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Determining the orbital parameters of the gamma-ray binary HESS J0632 +057

Gamma-ray binaries are a small subclass of high mass binary systems that display multi-wavelength emission peaking in the gamma-ray regime (≥ 1 MeV). All known gamma-ray binaries consist of a massive O/B type star and a compact object, either a neutron star or a black hole. There are currently less than ten known systems. The compact object has been identified for only two systems, both as a young pulsar. In order to understand how the physical processes occurring within these systems result in the observed emission, it is necessary to know the geometry of the binary and its orientation with respect to the observer. Therefore the orbital parameters must be determined via radial velocity measurements of the optical companion. HESS J0632 +057 is a gamma-ray binary comprising of a Be type star and an unknown compact object with an orbital period of 316.8 days. Two previous studies by Cesares et al. 2012 and Moritani et al. 2018 have presented orbital solutions, which are very different and incompatible. This study aims to better constrain the orbital parameters. To do this, observations are currently being obtained with the High Resolution Spectrograph on the Southern African Large Telescope to establish the radial velocity and observe the long term behaviour of the Be star. Because of the long orbital period, observations are required over several years to obtain a sufficient coverage of radial velocity. We present the initial results from this project.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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