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BSN, LATEST RESULTS FROM THE AMATEUR-PROFESSIONAL COLLABORATION ON THE STUDY OF BINARY STAR SYSTEMS

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Abstract. As part of an amateur-professional collaboration between the IPSA Vega association and the BSN program for the study of eclipsing binary systems (contact binaries in particular), we conducted observations on two systems: Qu-Vir and V2822 Ori, two eclipsing binary system. IPSA Vega is taking part by tracking and collecting data on these two stars via different telescopes and filters, with the aim of producing standardized light curves.

Keywords: binary systems, eclipsing binary, photometry, amateur

1 Introduction

The BSN (Binary Systems of South and North) program is a collaborative initiative involving professional astronomers such as Atila Poro, Mark G. Blackford, and Edwin Budding, as well as amateur astronomers. The project aims to observe and analyze eclipsing binary systems, in particular "contact binaries". The systems studied are either recently discovered, or have been little observed for several years. Amateur astronomers can participate by observing these stars over one or more nights and obtaining light curves in V or B photometric bands. As part of this project, the IPSA Vega association used R filters, in particular at the OHP (R Johnson filter) and on the Telescope Live website (Sloan r filter) to make observations of the variable stars Qu-Vir and V2822 Ori.

Fig. 1. Left: Logo of the association IPSA Vega **Right:** Logo of the BSN program

2 Observations and data collection

2.1 Presentation of the two systems

The star QU-Vir is located in the Virgo constellation. It is an EW-type variable star, characterized by a short period (0.399249 days or approximately 9.58 hours) and a modest magnitude variation (from 11.75 to 12.06, in clear filter). EW-type stars are known as eclipsing variables, and are made up of two stars in contact, forming ellipsoids. Variations in system brightness are often less than 0.8 magnitude in the V filter.

The star V2822 Ori is located in the Orion constellation. It is also an EW-type variable star, with a period of 0.2480774 days (approximately 5.95 hours) and a magnitude variation of around 0.7 mag (from 11.41 to 12.13, in G filter).

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2.2 Means of observation

Observations were carried away by two means. First, for the star V2822 Ori, IPSA Vega used Anica Lekic's teacher account on Telescope Live (`https://telescope.live`), which allowed the members to have access to a plurality of telescopes remotely, in exchange of credits (which can be purchased directly on the site). To perform this photometry, the CHI-1-CMOS telescope was used because it is equipped with Sloan r filters, with a bandwidth between 550 and 700nm, ideal for this kind of observations.

Then, for the star Qu Vir, IPSA Vega used two nigts on one of the telescope available at the OHP: the T120. With these two night, the association was able to retrieve 5 hours of the whole period. The T120 was also an ideal choice for this kind of observation, because of its diameter of 1.2 meters: This allows to have a high signal-to-noise ratio and a good resolution, but makes it difficult to find a comparison star, as the field of view is very small (14.1"x14.1").

3 Data processing

In comparison to previous observations, the association made sure that each star were observed using only one mean of observation, in order to avoid having to calibrate data from different filters and telescopes. Then, it was only necessary to use the magnitude of the star in the correct filter, and then to draw the photometry diagram. This allowed IPSA Vega to obtain two curves, one for each star, which were calibrated using an adequate comparison star (found either using `https://simbad.cds.unistra.fr/simbad/` and `https://apps.aavso.org/vsp/`, or with the help of Jean Bruno Desrosiers).

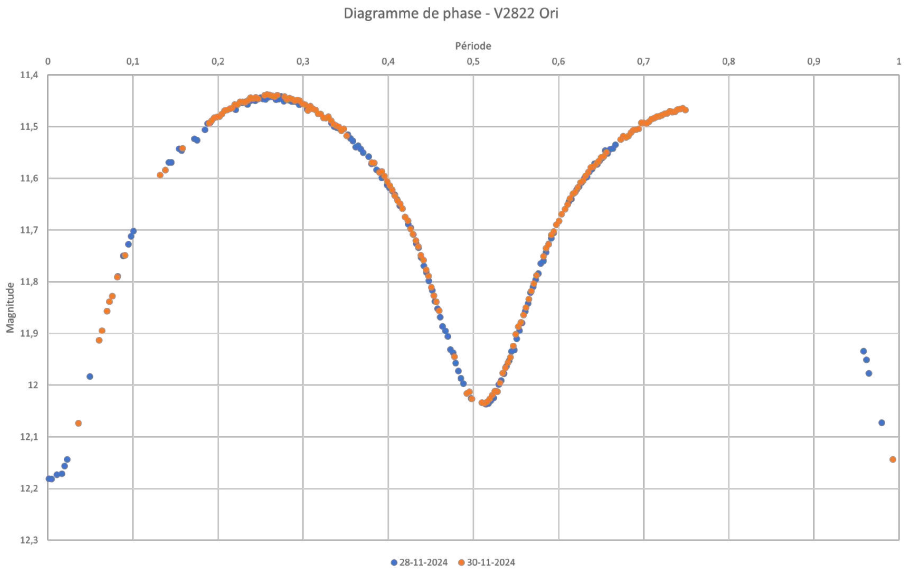

Fig. 2. Light curve for V2822 Ori

4 Conclusions

In the coming months, the IPSA Vega association will continue to observe the previous systems to obtain data in the B and V band filters, as requested by Atila Poro and his team. Observations of other proposed targets will also be considered, with the aim of producing further photometry, which we will also send to Atila Poro. Observations will also be extended to the southern hemisphere, using the network provided by the SADR association, which possess installed equipment in Chile. IPSA Vega hopes to present concrete results at the next SF2A symposium in 2026.

We would like to thank Jean Bruno Desrosiers for helping us to find a comparison star for Qu-Vir, despite the difficulty because of the size of the field. We would also like to thank the organizers of the SF2A 2025. Finally, special thanks to Atila Porro, Mark G. Blackford and Edwin Budding for their participation and investment in this research.