RADIAL VELOCITIES IN THE OPEN CLUSTER IC 2602

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Abstract. We determined radial velocities for 25 probable members of the open cluster IC 2602. We identified the stars with variable radial velocity. We improved the orbit of HD 93030, and computed a preliminary orbit for another spectroscopic binary. We discussed with such data the average cluster radial velocity and we compare the incidence of short period binaries among the Main-Sequence members of IC 2602 with the incidence for other clusters with different values of the average axial rotation of their members.

1. Introduction

There is a need for radial velocity data in open clusters and associations because we would like to know with certainty if there are differences in the proportion of binaries among the different clusters and associations. If this is the case we will like to know if the proportion of binaries in a cluster is statistically related with other properties (rotation, magnetism, initial mass function, etc.).

Abt and Sanders (1973) proposed a correlation between the average axial rotation for cluster members with respect to field stars of the same types and the percentage of short-period binaries plus magnetic stars. As this correlation was criticized by different authors, among them Crampton et al. (1976), we want to increase the sample of clusters and associations on which a systematic search of short-period binaries (< 15 days) has been done, as a first step for discussing the proposed correlation with a substantially larger sample.

Since 1975 we have been obtained radial velocities of members for a dozen of open clusters and associations using the standard photographic technique. Results for the Sco–Cen Association (Levato et al., 1987), NGC 6231 (Levato and Morrell, 1983) were already published.

We want to publish the data for the remaining objects at this time because new techniques for measuring radial velocities have been implemented at different observa-

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tories and we are continuing our program using these new techniques which involves the tightening of the velocity systems.

This paper is the result of a straightforward determination of radial velocities among the members of IC 2602 in a typical 10-night observing run.

IC 2602 is a nearby open cluster in Carina. Its brightest member is θ Carinae whose spectrum is anomalous. The cluster is located 5 deg south of the galactic plane and near the η Carinae region. Whiteoak (1961) made a complete photometric and spectroscopic study and determined a distance of 155 pc. Braes (1962) also made a proper motion study combined with photoelectric and photographic photometry. Hesser and Henry (1971) carried out K-line photometry for some members of the cluster and Abt and Morgan (1972) derived accurate MK types for 16 members. Levato (1975) measured $V \sin i$ for some probable members of the cluster.

2. Observations and Results

We have obtained an average of 13 spectrograms per star of a list of 25 probable members of IC 2602. They were selected from the list of Levato (1975). The stars HD 93714 and HD 93163 have not been observed because they are probable non-members (see Braes, 1962). In addition we included in the observing list HD 92989, HD 94174, HD 91906, HD 92535, and HD 92896 which were not observed by Levato but they are probable members of IC 2602.

The spectrograms were secured with the Cassegrain spectrograph attached to the 1-m Yale telescope at Cerro Tololo using a grating giving 45 Å mm$^{-1}$. The spectra were recorded on baked IIIa-J emulsion, baked in forming gas, and located behind a magnetic image-tube of two stages. We used a slit of 1" projected on the sky and a decker projecting 1 mm on the plate for widening the spectrograms. Radial velocities were measured with a Grant machine at La Plata Observatory. Table I presents the results in the Lick system of radial velocity (Moore, 1932) reproduced through a correction of +6 km s$^{-1}$ for the B-type stars and +15 km s$^{-1}$ for the A-type stars. This correction was derived by Levato et al. (1986) and the amount of it for the A-type stars is mainly due to the usage of Moore’s (1945) wavelengths. For the B-type stars we used the hydrogen Balmer lines and some of the He lines in the blue violet portion of the spectrum. For the A-type stars we used the hydrogen Balmer lines plus CaII (λ3933), MgII (λ4481), and some FeI lines (λλ4045, 4063, 4071, etc.). The corrections derived by Levato et al. seem to be very stable at least since 1982 and they were continuously monitored during the observing run. The corrections were applied to all our observations.

Table I indicates the identification of the star, the Julian date, the radial velocity, the number of lines included in the radial velocity average, and the probable error for each plate.

The observations were analyzed statistically using a variance test (see Conti et al., 1977). A significance level of 1% was chosen as the variability level for our observations. Therefore, we consider that a sample of radial velocities with a significance level lower