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ON THE LOCATION OF NOVA CORONAE AUSTRINAE 1981

In a recent communication Caldwell (1981) proposed, on the basis of U, B, V, R, I photometry of the outburst, that the distance to this nova ought to be of the order of 8 kpc., putting the object on the near side of the galactic bulge. This note points out that this outburst could well have happened on the far side of the bulge with respect to the Sun.

Two additional pieces of evidence should be considered when trying to understand the location of the present outburst. Firstly, stars from Klare and Neckel (1977) within 5° from the nova position, have $A_v \cong 0.3$ while being at an average distance to 500 pc. Secondly, at the accurate position given by Gilmore (1981) there is no image brighter that $m_r \cong 19$ on the red extension of the Palomar Sky Survey.

Brosch (1981) has shown, from spectrophotometry of the Balmer lines in Nova CrA 1981 one week after its discovery, that the extinction towards the object is $A_v = 1.7$ mag. The line of sight towards the nova leaves the extinction layer of dust in the galactic plane rather quickly, the nova being at $b \cong -14^{\circ}.4$. With this angle a distance of 500 pc. paces out just about one scale height of extinction (Allen, 1973). Therefore most of the extinction towards the nova (1.4 mag. at V) should be produced by material in its "immediate" vicinity. Should the nova be located on the near side of the bulge, the way to produce this effect is by having dust grains near the pre-nova system. This would however have become evident in the measurements carried out by Vrba and Rydgren (1981), as an infra-red signature of the outburst. The second obvious possibility is that the nova was located beyond the galactic bulge, and then material in the bulge would be responsible for the additional extinction.

A simple exercise is characterizing the outburst points towards a remarkable similarity to Nova Cygni 1975 (which has been remarked also by

Busko et al., 1981), and to CP Pup. The points in common are,among others the velocity of ejection (2.2. 10^3 km.s^{-1}, from the width of the Balmer lines), the smooth and fast decline (see Figure 1 and compare with Duerbeck, 1981) and the lower limit of outburst range ($m_{prenova} - m_{max} \gtrsim 12$). The absolute magnitude for both these objects at maximum was brighter than -10. A bright maximum magnitude is obtained also when comparing with data in Duerbeck (1981). The light curve of the present outburst is clearly of his type A, implying that the nova belongs to his group I. The objects in this group have an absolute magnitude at maximum of $M_V = -9.4 \pm 1.0$, implying a distance of 9 ± 5 kpc.

Adopting an absolute magnitude of -10. at maximum for Nova CrA 1981 produces the following distance estimate:

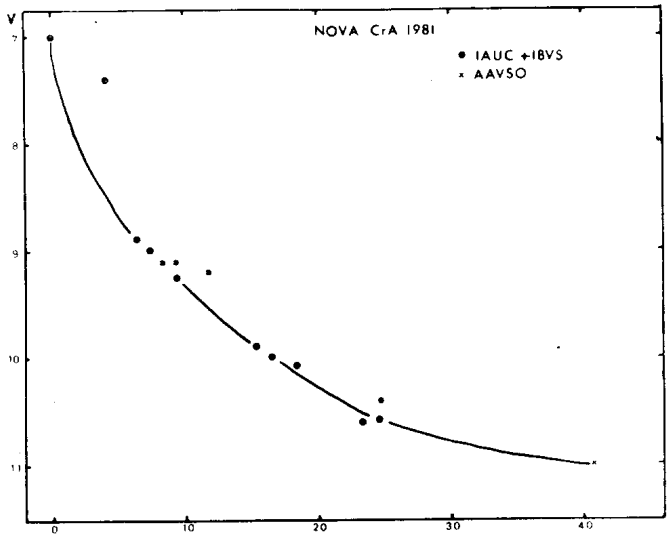

Figure 1

$$D = \mathrm{dex}\left[\frac{m - M}{5} - \frac{A_V}{5} + 1\right] = 12 \text{ kpc} \quad .$$

This puts the object in the galactic bulge, on the far side from the Sun, and makes it simpler to obtain the required amount of extinction, in this case from bulge material.

Thus a location behind the galactic bulge is not inconceivable and at least as easy to explain as the nova being in front of the bulge. The final settlement of this question shall however rest until a nebular parallax to the nova will be measured.

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