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Effects of Magnetic Field Topology on Secondary Neutron Spectra in MagLIF BRIAN APPELBE, JEREMY CHITTENDEN, Imperial College London — Ignition in Magneto-Inertial Fusion schemes requires both inertial and magnetic confinement of the fuel and charged fusion products. Recent theoretical and experimental work has demonstrated the confinement of charged fusion products by magnetic fields in Magnetized Liner Inertial Fusion (MagLIF) experiments. This confinement can be inferred from the ratio of secondary to primary neutron yields and the shape of secondary neutron spectra. In this work we investigate the effects of magnetic field topology on the shape of secondary neutron spectra. The MagLIF design has a cylindrical geometry and includes both axial and azimuthal magnetic fields. The azimuthal field is initially in the liner surrounding the fuel but instability growth may cause it to penetrate into the fuel. Charged fusion products (such as tritons or alpha particles) that are isotropically emitted and then confined by an axial field will flow parallel and anti-parallel to the field with equal intensities. In the case of tritons, this motion results in a secondary neutron spectrum emitted in the axial direction that is symmetric. However, in an azimuthal field such particles exhibit singular orbits and there is a net ion drift along the axis. This ion drift can cause the secondary neutron spectrum to be asymmetric. We examine the effects on the spectrum shape of confinement by a combination of axial and azimuthal fields.

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