Erika Carlson

**Award:** WSGC Graduate and Professional Research Fellowship; $4799.00

**Status:** Ph.D., Astronomy

**Advisor:** Robert Mathieu

**Research Topic:** Determining the Fraction of Triple  
Star Systems in Open Clusters

**Abstract:** (First Paragraph in Proposal) Studying binary stars and other multiple star systems is essential for understanding stellar evolution and stellar dynamics within open clusters. Though stellar evolution processes for single stars like our Sun are thought to be well understood, stars in binary and multiple systems, which are known to comprise the majority of stars, can often follow evolutionary paths unavailable to single stars due to interactions both within and between systems in a star cluster. For instance, blue straggler stars, whose masses are too great given the age of their host clusters, cannot be readily explained as the evolution of single stars. In fact, in open clusters, blue stragglers are likely formed only in binary or multiple systems, where mass can be transferred to the blue straggler from a companion star to give it excess mass. Recent work has suggested that triple stars may be crucial for forming blue stragglers, through phenomena such as the Kozai mechanism and tidal friction (Perets & Fabrycky, 2009; Geller & Mathieu, 2011).  
Thus, in order to better understand the formation of stars such as blue stragglers, it is necessary to understand the frequency of triple systems. Very little is known about the primordial formation of triples in star clusters, i.e. their initial frequency and distribution of separations. Furthermore, dynamical models have long predicted that triple systems with a wide tertiary companion will be less common in evolved clusters due to dynamical encounters with other single and binary stars in the cluster (Aarseth, 2004). However, this prediction is yet to be tested.

**Biography:** Erika began her graduate student career in the fall of 2016 in the Department of Astronomy at the University of Wisconsin—Madison, where she works with Professor Robert Mathieu and his research group on questions regarding stellar evolution and binary star systems in open clusters in the Milky Way. She is working specifically on a project to determine the prevalence of triple star systems in open clusters and better characterize how the prevalence of triple star systems can change with time. Before coming to UW-Madison, she earned a bachelor’s degree in Physics with a concentration in Astrophysics at Pomona College in 2015 and then spent a year at the Carnegie Observatories working as a research assistant and a member of the Carnegie-Chicago Hubble Program team to better determine the expansion rate of the Universe known as the Hubble constant.

**Congressional District:** 2

**Congressional Representative:** Mark Pocan