

UW Oshkosh physics major Christopher Christopherson to present at Posters on the Hill

Not since 2004 has UW Oshkosh been represented at the prestigious Posters on the Hill event. It's a signal honor for a student to participate as the selection process is highly competitive with a 10 to 15 percent acceptance rate. UW Oshkosh undergraduate Christopher Christopherson (Nadia Kaltcheva, Physics & Astronomy, faculty mentor) will represent our campus this year.

On April 22-23, 2015, the Council on Undergraduate Research (CUR) will host its 19th annual undergraduate poster session on Capitol Hill. During an evening poster session and reception students and their faculty mentors will have the opportunity to speak directly to members of Congress and demonstrate the impact of these programs. CUR will invite representatives from federal funding agencies and nearby foundations, members of Congress, and Congressional staff to attend the poster session.

As the undergraduate research community works to ensure that those in the U.S. Congress have a clear understanding of the research and education programs they fund, nothing more effectively demonstrates the value of undergraduate research than a student participant's words, work, and stories.

In Washington, D.C., Christopherson will present a poster titled *Observing Nebulosities: the Cygnus Superbubble* that reflects his current research and long-term interests in astronomy. This student-led project at UW Oshkosh was undertaken to study star-forming complexes with the aim of gaining more understanding of their large-scale structure and star-forming history. The Cygnus superbubble is the project's first target. This is one of the largest, very complex and still not well understood star-forming regions in the Milky Way galaxy, located toward the constellation Cygnus, the Swan. A computer-guided modified Canon DSLR camera designed by Christopherson, which facilitates the observations of large areas of the night sky, was used for the project. In astronomy almost everything is about collecting data; therefore, many nights were spent observing the Cygnus star-forming field from various suitable observing sites in Wisconsin. Christopherson involved several physics students in these observations during the summer and fall of 2014. Nick Grosskopf, Henri LeMieux, Steven Lund and Erik Robinson all made valuable contributions to the data gathering. This is a unique hands-on experience in the collection and reduction of astronomical observations that yields insights on the entire research process—from obtaining data to final results. Grosskopf will present these aspects of the project at the Posters in the Rotunda event at the Wisconsin State Capitol this April.

Observing Nebulosities is about imaging large areas of the sky (22 by 17 degrees) in the Hydrogen-alpha, Hydrogen-beta and the doubly ionized oxygen emission lines. These are particular wavelengths of the electromagnetic spectrum emitted from the gaseous component of star-forming regions. The two hydrogen lines are recombination lines providing information about the overall distribution of ionized material, while the doubly ionized oxygen line at 500.7 nm is driven by collisional excitation and its intensity increases with the temperature of the interstellar gas. A comparison between the Hydrogen-alpha and ionized oxygen emission allows us to trace regions where the physical conditions change rapidly due to supernova shock fronts and strong stellar winds. The ratio of the Hydrogen-alpha to Hydrogen-beta emission is used to trace the overall distribution of the interstellar dust. The field of view of the modified Canon DSLR camera used for this project is much larger

than that of professional telescopes and allows measurements to be produced that integrate the entire nebulosity. In this way, these observations complement existing all-sky professional surveys of the interstellar content of the Cygnus superbubble, providing additional details on the interaction between the massive stars and the surrounding interstellar medium. This research seeks to reach specific conclusions on still controversial issues on the origin and energy source of this vast star-forming structure of expanding interstellar matter.

The research has been sponsored by a Wisconsin Space Grant Consortium scholarship and research award and a UW Oshkosh Undergraduate Student/Faculty Collaborative Research Small Grant.