1086-85-1501 **Lindsay Grayson*** (graysonl2@mymail.nku.edu) and **Kirk Wallace** (wallacek1@mymail.nku.edu). *Assessing the Chaotic Nature of Interstellar Magnetic Fields.*

The interstellar medium contains a magnetic field whose strong turbulent component plays a crucial role in how high-energy cosmic rays influence the formation of stars and planets. Due to the turbulent nature of the magnetic field, it is known that two particles injected into a field with the same initial velocities but slightly different initial positions will subsequently follow very different paths. Mathematically, we can quantify this effect by calculating Lyapunov exponents. Models for the magnetic field consist of sums of Alfvén waves, as predicted by linear magnetohydrodynamic theory. We calculated the Lyapunov exponents numerically for the fields and found one positive exponent, indicating the chaotic nature of the field lines, each time. Since each model consists of N randomly directed Alfvén waves, we ran simulations to obtain a distribution of largest Lyapunov exponents for each value of N. We found that the mean largest Lyapunov exponent increases with N, indicating that the length scale over which information from the initial condition is lost is shrinking. For N greater than 100, the mean largest Lyapunov exponent plateaus, meaning that a model consisting of 100 waves adequately describes the chaotic nature of the field. (Received September 22, 2012)