross sections in electron-molecule collisions, where the majority of electrons do not interact with the gaseous target. Unscattered electrons are collected, passed back through the ERS for another collision opportunity in the interaction region - i.e. they are “recycled” so that each electron generated in the electron source may undertake multiple passes through the interaction region. Initial results will be presented which demonstrate that the electron beam undergoes up to ~ 1000 orbits in a time of ~ 250 μs . The design of the system is likely to enable the storage at low kinetic energy of any type of non-relativistic charged particle, including positrons, polarized electrons, and positive & negative ions.

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