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# Analyzing the Mysterious Light of KIC 8462852

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## 1- INTRODUCTION

Tabby's Star (KIC 8462852) exhibits unusual brightness dips detected by the Kepler telescope. Possible explanations include dust clouds or exoplanet transits.

In this project, we use Python's Lightkurve to analyze Kepler's photometric data. We will download and visualize light curves, study dips using Fourier transforms, and detect periodicities to explore these anomalies.

## 2 - MATERIALS & SOURCES

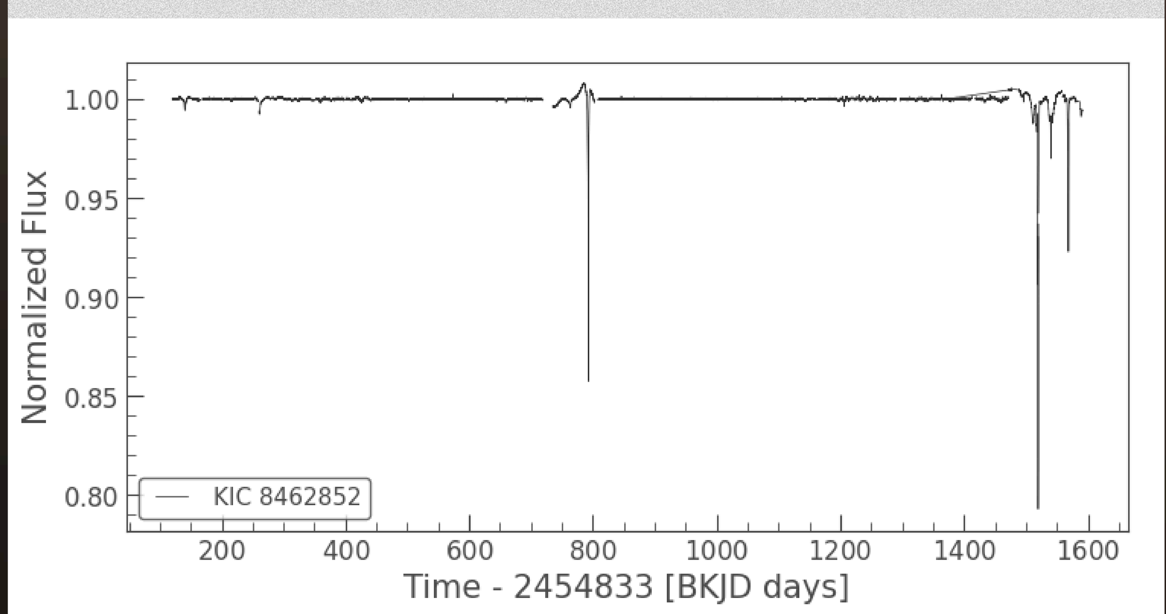
Materials:

- Computer
- Python with Lightkurve, NumPy, Matplotlib libraries
- Kepler database

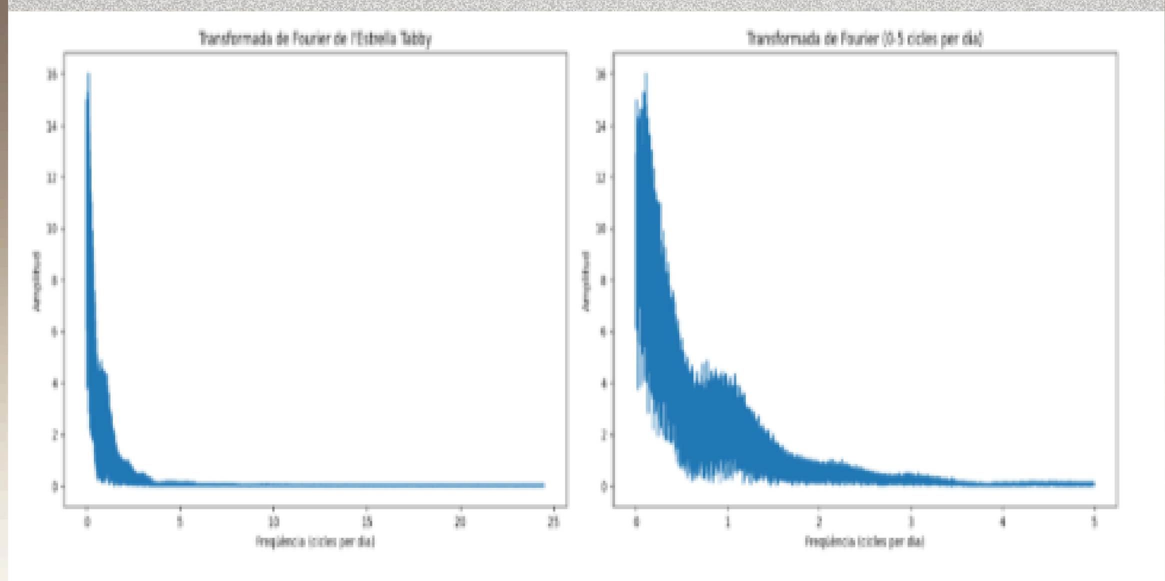
## 3 - METHODS:

To analyze the variability of Tabby's Star (KIC 8462852), we used Lightkurve, a Python tool for photometric data analysis. First, we retrieved and downloaded the star's light curve data from the Kepler mission, combining multiple files into a continuous dataset.

Next, we visualized the light curve to identify brightness dips and patterns of variability. To improve data quality, we removed NaN values, normalized the light curve, and applied a Savitzky-Golay filter to eliminate long-term trends while preserving short-term fluctuations.




To investigate periodicity in the star's brightness variations, we performed a Fourier transform, focusing on frequency components between 0 and 5 cycles per day to detect significant patterns.



Additionally, we explored transit detection techniques, such as the Transit Least Squares (TLS) algorithm, to identify potential exoplanetary transits and compare observed dips with known transit models.

Finally, we conducted a statistical analysis of the brightness dips, examining their depth, duration, and frequency. By comparing these characteristics with similar stars, we aimed to determine whether the observed behavior was truly anomalous.

## 4 - RESULTS & OBSERVATIONS

The analysis of Tabby's Star using Lightkurve allowed us to identify and study the dips in its brightness. By normalizing and filtering the data, we improved the quality of the light curve, making it easier to detect unusual patterns.

The Fourier transform results did not show a clear periodicity within the analyzed range, suggesting that the brightness variations do not follow a simple or regular cycle. Additionally, applying the Transit Least Squares (TLS) algorithm did not detect exoplanetary transits matching known models, supporting the idea that the dips in brightness are not caused by a typical planetary system.

## 5-CONCLUSIONS:

The strange pattern of light from the star is believed to be caused by the breaking apart of a large comet from another star system. This comet was on a very stretched-out orbit, and after it broke up, the pieces blocked the star's light. Scientists think that a small star, called an M-dwarf, which has recently been confirmed to be part of the system, could be influencing nearby small objects called planetesimals. If this small star's orbit is tilted in the wrong way, it could cause the planetesimals to move in very stretched-out orbits. This effect is called the 'EccentricKozai–Lidov Mechanism.'

## 6-REFERENCES:

Sources:

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