Alecio Madrid

**Award:** Undergraduate Student Research; $4000.00

**Status:** Senior, Astrophysics

**Advisor:** Dr. Audra K. Hernandez

**Research Topic:** Using Velocity Anisotropy to Analyze Magnetohydrodynamic Turbulence in Giant Molecular Clouds

**Abstract:** Theoretical studies have shown structure function (SF) analysis to be a strong tool for gaging interstellar magnetohydrodynamic (MHD) turbulence. MHD turbulence plays a critical role in the structure and evolution of giant molecular clouds (GMCs) as well as in the formation of sub-structures known to spawn stellar progenitors. This study takes an in-depth approach to studying the limitations of SF analysis for gauging MHD turbulence in GMCs. Limitations of radio observation has led to large variations in the methods used to extract GMCs from survey data. Thus, a strong indicator of the robustness of SF analysis is whether it remains accurate even when implementing different methods of extraction. Even though a plethora of studies have indicated the strong potential of SF for analyzing MHD turbulence, this study finds significant cause for concern regarding the feasibility of SF analysis as a robust tool in GMC spectroscopy.

**Biography:** Alecio Madrid is currently a junior at the University of Wisconsin-Madison  
 studying Applied Mathematics, Astronomy, Chemistry, Computer Science, and  
 Physics. He is originally from Denver, Colorado, but his parents currently living in  
 Reading, United Kingdom. He is currently researching magnetic fields within star  
 forming molecular gas in the milky way galaxy, and is looking forward to  
 continuing his research over the next year. His hobbies include traveling, reading,  
 and coding, and he has a passion for space and science. He is grateful for this  
 opportunity, and looking forward to the upcoming months.

**Congressional District:** 2

**Congressional Representative:** Mark Pocan