Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Generation of Vector Potentials for General Relativity Simulations[1] ZACHARY SILBERMAN, JOSHUA FABER, Rochester Inst of Tech, THOMAS ADAMS, ZACHARIAH ETIENNE, IAN RUCHLIN, West Virginia University — In studies of highly relativistic magnetized accretion flows around compact objects, many different numerical codes can be employed. Based on the formalism each uses, some codes evolve the magnetic field B, while others evolve the magnetic vector potential A, defined such that these two fields are related via the curl: $B = \nabla \times A$. Here, we discuss how to generate vector potentials corresponding to specified magnetic fields on staggered grids, a surprisingly difficult task on finite cubic domains. The codes we have developed solve this problem in multiple ways: one of them via a cell-by-cell method, whose scaling is nearly linear in the number of grid cells, and the other by directly solving the overall linear algebra problem. Here we discuss the successes these algorithm have in generating smooth vector potential configurations to be used for numerical simulations.

[1]NSF OAC-1550436

Zachary Silberman
Rochester Inst of Tech

Date submitted: 11 Jan 2018 Electronic form version 1.4