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EXOPLANETS DETECTION METHODS AS A CONTEXTUALIZATION OF THE PHYSICS TEACHING

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This work aims to present and highlight the possibility to introduce areas of knowledge that have been important for the development of Astrobiology as a contextualization tool for the teaching of Physics. For this, in order to detect Physics contents which are inserted directly or indirectly for the construction and use of the methods, we consulted the works of Galante and Pacheco, since they address the exoplanets detection methods mentioned in this work.

The planetary transit method, responsible for the detection of most of the exoplanets already found todate (NASA 2021a), consists of observing the variation in the amount of light that an observer on Earth receives from the observed star. When observing a planetary system, the amount of light the telescope receives from that system's star is approximately constant. However, when a planet orbits its star, there is a momentary change in the amount of light the observer receives, such that its brightness is attenuated (Galante et al. 2019). The first exoplanet (rocky and Earth-like) discovered by this method, in 2009, is called CoRot-7b. Its orbital period is 20.4 h, its distance to the star is 0.0167 au., it has 5.7 Earth masses, 1.58 Earth radii and its density (7.9 g/cm^3) is very close to the Earth density (5.5 g/cm^3) (Pacheco 2020).

The star's radial velocity method is the second method that has detected most of exoplanets to date. It consists of detecting small variations in the speed with which the star moves in relation to the observer on Earth, through the Doppler effect (Lemarchand et al. 2010). The swiss astronomers Michel Mayor and Didier Queiloz, of the Geneva Astronomical Observatory, announced on October 6, 1995 the detection of the first planet 51 Pegasi b around a star with physical characteristics similar to those of the Sun, identified as 51 Pegasi, located in the Pegasus constellation. That detection earned them the Nobel Prize in Physics in 2019 and was made using the radial velocity method. The orbital period of the star around the center of its system is 4.23 days, the amplitude of the variation of its velocity, due to the presence of 51 Pegasi b, is 56 m/s and its effective temperature is 5758 K. 51 Pegasi b has 146 Earth masses and 14.3 Earth radii (NASA 2021b).

By accessing the data cited above and the history of those and other discoveries - that provided and still provide important data for the development of Astrobiology - the Physics teacher has a wide range of opportunities to address and teach, contextually to the two exoplanet detection methods used as examples in this work, many contents of Physics, such as: units and physical dimensions (as mass, temperature, length and density); period and frequency of revolution; linear and orbital velocity; tangential and centripetal acceleration; dynamics of circular motion; Kepler's laws; law of Universal Gravitation; center of mass of particle systems; Doppler effect and fundamental concepts about waves, such as length, frequency and wave propagation speed.

Physics classes may become interesting and motivating for students and teachers when they receive the Science reality (Masetto 2006), include and develop this reality with scientific knowledge and current discoveries (our enhance) -, allowing a return with new perspectives for their formation.

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