

## SERPENS - SVS20: A NEW INFRARED DOUBLE SOURCE

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**ABSTRACT.** 0.9  $\mu\text{m}$  CCD images and 2.2  $\mu\text{m}$  slit scan observations reveal the double character of the infrared source Serpens - SVS20; the separation, position angle and brightness ratio are  $1''.6$ ,  $10^\circ$ , and  $\Delta m \approx 1.6$  mag respectively. The southern source is the brightest at both spectral ranges. At 0.9  $\mu\text{m}$  the observed polarization of each component is  $p = 9.0\%$ ,  $\theta = 155^\circ$  and  $p = 10.4\%$ ,  $\theta = 135^\circ$  for SVS20-South and SVS20-North respectively. These results combined with 2.2  $\mu\text{m}$  polarimetry and JHKLM photometry suggest that both SVS20 sources are in fact low mass, probably PMS, stars.

### 1. INTRODUCTION

The Serpens cloud is an active star formation region in which a high number of young objects, IR-sources with  $\text{H}_2\text{O}$  masers, molecular outflow, etc., is found. We are now carrying out an extensive observational study of this region, by means of CCD and near infrared techniques. In this work we report about our results in one of the most interesting Serpens objects: the IR-source SVS20 (Strom et al., 1976, Churchwell and Koornneef, 1986), which is thought to be a low mass PMS star.

### 2. OBSERVATIONS AND MAIN RESULTS

The 3.5 m and 2.2 m telescopes of the Calar Alto Observatory, Spain, were used to realize the following observations: 0.9  $\mu\text{m}$  CCD direct images and polarimetry; 2.2  $\mu\text{m}$  slit scan and polarimetry; JHKLM photometry and 2-4  $\mu\text{m}$  CVF spectralphotometry. The main results of these observations are:

a) Both CCD images and slit scan observations clearly show that Serpens - SVS20 is a double source. An isocontour plot of the CCD image and the 2.2  $\mu\text{m}$  visibility data are shown in Fig. 1 and 2. At both wavelengths the brightest source is the southern one (SVS20-South); the separation and the brightness ratio are  $1''.6$ , NS direction, and  $\Delta m \approx 1.6$  mag respectively. A position angle of  $10^\circ$  is seen in the CCD frame.

- b)  $0.9 \mu\text{m}$  polarization values of each source are:  $p = 9.0 \%$ ,  $\theta = 155^\circ$  (SVS20-South), and  $p = 10.4 \%$ ,  $\theta = 135^\circ$  (SVS20-North). The integrated SVS20 polarization ( $6''$  beam) at  $2.2 \mu\text{m}$  is  $p = 2.6 \%$ ,  $\theta = 158^\circ$ .
- c) The SVS20 near infrared fluxes ( $6''$  beam) can be reasonably fitted by a black body of 960 K. This is also the colour temperature of each individual SVS20 source.
- d) The  $2\text{--}4 \mu\text{m}$  CVF spectrum ( $6''$  beam) of SVS20 shows the  $3.1 \mu\text{m}$  ice absorption feature,  $\tau \approx 1$ .

### 3. DISCUSSION

The observed separation between both SVS20 sources corresponds to a projected distance of 400 AU, assuming a distance of 250 pc for the Serpens cloud (Chavarría et al., 1987). One interesting point concerns the nature of the sources. Three possibilities are discussed: a) both sources are stars, b) both are knots of nebulosity, and c) one of the sources is a reflection nebula illuminated by the other. Taking into account all the results reported above, the first possibility seems most probable. Lower and upper limits of the luminosity of each star can be deduced from our observations and from the FIR measurements of Harvey et al. (1984). We obtain  $L$  (SVS20-South)  $\gg 5.5 L_\odot$ ,  $L$  (SVS20-North)  $\geq 1.3 L_\odot$ , and  $L$  (SVS20-South + SVS20-North)  $\leq 45 L_\odot$ .

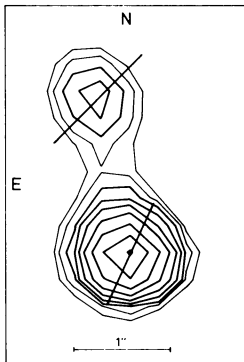


Figure 1: Isocontour plot of Serpens-SVS 20 ( $\lambda = 0.9 \mu\text{m}$ ) logarithmic spacing by  $\sqrt{2}$ . The lines represent the  $0.9 \mu\text{m}$  polarization. North is up, and East to the left

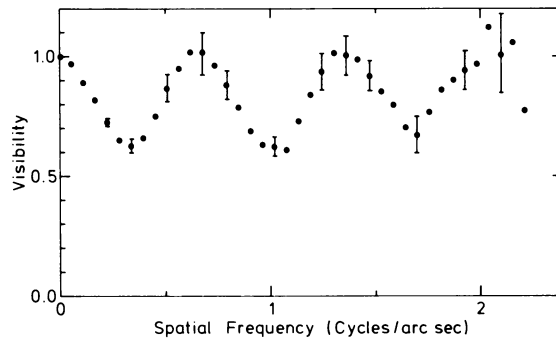


Figure 2. Visibility data of Serpens-SVS 20 at  $2.2 \mu\text{m}$  Error bars are  $1\sigma$ .

### REFERENCES

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