Abstract Submitted for the DNP20 Meeting of The American Physical Society

Computational Methods to Develop a Magneto-ionization Spacecraft Shield for Interplanetary Travel (the MISSFIT Collaboration)¹ DAVID ATRI SCHULLER, JUSTIN BRUTGER, KEEGAN FINGER, LUKE HOFMANN, TRACE JOHNSON, JULIE LAFRANZO, LORIEN MACENULTY, MOLLY MCCORD, GAVIN MENNING, ETHAN MORTON, NOAH PETER-SON, ATHANASIOS PETRIDIS, AJAL R.C., WILLIAM THOMAS, DANIEL VIS-CARRA, Drake University, MISSFIT (MAGNETO-IONIZATION SPACECRAFT SHIELD FOR INTERPLANETARY TRAVEL) COLLABORATION — This work aims to develop radiation-shielding solutions for manned interplanetary travel using a combination of magnetic fields, ionization chambers and passive absorbers by developing the computational methods required to properly simulate the propagation of high-energy particles through such systems. We develop a code to compute a magnetic field around the proposed spacecraft employing the matrix relaxation method. The resulting magnetic field is used to calculate the trajectory of charged particles through various gaseous and solid media with a particle propagation code. The program is fully relativistic and employs SRIM to calculate the energy loss of such particles as they travel through the passive absorption shield. The aim of this work is to produce highly accurate results illustrating the motion of charged particles through analysis of case studies with varying energies, incident angles, and magnetic field configurations. A deterministic code is used currently, but a Monte-Carlo method to compute statistics for particle motion is being developed.

¹Support from Iowa Space Grant Consortium/NASA 103428-19-20.

David Atri Schuller Drake University

Date submitted: 26 Jun 2020

Electronic form version 1.4