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Optimizing Stellarators for Energetic Particle Confinement using BEAMS3D[1] PETER BOLGERT, Princeton University, MICHAEL DREVLAK, Max-Planck-Institut für Plasmaphysik, SAM LAZERSON, DAVID GATES, ROSCOE WHITE, Princeton Plasma Physics Laboratory — Energetic particle (EP) loss has been called the "Achilles heel of stellarators," (Helander, Rep. Prog. Phys. **77** 087001 (2014)) and there is a great need for magnetic configurations with improved EP confinement. In this study we utilize a newly developed capability of the stellarator optimization code STELLOPT: the ability to optimize EP confinement via an interface with guiding center code BEAMS3D (McMillan et al., Plasma Phys. Control. Fusion **56**, 095019 (2014)). Using this new tool, optimizations of the W7-X experiment and ARIES-CS reactor are performed where the EP loss fraction is one of many target functions to be minimized. In W7-X, we simulate the experimental NBI system using realistic beam geometry and beam deposition physics. The goal is to find configurations with improved neutral beam deposition and energetic particle confinement. These calculations are compared to previous studies of W7-X NBI deposition. In ARIES-CS, we launch 3.5 MeV alpha particles from a near-axis flux surface using a uniform grid in toroidal and poloidal angle. As these particles are born from D-T reactions, we consider an isotropic distribution in velocity space.

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Peter Bolgert
Princeton University

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