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Temperature screening of impurities in stellarators and tokamaks deviating from symmetry MIKE F MARTIN, MATT LANDREMAN, University of Maryland, College Park — Quasisymmetric stellarator configurations aim to combine the stability of stellarators with the confinement of tokamaks, making them particularly interesting for optimization efforts. However, perfect quasisymmetry can only be achieved on a single flux surface at best, making it useful to study configurations with small deviations from perfect quasisymmetry, a regime in which devices will have to operate. A particular neoclassical phenomenon that occurs in tokamaks, which are naturally quasisymmetric, is a favorable outward radial flux of highly charged impurity ions, commonly referred to as impurity temperature screening. Conversely, stellarators generally display an *inward* impurity flux, causing an impurity accumulation in the core that can be detrimental to performance. In this work, we use the SFINCS drift-kinetic solver to explore how the impurity particle flux is influenced as the degree of symmetry-breaking is varied between realistic levels and perfect quasisymmetry, over various reactor-relevant parameter regimes and configurations. We aim to answer the question of exactly how much symmetry-breaking a particular configuration can tolerate before impurity temperature screening is lost.

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