**Python Telescope Automation for Modern Eddington Experiment**

Kyle Gourlie, Heather Hill, and Austyn Moon

Linn-Benton Community College

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**Introduction to the Experiment**

In the astronomy community, external software such as Prism, Astrometry, Sharpcap, and SkyX are used for astrophotography and data analysis of images. This method results in expensive software costs and a complexity of integrating all operations asynchronously. ASCOM Alpaca fixes these issues by being a bridge between the hardware operating systems and uniting their operations under a single private network. The benefits of operating the astronomical hardware through ASCOM Alpaca is the ability to automate the operation process through the programming language Python. The connection is made through a module called Alpyca that communicates to ASCOM Alpaca through its API. The goal of this project is to fully automate the process of the Arthur Eddington Experiment that was originally performed in the year 1919 to verify Einstein’s theory of Gravitation. The modernization of the experiment through software and electronics has been done before in years prior, but with each new data set, the result has had higher accuracy. This experiment is unique compared to previous ones due to its free and open-source nature. The automation program will be available to anyone for free and will be used to gather data during the 2024 solar eclipse.

The automation process consists of three parts: slew mount controls, camera controls, and image processing. The telescope mount controls will slew to the desired positions on the day of the eclipse and track the movement of the sun to have direct exposure to the correct location in the sky. The camera controls will control the exposure rate, gain, and number of exposures. All the data will be stored in the form of a fits file and be analyzed after the eclipse. The image processing python script will stack the fits file images to decrease the amount of atmospheric disturbance. (will finish once image processing is complete)

**Prerequisites**

The python script that will be used for the automation requires some basic prerequisite software. The main component of course being a application that can communicate the python instruction to the physical computer. To install the application that can read python script, one can install VS code or the python IDE from python.org. The most beneficial route would be the installation of VS code because it will also be needed in the installation of various python modules. To download VS code, go to this website and select the proper installation package for the computer’s operating system (Windows, Linux, MAC). The next installation will be ASCOM. The proper installation packages can be found at ascom-standards.org. The website will provide the direct ASCOM applications, and the drives required to communicate with the hardware. The drivers will depend on the individual’s telescope mount model. The drivers are essential to the proper operation of the automation.