

Abstract Submitted  
for the DPP20 Meeting of  
The American Physical Society

**Position Tolerance of Permanent Magnets and Reduction of Magnetic Islands in the Stellarator MUSE**<sup>1</sup> AMELIA CHAMBLISS, Reed College, TONY QIAN, CAO XIANG ZHU, Princeton Plasma Physics Laboratory — We adapt techniques developed for coil optimization to the design of permanent magnet stellarators. Permanent magnets were recently proposed to address the challenge of building optimized stellarators by simplifying complex modular coils. MUSE is a table-top stellarator experiment using permanent magnets and will be built at Princeton Plasma Physics Laboratory. The permanent magnets for MUSE are designed by using the FAMUS code.<sup>2</sup> We are adapting the shape-gradient method<sup>3</sup> and the Hessian matrix method<sup>4</sup> to calculate the position tolerance of permanent magnets in MUSE. The target figures of merit that we are going to evaluate are the normal field error on the target plasma boundary, the quasi-symmetry of the produced magnetic field and the magnetic island width. In doing so, we can help construct MUSE to an acceptable precision and reduce the magnetic islands for MUSE.

<sup>1</sup>This work was made possible by funding from the Department of Energy for the Summer Undergraduate Laboratory Internship (SULI) program. This work is supported by the US DOE Contract No. DE-AC02-09CH11466

<sup>2</sup>Zhu et al. arXiv:2005.05504 (2020).

<sup>3</sup>Landreman Paul, *Nuclear Fusion* **58**(7), 076023 (2018).

<sup>4</sup>Zhu et al. *Plasma Physics and Controlled Fusion*, **60**(5), 054016 (2018).

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Date submitted: 04 Nov 2020

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