Faculty Name:

Elizabeth Paul

Faculty Email:

ejp2170@columbia.edu

Lab:

Plasma Lab

Project Title:

Symplectic integration for the dynamics of fusion products

Description:

Magnetic confinement fusion systems rely on the confinement of the charged fusion products, the alpha particles, for a sufficiently long time that they can deposit their heat in the hot plasma bulk. One magnetic confinement concept, the stellarator, has historically suffered from poor confinement of alpha particles. Numerical optimization algorithms have recently demonstrated the ability to obtain stellarator magnetic fields that could be candidates for a fusion energy device. This project focuses on improvements in the numerical integration schemes used for evolving the trajectories of alpha particles in a three-dimensional fusion system, enabling more efficient design and modeling of these devices. The student will perform modification of an existing open-source C++ and python library to improve the accuracy and performance of the integration routines. This will be achieved through application of symplectic algorithms, improved parallelism, and other code optimization techniques. The student must have a strong computing background, with preference for experience in high-performance computing and scientific computing.

Location of Research:

Hybrid (both on-site and remote)

# of hrs/week:

40

Department/Program:

Applied Physics and Applied Mathematics

Eligibility:

BS, Third Year, BS, Fourth Year, MS

To apply, please contact:

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