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PHOTOMETRIC STUDY OF NGC 2571

E.E. Giorgi[1,2], R.A. Vázquez[1], G. Baume[1], W. Seggewiss[3] and J.M. Will[3]

CCD *UBVI* imaging photometry was carried out in the field of the open cluster NGC 2571 using a 1024×1024 pixel CCD with a scale of $0\farcs37$/pixel and a field of view of $6\farcm3 \times 6\farcm3$ attached to the 1.54-m Danish telescope at ESO, La Silla, Chile.

This work is the first of a series aimed at investigating the spiral structure in the Vela Puppis spur arm through deep *UBVI* CCD photometry of open clusters.

NGC 2571 is a moderate young open cluster of 50 Myr, located in the association Vela-Puppis at a distance of 1380 ± 130 pc in a low absorption zone, $A_V = 0.3$. The present work confirms earlier investigations that a number of cluster members are indeed variable stars: a comparison of magnitudes and colours of 30 stars in common between our CCD photometry and the photoelectric photometry of Clariá (1976) reveals that 7 stars are definitely variable and one star is probably variable, i.e. about 30% of all stars in this sample. The cluster has an unusual high number of stars with "peculiar colours" which are candidates for metallic line stars, probably constituting a sequence of Am to Fm. Kilambi (1978) noticed the presence of a gap in the stellar distribution along the cluster's main sequence (MS). We demonstrated that this gap is not produced by a random process but is a real lack of stars in a given magnitude interval.

It is worth mentioning that not only open clusters show gaps but also field star distributions (Mermilliod 1976). Different mechanisms of gap production are at work for clusters of different age: the gaps in the MSs of intermediate-age clusters are likely the consequence of the onset of convection in the stellar envelopes (Böhm-Vitense & Canterna 1974), whereas in young clusters the gaps may be produced by the "burn-off" of ^{3}He in stars contracting to the MS (Ulrich 1971). Using the absolute magnitude of the candidate star No 1357 as the most secure parameter and Bergeron et al.'s (1995) tables, we find no contradiction in considering this star to be a cluster white dwarf (WD) in the intermediate-age cluster NGC 2571.

A strong criterium for a WD to be a cluster member is that the sum of the evolutionary time of its progenitor, t(evolution), and its cooling age, t(cooling), is of the order of the cluster's age. The mass distribution of NGC 2571 gives a mean mass at the turn-off point (TO) of $\approx 8\mathcal{M}_\odot$, thus allowing us to consider star No 1357 as the remnant of the evolution of an even more massive star, say about $9\mathcal{M}_\odot$ (i.e. $1\mathcal{M}_\odot$, conservatively, above the cluster TO). We know that a WD progenitor of $9\mathcal{M}_\odot$ spends about 30 Myr to completely exhaust its nuclear helium (Schaller et al. 1992) while, on the other hand star No 1357 as WD may be as young as 11^{+10}_{-3} Myr. Thus, the sum t(evolution) + t(cooling) is smaller than the cluster age favouring its membership. The slope of the cluster mass function (MF) varies from 1.66 to 1.74, depending on whether the most massive bin is included or not; but, on average, it is larger than the Salpeter's (1955) one. It is worth mentioning that with Scalo's (1986) relations [1.7 and 1.8] and a cluster MF's slope $x = 1.74$, the expected number of stars more massive than $8.5\mathcal{M}_\odot$ in NGC 2571 is 2.1. That strongly increases the chance that the WD candidate star No 1357 is the result of the evolution of a massive cluster member.

The complete version of this article can be found in Giorgi et al. (2001).

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[1]FCAG-UNLP. and IALP-CONICET, Paseo del Bosque s/n, C. P. 1900, La Plata, Argentina
[2]Fellow of Comisión de Investigaciones Científicas de la Provincia de Buenos Aires, Argentina, egiorgi@fcaglp.edu.ar
[3]Sternwarte der Universität Bonn, Germany