

Abstract Submitted  
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**Finite-Beta Stellarator Optimization and Energetic Particle Confinement**<sup>1</sup> ANDREW WARE, JESSE COOK, ANNA VONESSEN, HALEY WILSON, University of Montana — We present analysis of finite-beta optimization of quasi-helically symmetric stellarator configurations, including bootstrap current alignment and improved ballooning stability. This work includes both fixed boundary and free boundary (with coils) equilibria. The transport properties of the optimized configurations are analyzed as well. A summary of recent efforts on stellarator coil optimization for quasi-helically symmetric configuration is presented. This includes using the FOCUS code [C. Zhu, et al., Plasma Phys. Contr. Fusion **60**, 065008 (2018)] to develop and analyze coil configurations for four- and five-field period configurations with quasi-symmetry and enhanced energetic particle confinement, including configurations with and without a set of poloidal field coils. Finally, an analysis of energetic particle confinement in these configurations is carried out using the SIMPLE code [A C. Albert, S. Kasilov, and W. Kernbichler, J. Plasma Physics **86**, 815860201 (2020)].

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