THE WAVELENGTH DEPENDENCE OF POLARIZATION IN NGC2023

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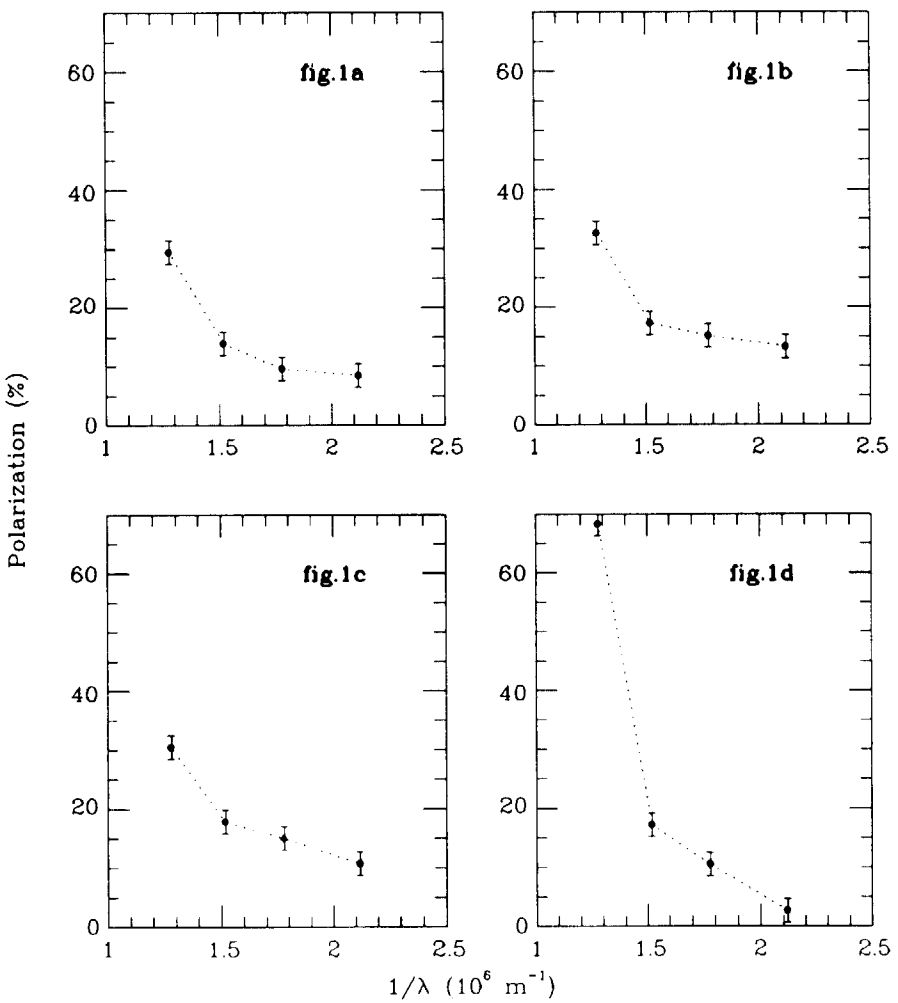
NGC2023 is a bright reflection nebula illuminated by the central star HD37903. At 2 microns the nebula is seen solely by reflected light from the central star but in the NIR there is excess radiation that is supposed to arise from thermal emission from a population of small grains (Sellgren, 1984). The unexpectedly high surface brightness at R and I wavelengths has led to the suggestion that even at these wavelengths there is a significant contribution from this thermal emission process (Witt, Schild and Kraiman, 1984).

If the nebula is seen by reflected starlight then this radiation will be linearly polarized. The level of polarization depends on the scattering geometry, grain size distribution etc and is typically 20-40% for nebulae such as NGC1999 which is morphologically similar to NGC2023. If, in any waveband, there is a contribution of radiation from emission processes this radiation will be unpolarized and will serve to dilute the scattered radiation to give a lower level of observed polarization. A study of the wavelength dependence of polarization in nebulae in which there may be thermal emission from grains will indicate the contribution from this process to the total luminosity.

We have produced polarization maps in BVRI wavebands for the NGC2023 nebulosity which confirm that at all wavelengths it is a reflection nebula illuminated by a central star. In fig.1 we show the wavelength dependence of polarization at representative points in the nebula and in fig.2 a scatter plot of polarization in V and I wavebands at all points at which we have measurements is given.

Our results indicate that throughout the nebula there is a general trend for the level of polarization to increase with wavelength and that maximum levels of polarization occur at the longest wavelengths. We see no evidence in our data for any significant contribution from the thermal emission from grains in the BVRI luminosity of NGC2023.

Sellgren, K.: 1984, Astrophys.J. 277, 623
Witt, A.N., Schild, R.E. and Kraiman, J.B.: 1984, Astrophys.J. 281, 708



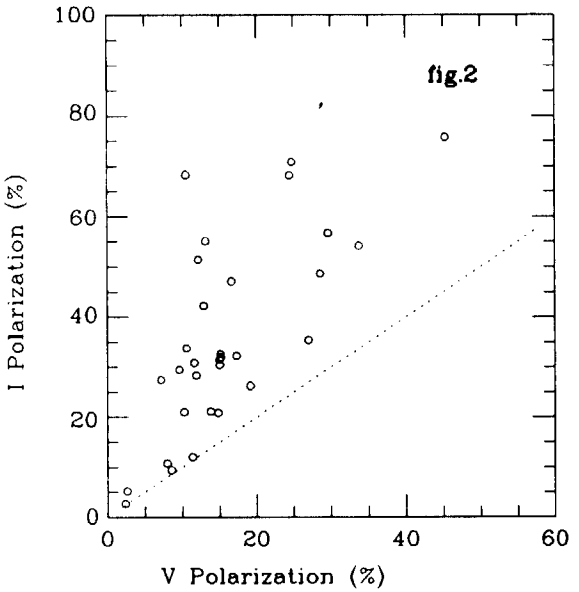


Fig.1 : Wavelength dependence of polarization
a 75 arcsecs SE of HD37903
b 100 arcsecs NE of HD37903
c 150 arcsecs SE of HD37903
d 200 arcsecs NW of HD37903

Fig.2 : Scatter plot of polarization in V and I wavebands.