NOVA LMC 1991: A SUPER-BRIGHT NOVA IN THE LARGE MAGELLANIC CLOUD

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Abstract. We discuss the recent outburst of nova LMC 1991. By comparing its magnitude at maximum and rate of decline with those of 14 historical LMC novae, we show that nova LMC 1991 represents the first detection of a *super*-bright nova in the Large Magellanic Cloud.

Results

a) The analysis of the lightcurve of nova LMC 1991 has allowed us to derive its magnitude at maximum and rate of decline. The comparison between these parameters and the well established MMRD relation for LMC novae, shows that Nova LMC 1991 deviates toward the brighter magnitudes by more than one magnitude.

b) A critical review of the magnitude at maximum *vs.* rate of decline relationships for the most consistently investigated nova populations (Galaxy, LMC, M31, and Virgo; Della Valle 1991), shows that: 1) 90% of the novae of our sample is bounded inside a Δm strip of ± 0.5 mag. Moreover novae in this area seem to follow the same MMRD relationship. This sketch is entirely consistent with the prediction (Shara 1982), that a dispersion of MMRD relation should be observed as a result of the intrinsic scatter in the white dwarf luminosity before the outburst. The contribution to the scatter of the photometric errors is indeed less than 20%. 2) at least one object in each sample (9 objects in all) deviates strongly from the respective MMRD relationships. In particular, the M31 and LMC objects (uncertainty on the photometry $\simeq 0.1$ mag), are systematically 1 magnitude brighter than what is expected from their rate of decline. For the object in Virgo and the two galactic ones, the respective errorbars are still consistent with the 1 magnitude deviation. This also may suggests the presence of a parallel MMRD relationship for the *super*-bright novae, although in the framework of the present statistic we can not make definitive conclusions.

c) Though heavily limited by poor statistics, we can attempt an estimate of the frequency of *super*-bright outbursts in comparison with 'normal' events. It is apparent that the weight of this estimate is almost completely based on the 5 objects in M31, from which we obtain a frequency of $f \sim 0.06$. Nevertheless, it is interesting to note that consistent figures arise from the LMC population and more marginally from the galactic one. We can assume an indicative final value of $(N_{super})/(N_{normal}) \approx 0.07$.

Reference

Della Valle, M. 1991, *Astron. Astrophys.* in press

Shara, M. 1982, *Ap.J.*, **243**, 926