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EXPLORING THE OUTER SOLAR SYSTEM THROUGH ANALYSIS OF WISE TELESCOPE DATA

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During the 2017-2018 school year, I worked with Dr. Ben Bromley and a collaborator from the University of California, Berkeley, Dr. Aaron Meisner. They were working on a project that takes data from the Wide Infrared Survey Explorer telescope, gathered over the course of several years, and converts it into usable files. Their first goal was to join in the search for a hypothesized ninth planet on the outer edges of the solar system that astronomers call Planet Nine. Absent the discovery of Planet Nine, other objects of interest that showed up in the data could be examined in more detail, including asteroids and brown dwarf stars.

As the data was processed, I was able to assist in combing through the objects located by our Python scripts. We had culled the set down to about 2,000, which I then checked against existing astronomical databases. Our results were that if Planet Nine exists, it isn't emitting strongly in the W1 infrared waveband. These results were published in The Astronomical Journal in January, 2018, in a paper titled "A 3π Search for Planet Nine at 3.4μm with WISE and NEOWISE" by Meisner et al.

In the following months, I worked with Dr. Bromley to write a Python script to simulate thousands of found objects, in order to determine the best parameters for brightness and speed. These results would be used to set parameters for a second search through the WISE data, this time in the slightly longer W2 waveband. As my participation in this project wrapped up, the search in W2 had been completed over a small part of the sky, in anticipation of a full-sky search.

This project gave me the opportunity to explore the research process first-hand. It has helped me make better decisions about graduate school programs and areas of interest. It also gave me many opportunities to present research to an audience, both in speeches and poster sessions. I am grateful for the opportunity given to me by the Office of Undergraduate Research, and by my research mentor, Dr. Ben Bromley.