CIRCULAR POLARIZATION OF CYG X-1, SCO X-1 AND 3C 273

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Abstract. An attempt is made to detect polarization from Cyg X-1, Sco X-1 and 3C273.

In 1971 we suspected appreciable and variable circular polarization of X-ray sources 3C273 and Cyg X-1 (Nikulin *et al.*, 1971), but some subsequent sporadic observations made in 1972 have not confirmed these results (Gehrels, 1972; Kemp *et al.*, 1972).

Starting from January 1972 we have been observing systematically in two (B and V) colours the circular polarization of these objects at the Cassegrain focus of the 2.6-m Crimean reflector. To exclude the instrumental and seeing effects, we found it most important to measure the polarization differentially with respect to a comparison star having zero circular polarization. For the purpose of control the white dwarf Grw $+70°$ 8247 has been observed and we found the values of the polarization in B and V to be $P_B = -4.34 \pm 0.23\%$ and $P_B = -2.60 \pm 0.16\%$ which are in good agreement with values obtained by other authors (Angel *et al.*, 1972).

We have not found for 3C-273 any appreciable effect in V but in B on some occasions (February–April 73) the values of P_B reach -1.0% which is about the usual 3-σ value. On other occasions there are no such effects and we think that the circular polarization of the quasar 3C-273 can probably fluctuate as is the case for linear polarization.

The possibility of rapid fluctuations of circular polarization of X-ray sources follows also from our observations of Sco X-1, where fluctuations of polarization exceeding 3 σ appear on some nights (Nikulin *et al.*, 1971) accompanied by the flaring or fading of the brightness of the star, while on other nights there are no such fluctuations.

Measurements of P_B and P_V for Cyg X-1 during 25 nights show quite definite fluctuations of these values within the limits 0.0 and 0.3%, well above σ, and showing a kind of synchronism with Bolton's (1972) radial velocity curves; there is a tendency for polarization to disappear near extreme values of the radial velocity. There was also a marked change in the character of these fluctuations after the sudden disappearance of the secondary minimum in 1973 (Walker, 1973).

References

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DISCUSSION

A. M. Cherepashchuk: The total interstellar absorption for Cyg X-1 is about 3^m. How did you take account for interstellar polarization of this object?

V. M. Kuvshinov: The interstellar polarization does not exceed 0.05%; we used special equipment in order to account for it.

V. F. Shvartsman: What is the time resolution of your observations?

V. M. Kuvshinov: The length of the integration time is about 5 min.

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