Polarization Variability in Isolated T Tauri Stars

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TW Hya and V4046 Sgr are two 'isolated T Tauri stars', in the sense that they are located far from any known dark or molecular cloud. TW Hya shows light variation with a 2.195 day period. The observed amplitudes in different wavelength bands suggest that the light variation is caused by the rotational modulation of hot regions (spots) on the stellar surface. We have found V4046 Sgr to have a 2.44 day photometric period. Observations of these objects over several seasons show that quite often they exhibit irregular light variations also.

As part of an ongoing program of polarimetric studies of T Tauri stars, TW Hya was observed in *UBVR* bands on nine nights and V4046 Sgr was observed in *BVR* bands on two nights with the 2.3 m Vainu Bappu Telescope at Kavalur during 1990–1992 with the PRL-polarimeter. The linear polarization ($P\%$) and position angle (θ°) obtained for TW Hya show large variations. The polarization observed on 24 March 1992 in B band was $\sim 3\%$, whereas those observed on other occasions were less than or close to 1%. The polarization does not show any appreciable dependence on wavelength on most of the occasions and hence the mechanism for polarization is most likely dust grain scattering. It is noticed that the position angles observed on two consecutive nights differ by $\sim 80^\circ$. There are observational evidences which show that TW Hya has active accretion disk. The rotation of the star would cause a variable illumination of the circumstellar material resulting in a net polarization.

V4046 Sgr is a classical T Tauri star with strong spectral emission features. It has a photometric period of 2.44 days. The polarization measurements were made for V4046 Sgr on 18 May 1991 and 15 March 1992. The position angles observed on these two nights remained more or less the same. But the wavelength dependence of polarization observed on 15 March 1992 was steeper than that observed on the other night. The mechanism of polarization in V4046 Sgr may be nonuniform illumination of its circumstellar envelope by a rotating spotted star.

A clear picture of the mechanism that causes the changes in polarization and position angle in stars with hot spots can be obtained by simultaneous photometry and polarimetry over a few rotation periods. These stars have active accretion disks and due to the accretion through the boundary layer hot spots are produced on the stellar surface. Polarimetric observations will help us to study the nature of the accretion disk, like the possibility of inhomogeneities in the accretion disk.

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Angular Diameter of Carbon Star TX Piscium from Lunar Occultation Observations in the Near Infrared

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A program of High Angular Resolution observations of stars and their circumstellar regions using the technique of lunar occultations in the near infrared has been initiated