

FABRY-PEROT INTERFEROGRAM PROFILES IN $\lambda 5303$ IN RELATION TO
CORONAL STRUCTURES : 1980 AND 1983 ECLIPSES

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ABSTRACT. Fringe profiles of Fabry-Perot interferograms taken in the $\lambda 5303$ line during the total solar eclipses of 1980 and 1983 are studied in relation to coronal structures observed in white-light pictures. Evidence for doppler-shifted discrete components and large random velocity components in specific regions is presented here.

During the total solar eclipses of 1980 (INDIA) and 1983 (INDONESIA) Fabry-Perot interferograms were taken in the emission line $\lambda 5303$ using an etalon of FSR 4.69 Å and a finesse ~ 15 . The spatio-spectral information provided by the fringe profiles was compared with corresponding coronal structures as seen in white light, after careful orientation matching. Some interesting features that emerge are reported here.

i) Fringes observed in the 1980 eclipse show profiles in which the existence of doppler-shifted components are apparent, the largest observed being ~ 70 km/sec at a position angle of $\sim 285^\circ$ [Chandrasekhar et al 1981]. Such features are almost entirely missing in the 1983 eclipse [Fig. 1(a) & (b)].

ii) Interfringe spacings were carefully measured at many locations to observe dispersion velocities, the accuracies attained being ~ 6 km/sec. We find that the fringe peaks do not show velocity dispersion within this error anywhere. However, discrete doppler components with velocity shifts ranging up to 50-70 km/sec are seen in many regions. This suggests that doppler-shifted components are associated with discrete features in the coronal plasma.

iii) Interferograms for 1980 show fringes with low contrast ($\sim 5-8$) at many locations, in comparison with the expected value of ~ 20 for a 2.5×10^6 Kelvin gaussian line for this etalon. However, in specific locations (Fig.2) the contrasts do attain high

values close to those expected. For the 1983 eclipse, a good interferogram was obtained in a limited region (Chandrasekhar et al 1984) at a position angle $\sim 260^\circ$, where the contrast was high.

A comparison with white-light pictures show that the low values of contrast cannot be explained in terms of the contribution of the continuum; but they could be due to the existence of large random velocities (~ 70 km/sec) in these regions. It is significant that the profiles in these regions are usually quite broad at the base.

REFERENCES

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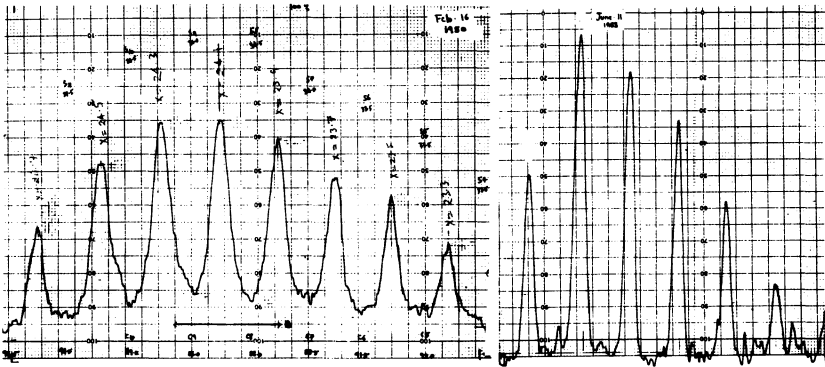


Fig. 1 : Microphotometer scans across interferogram fringes
 (a) 1980 eclipse: position angle 0° .
 (b) 1983 eclipse: position angle 260° .

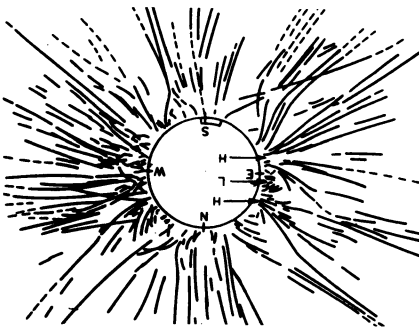


Fig. 2: Location of some high and low fringe contrast regions on the map of coronal structures for 16 Feb. 1980 eclipse. Structure map from Loucif M.L. and Koutchmy S. (1989).