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$uvby - \beta$ PHOTOELECTRIC PHOTOMETRY OF THE OPEN CLUSTERS NGC 1647 AND NGC 1778

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The present work studies two open clusters, 35 stars of NGC 1647 and 16 stars of NGC 1778, using Strömgren photometry ($uvby - \beta$) to determine their parameters: reddening, distance modulus and age.

NGC 1647 is situated beyond the Taurus dark cloud complex with $\alpha(2000) = 4^h46^m8^s.45$ and $\delta(2000) = +19°04'37''$. The diameter of the cluster is about $45'$ and it is a relatively rich populated cluster. Hoag et al. (1965) reported a distance $d = 549$ pc, reddening of $E(B-V) = 0.30$ and distance modulus of $V_0 - M_V = 8.7$, using Johnson photometry. Turner (1992) reported a distance $d = 542 \pm 4$ pc, and measured a reddening of $E(B-V) = 0.29 \pm 0.01$, distance modulus $V_0 - M_V = 8.67 \pm 0.02$ and an age of log age = 8.27 years. Hebb et al. (2004) determined a distance $d = 550$ pc, reddening $E(B-V) = 0.37$, distance modulus $V_0 - M_V = 8.7$ and log age = 8.3 years. Using the Vilnius seven-color photometric system, Zdanavičius et al. (2005) reported a distance $d = 555 \pm 74$ pc, reddening $E(B-V) = 0.35 \pm 0.01$, distance modulus $V_0 - M_V = 8.42 \pm 0.02$ and log age = 8.1 years. NGC 1778 lies in the direction of the Perseus arm, $\alpha(2000) = 5^h08^m04^s.56$ and $\delta(2000) = +37°01'24''$. The diameter of the cluster is about $10'$ and is a very poorly populated, faint cluster. Hoag et al. (1965) reported a distance $d = 1380$ pc, reddening of $E(B-V) = 0.34$ and distance modulus of $V_0 - M_V = 10.7$, using Johnson photometry. In 1972, Barbon & Hassan reported a distance $d = 1670$ pc, reddening of $E(B-V) = 0.33$ and distance modulus of $V_0 - M_V = 11.11$. Pandey (1998) reported a distance $d = 1100$ pc, distance modulus of $V_0 - M_V = 10.2$ and log age = 11.3 years. Xin et al. (2007) determined a distance $d = 2023$ pc, reddening $E(B-V) = 0.23$, distance modulus $V_0 - M_V = 11.53$ and log age = 11.18 years.

For NGC 1647, unreddened indexes in the LGK86 grids (Lester et al. 1986) allowed us to determine the effective temperature of the hottest star as 13000 K. We found a mean distance to the cluster of 564 ± 106 pc, which corresponds to a distance modulus of 8.75 ± 0.09 and a reddening $E(b-y) = 0.32 \pm 0.02$, that, through the relation $E(b-y) = 0.9E(B-V)$, gives a color excess of $E(B-V) = 0.35$ mag. These results are in good agreement with the parameters reported by other authors. When histograms of the distances are drawn (Figure 1a), one can see that most of the stars of NGC 1647 lie around a distance of 564 pc. However, when the histogram of distances to the stars is plotted for NGC 1778 (Figure 1b), it is not possible to identify a cluster in that direction.

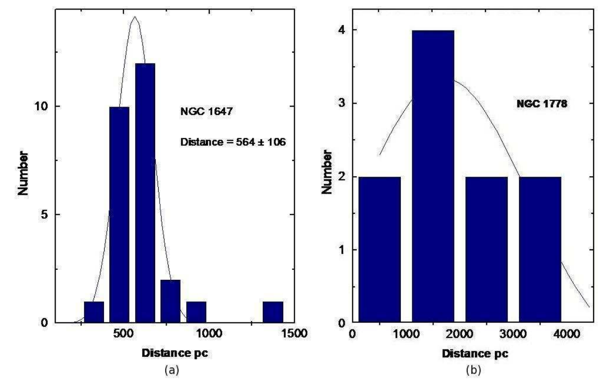

Fig. 1. Histogram of the distances for the stars in the direction of NGC 1647 (a) and in the direction of NGC 1778 (b). Solid line is a Gaussian fit to the data.

NGC 1778 observations are only for 16 bright stars and have not reached to the cluster MS which is fainter due to observing limitations. Consequently, we don't have statistically significant data to derive any conclusion regarding this cluster. Based on earlier and deeper photometric study, it is clear that NGC 1778 is an open star cluster.

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