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Tail-ion transport and Knudsen layer formation in the presence of magnetic fields PAUL SCHMIT, Sandia National Laboratories, KIM MOLVIG, Los Alamos National Laboratory — The impact of magnetic fields on Knudsen layer formation [1] in ICF-relevant plasma is investigated for the first time. Magnetic fields change the energy scaling of the ion diffusivity in a way that eliminates the preferential losses of fast ions compared to thermal ions. Simple threshold criteria give conditions such that the restoration of the ion tail distribution is sufficient to recover much of the lost fusion reactivity. The tail-ion kinetic equations are solved for hot fuel bounded by a cold, nonreacting wall using a numerical stochastic differential equation solver, and the modified fusion reactivities are calculated. We find that modest magnetic fields too weak to magnetize thermal ions are still sufficient to restore much of the lost reactivity, consistent with the threshold conditions. We also find that the Maxwell-averaged fusion reactivities are recovered more fully in cylindrical targets compared to spherical targets. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

[1] K. Molvig et al., PRL 109, 095001 (2012).

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