Abstract Submitted
for the CUWIP21 Meeting of
The American Physical Society

Evaluation and Optimization of the 3D Neutron Wall Load for Generic Stellarator Configurations HUAIJIN WANG, Yale University, WENDELSTEIN 7-X TEAM — Nuclear fusion by magnetic confinement is a promising technology for large-scale, carbon-free energy generation. Typical experimental design consists of deuterium-tritium plasma at high temperature ($\sim$10 keV) confined by a strong and torus like closed magnetic field. Wendelstein 7-X is an advanced stellarator plasma experiment that aims to bring the stellarator concept to maturity in order to prepare a next-step device towards a stellarator fusion power plant. To this end, extensive plasma simulations and optimization studies are done on a wide range of stellarator design parameters. Neutronic analysis determines the distribution of highly energetic neutrons on the stellarator first wall, and is essential in the design of blanket and critical components such as the magnetic field coils. In this presentation, I will describe a novel method for fast evaluation of the Neutron Wall Load distribution for arbitrary stellarator geometry and its application in stellarator optimization studies, which will inform design decisions on future stellarator power plant designs.

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Date submitted: 30 Dec 2020 Electronic form version 1.4