

STUDY OF BOK GLOBULES WITH SMALL TELESCOPES

P.V. Kulkarni, M.R. Deshpande, U.C. Joshi and
A.K. Kulshrestha
Physics Research Laboratory
AHMEDABAD-380 009, INDIA

ABSTRACT. Polarization of radiation in the UVBRI spectral bands of the stars in the vicinity of four Bok Globules/dark clouds is observed with 1.5 and 1 m telescopes. Moderate to high degree of polarization and alignment of polarization vectors indicate the possibility of frozen magnetic fields. Other possibilities for retarding the cloud collapse have also been pointed out.

With IRAS satellite discovering a few hot regions/young stars in the BOK Globule B-5 and in some more dark clouds it is now necessary to observe more such objects for their better understanding.

We have studied four such globules by measuring polarization in UVBRI spectral bands of stars in their vicinity. Table I summarizes the data.

Table I. Polarimetric observations on stars in the vicinity of Bok Globules

Globule	Observed in	Place, Telescope	Filters	No. of stars	Ref
B-361	Sep '82	Tenerife, 60"	UVBRI	10	R1
B-5	Jan '84	Mt.Catalina, 61"	UVBRI	24	R2
L-1534	Feb '85	Kavalur, 40"	(Ga-As)	28	-
L-134	Apr '85	Nainital, 40"	(Ga-As)	25	-

R1: Williams, I.P. et. al., *Mon. Not. R. astr. Soc.* (1985) 212, 181

R2: Joshi, U.C. et. al., *Mon. Not. R. astr. Soc.* (1985) 212, 275

Data acquisition systems attached to all polarimeters were microprocessor based. I, Q, U, V, the Stoke's parameters could directly be calculated. From these, percentage of plane polarization P and angle of polarization θ for each star along with their probable errors were printed on-line. Figure 1 shows the plots of P_s , the polarization

vectors, on stars. Length of \underline{P} is proportional to % polarization and its inclination is East of North.

Results obtained on the four globules are shown in Table II.

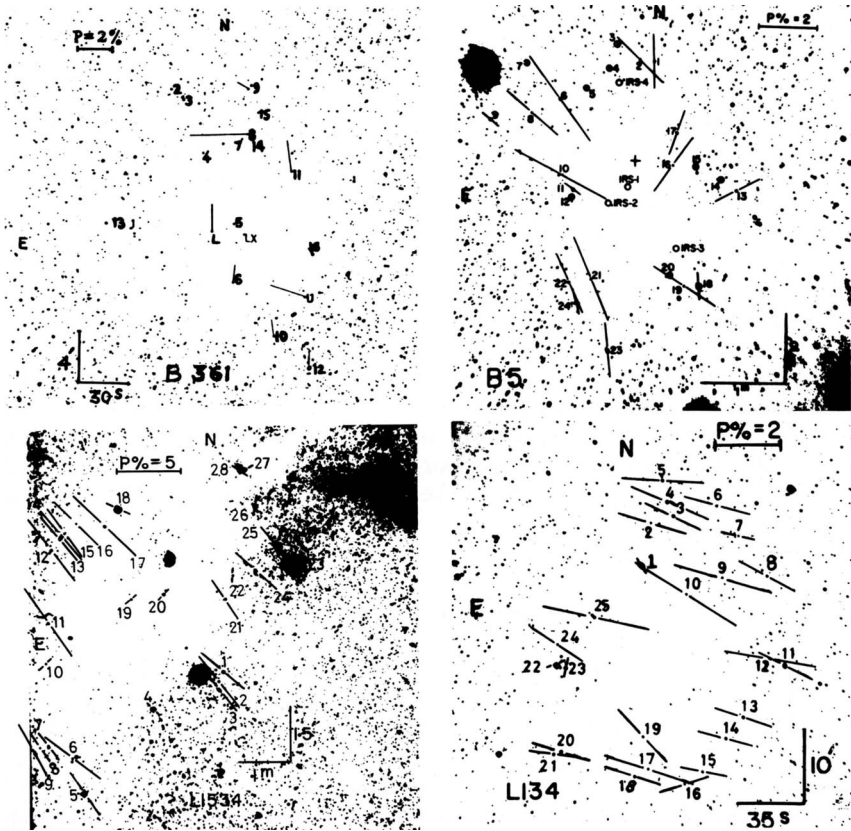


Figure 1.

Table II. Percentage of polarization and the alignment of \underline{P}_s .

Globule	Polarization	Alignment	Direction*
B-361	maximum 2%	Poor	-
B-5	" 2%	Fair	-
L-1534	" 6%	Very good	$0 \pm 15^\circ$
L-134	" 2%	Very good	$30 \pm 10^\circ$

* Average direction of \underline{P}_s with respect to the galactic plane.

Alignment of \underline{P}_s in L-1534 and L-134 is quite high, however magnitude of \underline{P} in L-1534 is unusually high. Four stars which may belong to another globule(s) in L-1534 show \underline{P}_s at right angles to those of other stars. No hot spots are detected in L-1534 and L-134. The direction of \underline{P}_s in L-1534 is along the galactic plane and in L-134 tilted by 30° to it. The high degree of alignment suggests the frozen magnetic field aligning the grains.

Other factors which may retard the gravitational collapse are (a) rotation of the cloud, and if there is an embedded star near the cloud centre, (b) stellar wind with outward plasma flow or (c) a torus with a magnetic field due to the central star.

DISCUSSION

Graham: Have you observed any foreground stars outside the field of the globules to see if the alignment still persists?

I would worry that this effect is a characteristic of the field and not the globules.

Kulkarni: There aren't many foreground stars (1 or 2) but they generally have less polarisation than the globules.