

# **Limb Darkening and Light Curve Simulation of the WASP55 System**

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## **ABSTRACT**

Light curves are recorded by radio telescopes and are used by astronomers to help better their guesses to existence of exoplanets. In our work we are using the new WASP55 stellar system which is composed of one star and one planet. We want to be able to give the star a more closely related characteristic of limb darkening in which the edges of the surface that is facing us is less bright due to a longer radial distance. To produce these light curve plots we will be using Python 3.X. Because python cannot make spectators (like radio telescopes) easily, our “sight” will be a 2d array that holds the information of brightness at all points away from the origin defining the radial distance. We will then simulate a “planet”, making a circle of smaller radius, which crosses our view of the star and carries 0 brightness on all points on its surface. Our iterations of sums of our matrix as the planet moves will produce our light curves.

## **CONTRIBUTIONS**

Edgar Escalante:

Edgar has been playing a pivotal role in the ideation process of the entire project. He used his analytical skills to valuably contribute to and lead the algorithm development of the project’s WASP55 simulation that is under the name “r\_brightness.py”. Through doing this, he has been able to greatly steer the project in the right direction. While collaborating with Kezman and Tiancheng, he is at the moment trying to integrate the transit of WASP55 b across WASP55 in the code that the team currently has.

Kezman Saboi:

To kick-start the project, Kezman developed and wrote the project proposal clearly stating formulae needed as well as the goals needed to be ultimately achieved from the entire project. He has been actively involved in the ideation process of figuring out how key and non-trivial parts of the project, such as the simulation of WASP55, can be achieved. He initially developed a short algorithm in VPython to observe the orbital movements of WASP55 b around WASP55. Additionally, he has been involved in researching ways in which an efficient and well-functioning algorithm can be developed to ultimately enable the team achieve its desired goals that are clearly outlined in the project proposal.

Tiancheng Gong:

Tiancheng has helped in establishing the useful functions that are required to calculate the wanted light curves of WASP55 b’s transit across WASP55. He has been editing the “r\_brightness.py” code to make it process a better matrix. He has also been actively involved in the team’s brainstorming meetings.