

SOME HYPOTHESIZED OBSERVATIONAL ASPECTS OF MAGNETIC FIELDS IN
PROTOPLANETARY NEBULAE

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ABSTRACT. Polarization mapping of some reflection nebulae (e.g., NGC 6729) reveals parallel bands of polarization vectors across pre-main sequence stars (Ward-Thomson *et al.* 1985, *Mon. Not. R. Astr. Soc.*, 215). These authors have suggested a model in which the bands would be explained by dust discs, the grains being aligned by toroidal magnetic fields $\sim 10^2 \mu\text{G}$.

Although the nebulae associated with pre-main sequence stars and the protoplanetary nebulae PPNS (associated with most evolved stars) be morphologically distinct objects, some likeness appeared in evidence from an inspection of the centro symmetric pattern of polarization (CPP).

Besides the substantial amount of polarization ($\sim 10 - 40\%$), produced by the reflection of the light star continuum on aligned (or not) grains throughout the nebula (Cohen, *Proc. IAU Symp. No. 103*, 1983); some part remains ($\sim 2-3\%$), which can be approximately represented by parallel bands of polarization vectors in an essentially perpendicular direction to the major axis of the PPN (small departure from the CCP or ellipticity of the CCP: Aspin and Mc Lean, 1984, *Astron. Astrophys.*, 134; King *et al.* 1985, *Mon. Not. R. Astr. Soc.*, 213).

Without neglecting the conclusions of these authors (presence of a central object not point-like, but elongated along the minor axis of the nebula); we propose another and new interpretation assuming a (toroidal) magnetic field within the PPN.

Some support of this can be drawn from the Reid *et al.* observations (1979, *Ap. J.*, 227) of a M-type star (U Ori) embedded in a OH maser region.

Indeed, a strong circular polarization, interpreted to be a result of the Zeeman effect, indicate magnetic field strengths ~ 10 milligauss in the masing region.

Theoretical results have been published (Pascoli, *Astron. Astrophys.*, 1987, in press) showing the peculiar morphology of PPNs (and planetary nebulae) as a direct consequence of an internal toroidal magnetic field. New matter (origin and geometry of this fossil magnetic field convectively ejected from the Red Giant progenitor) has also been discussed and will be subsequently published.

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