

Research Note

Discovery of an obscured globular cluster candidate in the bulge

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Abstract. The discovery of a previously uncatalogued extended object at $\alpha_{1950} = 17^h 21^m 50^s$ and $\delta_{1950} = -24^\circ 15' 44''$ is reported. The size ($d \approx 60''$) and appearance on the ESO R Atlas field 519 are similar to those of several reddened globular clusters found in the last two decades. This globular cluster candidate is projected on the bulge, at $l = 1.411^\circ$ and $b = 6.393^\circ$. Within the region 20° vs 20° centered on the Galactic nucleus direction, the object is located in the quadrant least populated by known globular clusters.

Key words: globular clusters: general – Galaxy: center

1. Introduction

The intrinsic number of globular clusters in the Milky Way is estimated to be ≈ 160 –200 (Harris & Racine 1979). Recent compilations indicate ≈ 150 observed globular clusters and globular cluster candidates (Webbink 1985; Djorgovski & Meylan 1993; Peterson 1993). Most of the missing clusters must be hidden by dust clouds in the bulge and disk directions.

In the last two decades many discoveries were reported, in particular in the bulge region (e.g. Terzan 1971a,b; Liller 1977; Terzan & Ju 1980; Djorgovski 1987). On the other hand some objects previously classified as open clusters rather turned out to be globular clusters, based on colour-magnitude diagrams (CMD) studies from deep CCD photometry like Rup106 (Buonanno et al. 1993 and references therein) and Lynga 7 (Ortolani et al. 1993).

The purpose of this letter is to call attention to a previously uncatalogued extended object which appears to be a good candidate for an obscured globular cluster. This finding was not by chance; in fact there are reasons to expect a globular cluster in the part of the sky where the object was found, as explained in Sect. 2. In Sect. 3 the object is presented and described. The concluding remarks are given in Sect. 4.

2. Missing clusters: where?

Obscured globular clusters (or candidates) have been discovered for various reasons. Systematic searches on R and I plates throughout the bulge region led Terzan (1971a,b) to find out the brightest ones. A deep search in the Sagittarius cloud B yielded the discovery of a few faint candidates, as well as obscured planetary nebulae and galaxies (Terzan & Ju 1980). The very reddened cluster UKS1 was found on an I Schmidt plate (Malkan et al. 1980), whereas the moderately reddened ESO452-SC11 was found in the systematic ESO/Uppsala southern Sky Survey (SS) of extended objects carried out on B plates (Lauberts 1982 and references therein). On the other hand Liller 1, one of the most reddened globular clusters known to date, was found in a search for optical counterparts of X-ray sources (Liller 1977). Djorgovski (1987) searched for globular clusters by looking at optical counterparts of IRAS sources.

The fact that induced the discovery of the present object was the angular distribution of globular clusters in a region 20° vs 20° centered on the Galactic nucleus direction (Fig. 1). The bright globular clusters are distinguished from the faint ones (mostly identified during the 70's and 80's). The number of clusters in quadrants Q1, Q2, Q3 and Q4 are respectively 7, 16, 8 and 13. Although numbers are small, two remarks are worth: (i) Q1 and Q3 are considerably depleted of clusters as compared to Q2 and Q4; (ii) Q1 has fewer faint clusters than Q3. Q1 is more uniformly obscured as compared to the other quadrants, in particular by the presence of a nearby dust complex which is located $\approx 2^\circ$ south-east of the star θ Oph (see Sky Survey field 520 for the thickest part of this dust cloud). The most populated quadrant Q2 is the one least affected by dust, in particular it contains the Baade Window (SS Field 456). The dust distribution in Q3 is more patchy than in Q1, which could explain why more faint clusters have been identified therein. Alternatively, patchy dust distributions might have directed previous searches to Q2, Q3 and Q4. Contrarily, the present cluster candidate was found in a inspection of ESO R fields in the quadrant Q1. The object was found out in field 519.

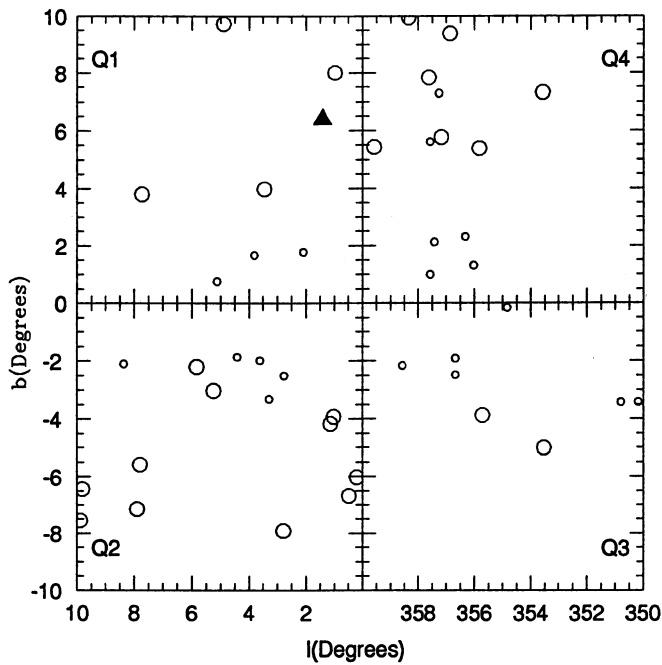


Fig. 1. Distribution of globular clusters in galactic coordinates for a box 20° vs 20° centered in the direction of the Galactic nucleus. Large circles are bright clusters and small circles are faint ones mostly discovered in the 70's and 80's; the dark triangle is the present candidate. Quadrants Q1 to Q4 are labeled

3. The object

A photographic reproduction of the object region in the ESO R Atlas field 519 is shown in Fig. 2. The position of the object was obtained from the neighbouring bright stars SAO 185374 ($V=6.3$, K0, $\alpha_{1950} = 17^h 22^m 02.7^s$, $\delta_{1950} = -24^\circ 11' 59.4''$) and SAO 185401 ($V=4.3$, F0, $\alpha_{1950} = 17^h 23^m 18.8^s$, $\delta_{1950} = -24^\circ 07' 52.1''$), resulting $\alpha_{1950} = 17^h 21^m 50^s$ and $\delta_{1950} = -24^\circ 15' 44''$). The corresponding Galactic coordinates are $l=1.411^\circ$ and $b=6.393^\circ$. This extended object is not listed in catalogues of open or globular star clusters, planetary nebula and galaxies (e.g. Alter et al. 1970; Perek & Kohoutek 1967; Lauberts 1982; Webbink 1985).

Although it cannot be ruled out with the available data that the object is a planetary nebula or galaxy with a superimposed field concentration of stars, its appearance strongly suggests that one is dealing with a star cluster, in particular a globular cluster. It is approximately circular, moderately concentrated and partly resolved into stars. It is similar to several faint obscured globular clusters with marginally resolved red giants, which are estimated to be in the central parts or in the opposite side of the Galaxy (e.g. Liller 1, Ter 4, Ter 6, UKS 1 in Webbink 1985). A detailed inspection of the corresponding images on the ESO R Atlas indicated that the present object would be more readily interpreted as a globular cluster than Liller 1, TJ23, UKS 1, Djorg 1 and TJ 5; it is as conspicuous as the faintest Terzan clusters (Ter 4,6,9 and 10) and TBJ3=TJ13.



Fig. 2. Photographic reproduction of the object region from ESO R Atlas field 519. The bright star NE of the globular cluster candidate is SAO 185374 with $V=6.3$

4. Concluding remarks

The discovery of an extended object in the ESO R Atlas field 519 is reported. Its appearance and size suggest a candidate for a reddened globular cluster. The object is projected on the bulge quadrant which is least populated by known globular clusters. It is an interesting target for future deep CCD photometry in order to check the possible globular cluster nature by means of CMD and structural studies. Many other interesting uncatalogued extended objects such as obscured globular clusters, planetary nebulae and galaxies might be identified in a systematic inspection of R and especially I Sky Survey fields in the bulge and disk directions.

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