Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Deep Learning Subgrid Models of Magnetohydrodynamic Turbulence[1] SHAWN ROSOFSKY, ELIU HUERTA, University of Illinois at Urbana-Champaign — We explore the suitability of deep learning to capture the physics of subgrid-scale ideal magnetohydrodynamics turbulence of simulations of the magnetized Kelvin-Helmholtz instability (KHI). We produce simulations at different resolutions to systematically quantify the performance of neural network models to reproduce the physics of these complex simulations. We then implement these deep learning models in low resolution KHI simulations to examine their ability to reproduce the magnetic field amplification observed at high resolutions. We discuss the feasibility of using such models to reproduce the physics of magnetohydrodynamics turbulence in numerical relativity simulations of binary neutron star mergers.

[1]We gratefully acknowledge National Science Foundation (NSF) awards OAC-1931561 and OAC-1934757. We are grateful to NVIDIA for donating several Tesla P100 and V100 GPUs that we used for our analysis, and the NSF grants NSF-1550514, NSF-1659702 and TG-PHY160053.

Shawn Rosofsky
University of Illinois at Urbana-Champaign

Date submitted: 08 Jan 2021 Electronic form version 1.4