OPTICAL/NEAR-INFRARED LIGHT-CURVE PROPERTIES OF PULSATING VARIABLES IN THE CEPHEID INSTABILITY STRIP

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Making the distinction between Type I and II Cepheids found in the Vista Variables in the Via Lactea (VVV) ESO Public Survey is crucial for the studies of Galactic structure using these variables. As VVV provides only K_S-band light curves, this distinction has to be based on near-IR light-curve properties.

Because of their reduced amplitudes in the near-IR, however, it is not immediately obvious whether such a distinction can be unambiguously made. To assess this problem, we have compared the VVV and VVV Templates K_S-band light-curve properties of 213 Type I and 215 Type II Cepheids using Fourier decomposition. The Fourier parameters of these types were found to be different enough for the purposes of classification. For example, over most of the Cepheid period range, there is an upper limit for the amplitudes of Type I Cepheids. As 50 percent of the Type II variables lie above this limit, half of the variables that could be confused with Type I Cepheids are sorted out by this simple feature alone, suggesting that the automatic classification schemes under development for the VVV Survey will be able to classify such variables with a high degree of accuracy.

We have also found that bump Cepheids can be easily identified using VVV data, as the bump feature also appears in the near-IR light curves. Detailed modeling of the light curves of the bump Cepheids found in the VVV data will provide accurate stellar parameters for these stars.

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ON THE ORIGIN OF THE WIND VARIABILITY OF 55 CYG

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The early B-type supergiant 55 Cygni exhibits pronounced night-to-night variations in its Hα P-Cygni line profile, probably related to a strong variable stellar wind. In this work we studied a sample of spectroscopic observations, taken at the Observatory of Ondřejov (Czech Republic), in order to analyze the variations in the stellar and wind parameters. The observations were modeled using FASTWIND code (Santolaya-Rey, Puls & Herrero 1997, A&A 323, 488-512). Although we were not able to find an exact period from the Hα line profile variations, the same pattern (shape and intensity) seems to have a cyclic behaviour of about 17 days. The values for the wind and stellar parameters suggest changes of the mass loss rate by a factor of three during a cycle of variability. On the other hand, Kraus et al. (Precision Asteroseismology Proceedings, IAU Symposium 301, 2014) found that the HeI λ6678 photospheric absorption line presents a 1.09 day period, which could be superimposed over a longer period. From the analysis of our theoretical parameters we found that a gravitational mode of pulsation could not be the only agent responsible for the observed variations. As the stars evolving from the main sequence to the red supergiant stage (RSG) have different pulsation properties than those evolving back to the blue supergiant region (Saio, Georgy & Meynet, 2013, MNRAS, 433, 1246), we conclude that 55 Cygni could be in a post-RSG phase with multiperiodic pulsation modes. The variable mass loss could be attributed to the coupling of the oscillation modes.

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NIP OF STARS: EARLY RESULTS AND NEW ECLIPSING BINARIES

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We have performed a near-infrared photometric monitoring of 39 galactic young star clusters and star-forming regions, known as *NIP of Stars*, between the years 2009–2011, using the Swope telescope at Las Campanas Observatory (Chile) and the RetroCam camera, in H- and Y-bands. This monitoring program is complementary to the *Vista*