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NSV 12597 AND RX J1957.0+2005

NSV 12597 = 59.1928 Sagittae was discovered by Baade (1928) as a variable star of unknown type in the range 15^m0-16^m7 . The NSV catalogue (Kukarkin et al. 1982) lists type E for this object. The source of this information is unknown, however: we could not find any other publication on NSV 12597 than the one of Baade (1928). So, the statement E may be a private communication or possibly a misprint.

Unfortunately, no finding chart was given, and the published coordinates transform to

$$\text{R.A.} = 19^h57^m01^s.4, \text{Dec.} = 20^\circ05'53''.$$

(equinox 2000.0). This is about $7''$ north of the eastern star of the unresolved pair denoted with “v” in Figure 1. This unresolved pair has a brightness of $B \approx 17^m$ on the blue sensitive Sonneberg plates, and $R \approx 14^m.5$ ($B-R \approx 2.2$) on the POSS plate E372 taken in 1951. (Neither B nor R magnitudes given here are “international” values, they rather mean blue and red sensitive photographic magnitudes.)

We checked 310 archival plates of the 400/1600 mm and 400/2000 mm Sonneberg astrographs (limiting magnitude $\approx 18^m$) and 190 plates of the astrograph 170/1400 ($\approx 17^m$) for variability of NSV 12597. Though difficult to investigate because of its faintness, this star (pair) seems to be slightly variable between about $16^m.5$ and 17^m (B band) during the time span 1938–1995. Occasionally, we find indications of flat waves (≈ 40 days) of small amplitude (< 0.3 mag). We do not find eclipses, but given the typical exposure times of 20 min. eclipses might easily be undetectable in our data if they are of short duration and/or of small amplitude. Though we did not observe any typical flare, the red colour indicates the possibility that Baade observed a flare-up of NSV 12597.

We got interested in NSV 12597 due to the nearby X-ray source RX J1957.0+2005 discovered during the ROSAT all-sky survey. This X-ray source with best fit coordinates

$$\text{R.A.} = 19^h57^m02^s.6, \text{Dec.} = 20^\circ05'14'',$$

(2σ error of $\pm 30''$) was found at a countrate of 0.039 ± 0.010 cts/s. The hardness ratios $\text{HR1} = (N_{52-201} - N_{11-41}) / (N_{11-41} + N_{52-201}) = -0.35 \pm 0.30$ (where N_{a-b} denotes the number of counts in ROSAT’s position sensitive proportional counter between channel a and channel b) and $\text{HR2} = (N_{91-200} - N_{50-90}) / N_{50-200} = 0.42 \pm 0.64$, though admittedly purely constrained due to the low number of counts, are consistent with coronal emission from a late-type star. Thus, the brightest object inside the X-ray error circle (see Fig. 1), with $B \approx 13^m$ and located at $\text{R.A.} = 19^h57^m03^s.1, \text{Dec.} = 20^\circ05'10''$ is a viable counterpart candidate nearly independent of its spectral type. Only spectral types later than about M0 are less probable due to their implied low X-ray to optical flux ratio, and their intrinsic colours being redder than the $B-R \approx 1.5$ of this $B \approx 13^m$ star.

A check of this $B \approx 13^m$ star on the same plate material as described above revealed no hint for any kind of variability. This makes a possible mis-identification of this $B \approx 13^m$ star with NSV 12597 rather unlikely.

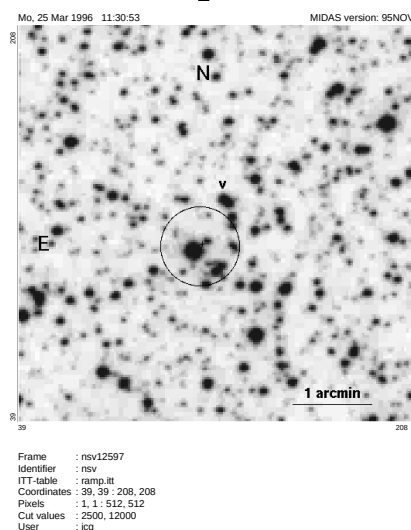


Figure 1. A finding chart showing the position of NSV 12597 on the E band Palomar Observatory Sky Survey plate. “v” marks the pair of stars, the eastern of which is thought to be NSV 12597. The circle marks the 30'' error radius around the X-ray position (cross) of RX J1957.0+2005.

NSV 12597 is about 45'' off the position of RX J1957.0+2005. With the present knowledge we think that NSV 12597 is unrelated to this X-ray source and that the $B \approx 13^m$ star is the optical counterpart of RX J1957.0+2005. Spectroscopic observations of this $B \approx 13^m$ star in the X-ray error box as well as of NSV 12597 are needed to prove our conclusions and to determine the type of NSV 12597.

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