Observational insight Nova Project

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1 Introduction

This document contains some of the principal observational aspects we can study from novae and, in particular, in symbiotic recurrent novae.

2 Features

2.1 General features

The first and obvious feature is a peak in luminosity/brightness ... This peak is shown on different timescales depending on the system (symbiotic or classical), and the observation band, e.g.(Bolometric, or Visual luminosity)

For symbiotic recurrent novae we have the configuration of WD and RG and we can have features on the emission lines and the light curve (LC) about the mass transfer process, for that we can study the system from soft x-ray emission that is dominated for the WD and emissions in the I band that are associated with the cool RG companion that we usually call secondary star.

In general for symbiotic stars, systs from now on, as adopted in some papers, e.g. (Munari 2019), if we have Roche-Lobe overflow (RLOF) from the secondary we can see distorted ellipsoidal light curves in the I band $\sim 7650 - 8060\mathring{A}$, this is usually seen in the LC with two maxima and two minima in brightness with amplitude depending on inclination and spectral type. For accreting only WD, as is the case of T-CrB, the ellipsoidal modulation dominates to the bluest wavelengths, but for burning systs the WD radiation onto the RG dominates the bluest photometric bands with a sinusoidal modulation, and the amplitude of this modulation depends on the temperature and luminosity of the burning WD.

The systs novae can be differentiated from the classical ones (CNe) by observing their companion, which can be a RG for systs novae or a RD for the

classical; also we can observe the difference in the period. For SyRNe it is long (hundred days -years), and for classical we have short periods (hours-days).**As I see** the SyRNe are brightest in absolute magnitude M in the K band and differ from the CNe by a factor of ~ 10 in the M(K)

2.2 Flash ionization of the RG wind

For SyRNe there is a unique feature that comes from the interaction of the RG wind with the UV flash that comes inmediatly after the TNR (thermonuclear runaway), as a consecuence of the same TNR. As the UV flash interacts with the wind the latter absorb the photons and gets ionized, and then, the gas starts recombination glowing very bright in the process. It is important to say that this process is very short in time, and the durations is associated with the electron temperature T_e and the electron density n_e.

As a consequence of this interaction we can see emission lines from the flashed wind that are located on top of the pedestal originated by the fast ejecta, these lines that are sharp and noticeable just for hours or a few days, are accompanied by absorption lines that are slightly blue shifted and gives us a measure of the terminal wind velocity.

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ref: Ulisse Munari 2024,
Add some drawings and figures to represent the observations