INTRIGUING FEATURES OF THE OUTBURSTING YOUNG STAR IRAS 20568+5217.

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The variable reflection nebula in the Cygnus OB7 molecular cloud, associated with IRAS 20568+5217, is studied. Optical images of the field including this object, were obtained using in 2006 SUPRIME-CAM on the SUBARU 8 m telescope. Data through narrow band Hα and [S II] filters and broad band R and I filters were acquired. Additionally, near-infrared observations of the same region were made, again in 2006, using WFCAM on the UKIRT 3.8m telescope. A narrow band v=1-0 S(1) molecular hydrogen filter (2.122 microns) and broad band J, H, and K filters were used.

We have compared our new images with both the Palomar Digital Sky Surveys DSS-1 and DSS-2 and find that the IRAS 20568+5217 nebula is invisible on the earlier DSS-1 plates (taken in 1953), only faintly visible on Quick-V plates (taken in 1983) (see Fig.1) yet significantly brighter on the DSS-2 plates (taken in 1990). During the period 1983 to 1990, the optical brightness of the stellar source located centrally in the reflection nebula and designated HH 381-IRS, increased by $\sim$2.5 magnitudes (Fig.2).

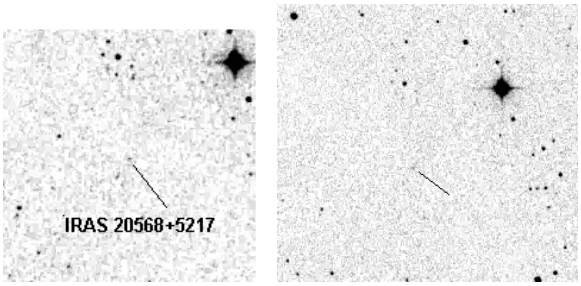

Figure 1: DSS1(red),1952 - left, Quick-V(yellow),1983 - right

The highly significant fact is that an infrared K-band spectrum of this object, obtained in 1996 by Reipurth and Aspin (1997), shows it to be very similar in characteristics to FU Orionis, BBW 76, and L1551-IRS5 suggesting that this star is closely related to FUOr type outburst objects.

This star is the likely exciting source for several HH objects, including HH 382 and, perhaps, several knots of HH381 (Devine et al, 1997). We have found that it is most likely the energy source of several additional HH objects, which we have discovered on our images. Our conclusion is that this source is, in fact, driving a very large parsec-scale bipolar outflow in N-S direction of total extent about 6 pc. Besides, a tiny emission knot (or jet) in the northern direction on a distance 2.2 arcsec (1200 a.u.) from the central star was found.

A long-slit optical spectrum of this object, obtained on the SAO 6 m telescope in Russia in 2007, confirms that it is a pre-main sequence object and is the driving source of the intensive bipolar optical outflow. The strong emission lines of Hα, [OI], [NII], [SII] as well as absorptions of Li I and BaII blend are observed. Hα line has a complex profile, which includes an absorption component with radial velocity about -400 km/s and FWHM about 150 km/s. The velocities of other lines are shown on Fig.3. The very interesting feature is the much lower negative velocity of [SII] lines (and probably [OI] lines as well) in the star spectrum compared to higher excitation emissions.

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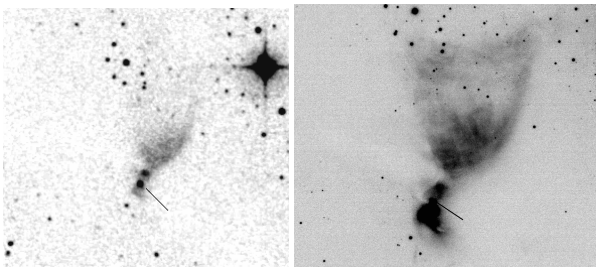

Figure 2: DSS2(red),1990 - left, SUBARU(R),2006 - right

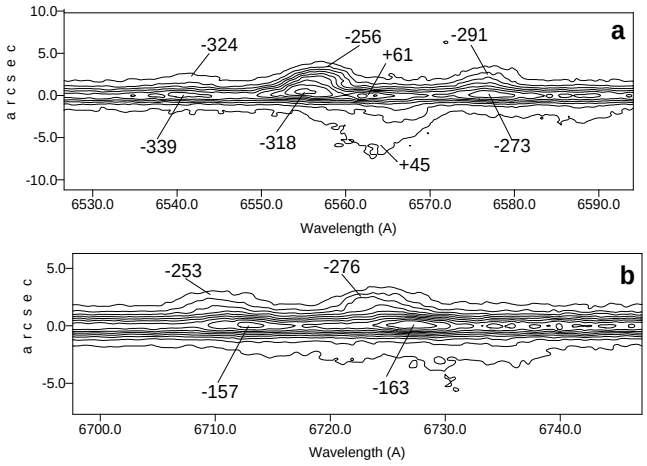

Figure 3: Isolines of the parts of long-slit spectrum of IRAS 20568+5217: Hα and [NII] region (a), [SII] region (b)

References

Devine D., Reipurth B., Bally J., 1997, in *Low Mass Stars Formation - from Infall to Outflow*, poster proceeding for IAU Symp. N 182, eds. F. Malbet and A. Castets, Observatoire de Grenoble, p. 91

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