



Modelling of an eclipsing RS CVn-binary: V405 And

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V405 And is an ultrafast-rotating ($P_{\text{rot}} \sim 0.46^{\text{d}}$) eclipsing binary. The system consists of a primary star with radiative core and convective envelope, and a fully convective secondary. Theories have shown, that stellar structure can depend on magnetic activity, i.e., magnetically active M-dwarfs should have larger radii. Using an iterative binary and spot modelling method (for details see Vida et al. 2009 A&A 504,1021) we indeed found that the radius of the primary is significantly larger than the theoretically predicted value (the discrepancy is the largest of all known objects), while the secondary fits well to the mass-radius relation. Recently obtained light curves show significant changes due to surface evolution of the spotted primary component. By modelling these light curves (plotted on Fig. 1 and Fig 2.) with the same method, we can find further proof for this phenomenon.

The modelling gave a very reassuring result: although the shape of the light curves, thus the spot configuration changed significantly during the different seasons, the same binary model can describe the light curves very well, suggesting that the primary indeed has a radius approximately 65% larger than the theoretical value (see Fig. 3).

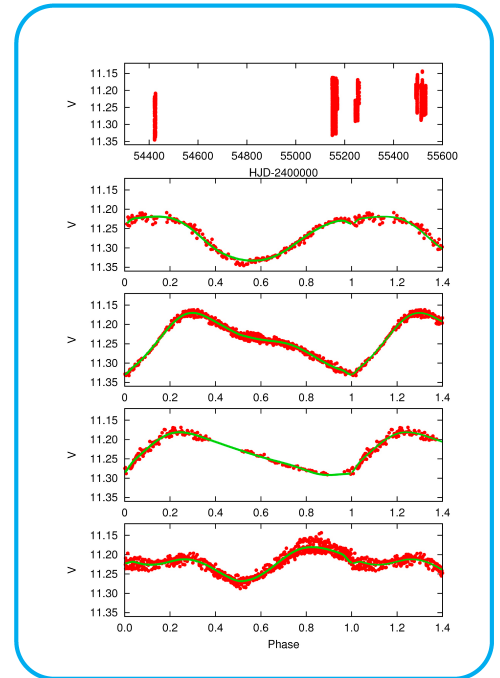


Fig. 1: V light curve of V405 And, and phased light curves of the different observing seasons with the fitted binary and spot model.

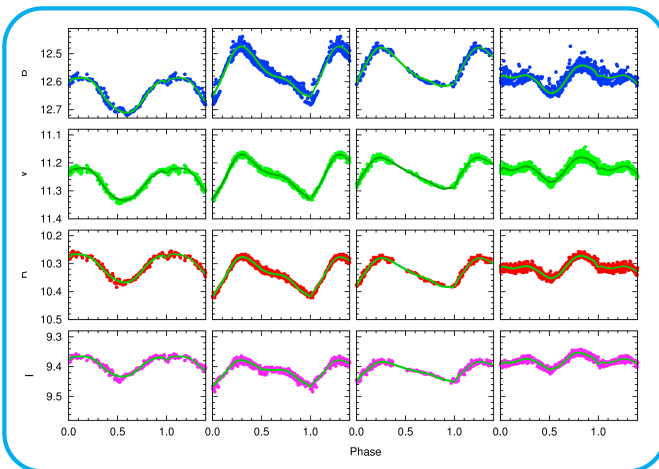


Fig. 2: BVRI light curves of V405 And with the fitted spot and binary models. Data in the first column show the previously modelled light curve.

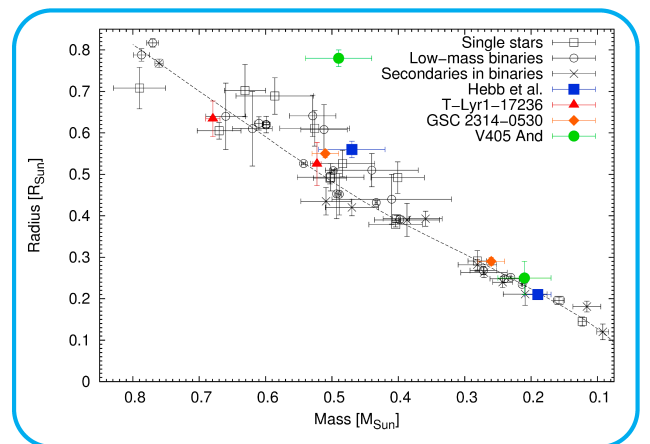


Fig. 3: Mass-radius relation for 5 Gyr stars after Baraffe et al. (1998). Coloured points show V405 And and binaries with components of similar structure. Radius of V405 And is well over the theoretically predicted value.