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Kepler is a space-borne optical telescope with a 0.95-m mirror and 105 deg 2 field of view
in an Earth-trailing orbit around the sun with a period of 373 days (figures 1 and 2). The primary purpose of the Kepler mission is to identify extrasolar planets by measuring the decrease in brightness as the planets move in front of the stars they orbit. However, I plan to use Kepler data in a different way: There are over 200,000 stars in the publically available Kepler database with several years of continuous high-quality photometric measurements.

In particular, we will use star spots, faculae and flares as tracers of magnetic activity. All three of these phenomena have been studied on our own star, the sun, and are well-understood. Sunspots (or star spots) are regions on surface the sun that that emit several times less radiant energy than surrounding regions of the solar photosphere.

The purpose of this research project was to investigate the relationship between magnetic strength and the position in the Hertzsprung and Russell diagram, mainly low-mass star with in range of M and L stars. Using the Kepler MAST catalog, which was used to find exoplanets of stars. It will assist me by providing long term exposure of the source , collecting and tagging data, and compiling a light curve of the star. Using the light curves from the FITS files from the archive I will study the selected pool of stars to detect their magnetic activity. Magnetic signatures such as flares and sunspots indicate strong fields in a region of the stars disk. The Kepler derived light curves will be the primary subject of study to fight these flares and starspots. To use the Fits files i have to a basic understanding of MATLAB, software for mathematical and scientific fields of study.
So far up to this point I have collected a pool of about 20 stars all under the stellar temperature of 4000K. Next move is to gather the graphs of light curves, look for significant flares, then sunspots. Once confident in that ,compare their magnetic activity as an indicator of strength with their temp and mass. These stars in general will be less luminous according to the HR diagram. The main purpose of this project is to study magnetic activity of low-mass stars using publically available data from the Kepler Mission available through the Mikulski Archive for Space Telescopes. Studying magnetic activity through star spots, faculae and flares can help us better understand the astrophysics of low-mass stars. In particular, it can provide a better understanding of how these unique types of stars form and evolve, as well as provide insights into their internal structure, especially the dynamo model (Wright et al. 2011). In addition, the

periodic variations due to magnetic activity can be major sources of noise in the search for small exoplanets, making it more difficult to identify planetary orbits.

We used star spots, faculae and flares as tracers of magnetic activity. All three of these phenomena have been studied on our own star, the sun, and are well-understood (see figure 1). While the primary purpose of the Kepler mission is to identify extrasolar planets, these data are also ideal for studying brightness variations such as those caused by star spots, faculae and flares, all indicators of magnetic activity. What makes these data particularly useful for our project are the long exposure times and high photometric accuracy.

from the Kepler Telescope was downloaded from https://archive.stsci.edu/kepler. The NASA Exoplanet Archive was used to collect information on specific objects. Graphs were generated with MATLAB. The NASA Exoplanet Archive at the California Institute of Technology (https://exoplanetarchive.ipac.caltech.edu) was used to look for specific features of target objects. Relevant data for target objects was cataloged and loaded into MATLAB to generate graphs to study features of the light curves of target objects. Our study focused on stars with temperatures below 3,700 K

My research shows that there is a weak relation between magnetic activity and stellar diameter. On average stars with larger diameters have a slightly higher flare frequency. The three stars with the highest flare frequency in my sample have an average flare count of 23 over an approximate 4 year span (4.3 yrs) for this data set, while on average the flare count of the sun is larger (213) from 2014 to 2017 (Space weather live). It seems the magnetic activity for low-mass stars are on average lower, compared to the magnetic activity of stars of larger mass and diameter.

The next step in my research will be to expand the data set I have already analyzed, while keeping the temperature range the same (below 3,700 K). This will allow me to further establish the the relationship between stellar size and magnetic activity in a more precise manner.