Centennial Honors College
Thomas E. Helm Undergraduate Research Day 2024

ABSTRACT

Major: Physics Poster

Faculty Mentor(s): Esteban Araya

Investigating the Origin of 4750 MHz Hydroxyl Emission in a Region of High-Mass Star Formation

Matthew Clayton

This project investigates the formation of high mass stars through the use of hydroxyl (OH) emission. Outflows and molecular jets are signs that high mass stars are forming within giant clouds of dust and gas. Based on data from the Arecibo Radio Telescope, Tan et al. (2023) reported detection of multiple hydroxyl transitions in the region of high-mass star formation G34.26+0.15, among them, a transition at 4750 MHz that was detected in emission. As the observations were conducted with a single-dish telescope, the location of the 4750 MHz OH emission was unknown. This project focuses on the analysis of follow up Very Large Array (VLA) observations of the 4750 MHz OH transition toward G34.26+0.15 conducted by our group in the WIU AstroLab. The data were reduced and analyzed through the use of programs such as Jupyter Notebook and Common Astronomy Software Applications (CASA). The new VLA data confirms the detection of 4750 MHz OH reported by Tan et al. (2023), and our high-angular resolution images reveal that the 4750 MHz OH emission is tracing a linear (filamentary) structure, that follows the morphology of OH absorption detected in other transitions. Our data support the hypothesis that the molecular outflow/jet is coming from a hot molecular core in the region. This work is partially supported by NSF grants AST-1814063 and AST-1814011, and computational resources donated by WIU Distinguished Alumnus Frank Rodeffer.