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FINAL REPORT
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Be Stars:

Observations by OAO-A2 of two Be stars, 60 Cyg and Gamma Cas, have been analyzed to show that unpolarized radiation produced by Balmer continuous emission in the atmospheres of Be stars is significant in explaining the polarization observed shortwards of the Balmer discontinuity. The polarization in the UV in Be stars is relatively less than that in other stars, because of the added unpolarized energy produced by Balmer continuous emission in Be stars. The ratio of the energy flux (normalized at 2200A) of Be stars to normal B stars, with the same amount of reddening, varies from about 1.4 at 3600 A to 1.05 at 2500 A. This is interpreted as due to continuous emission in Be stars. For Gamma Cas the polarizations at 3300 A and 3600 A are respectively 0.6 and 0.7 of the values one expects from interstellar polarization. Neutral polarization produced by Thomson scattering and thence modified by both hydrogen absorption and Balmer continuous emission is adduced to explain the wavelength dependence of the observed polarization. These results are now in press (Coyne 1972).

In support of the OAO observations of Be stars, Coyne 1971 has published further ground-based observations of Be stars and has given the best mean values for the wavelength dependence of the intrinsic polarization in Be stars from 0.3 to 1.0 microns. Furthermore, in support of the OAO observations Coyne and Dyck (1972) have shown that the polarization for one Be star, Zeta Tau, shows an almost flat wavelength dependence from about 0.75 to 1.60

microns, where the polarization drops into the infrared. It will be interesting to know whether the Paschen discontinuity is responsible for the peculiar wavelength dependence of the polarization in the red-infrared as the Balmer continuous emission is responsible for the peculiar wavelength dependence of the polarization in the UV. Infrared polarimetric observations of Gamma Cas and 60 Cyg will be of interest in that regard.

Interstellar Polarization:

With respect to the interstellar polarization, all of the available multi-color polarimetry has been analyzed by us (Coyne, Gehrels, Serkowski 1972a, 1972b) and it has been shown that the wavelength, λ_{max}, at which the maximum polarization occurs is a characteristic parameter of the interstellar grains. Stars with large values of λ_{max} appear also to have abnormal wavelength dependence of the extinction. We are now analyzing the OAO photometric data in conjunction with ground-based photometric data for two stars, HD 37903 and Rho Oph, both of which have large values of λ_{max}.

References:

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