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POSSIBLE HABITABLE PLANETS IN HABITABILITY ZONE OF BINARY STAR SYSTEMS

M. M. Marques[1] and B. L. do Nascimento Dias[2]

The main goal of this contribution is to study the Habitable Zone (HA) of binary systems. Therefore, as explained by Barbosa (2016), we will initially use the Habitable Zone in Multiple Star Systems website (http://astro.twam.info/hz/) and later the Rebound software for the HA analyses of each system of interest.

After the discovery of the first exoplanet in the 1980s more and more resources are being put into the study of exoplanets. The question that naturally arises is about the habitability of these new planetary systems. Computational tools are needed that allow the analysis of all the data of newly discovered exoplanets, which is daily updated.

Quintana et al. (2007) point out that numerous factors influence the determination of the habitability zone, such as the temperature, luminosity and mass of both stars composing the system, as well as the eccentricity of the binaries and the semi-major axis. Two example binary systems were chosen, namely, Kepler-34 and Kepler-35. From the analysis on the website Habitable Zone in Multiple Star Systems we generated the data contained in Fig. 1a and 1b. Both systems are circumbinary systems, meaning that the two stars are in the center while the planet orbits both stars.

Barbosa et al. (2020) point out the Kepler-35 system (Fig1b) as one of the most prone to the formation of terrestrial planets within the habitability zone. That study took into account the specific characteristics of the system. Thus, comparing the planetary formation probability between the two systems in Rebound will bring additional data to the planetary formation study.

It is possible, when observing figure 1, that the different sizes of each of the AU Habitable Zones, are due to the different characteristics of the systems.

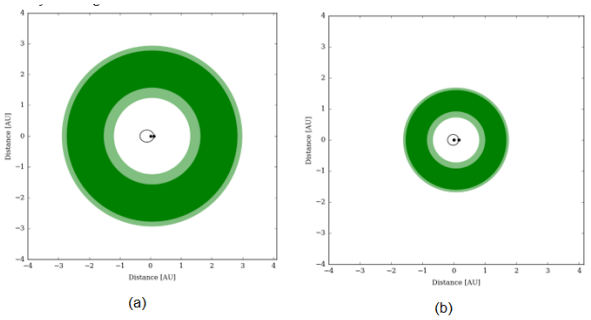

Fig. 1. (a) Habitable Zone of the Kepler-34 Binary System; (b) Habitable Zone of the Kepler-35 Binary System. Source: http://astro.twam.info/hz/ made by the authors.

With the analysis of the systems of interest in both computational tools mentioned above, we hope to obtain more complete information about the composition and structure of the systems of interest. Such analysis will allow to better understand the origin, formation and evolution of these planetary systems, which is the primary focus of the study of terrestrial planets that are within the Habitable Zone of their system, i.e., the study of possible candidates for inhabited planets. It will also contribute at complementing the already existing bibliography on the subject.

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[1]Federal University of Rio de Janeiro. (may.mmarques@gmail.com)
[2]Federal University of Juiz de Fora.