ABOUT THE POSSIBILITY OF APPEARANCE OF A FALSE CIRCULAR POLARIZATION IN THE LIGHT OF SOLAR SYSTEM BODIES.

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Introduction: The purpose of this note is to put an attention of the researchers, who study the circular polarization V of the light of the Solar system bodies, on a possibility of emergence of a false circular polarization. The thing is that in the studies, aimed to measure the circular polarization (for instance [3], [4], [5], [6], [7], [9], [11], [12], [13], [14], [15]), the instrumental polarization was determined and taken into account, which arises from the transformation of the unpolarized light (I_0,0,0,0) to the elliptically polarized one (I,Q,U,V) by the optics of the telescope. At the same time, it was shown in [1] that, when the light with the polarization vector (I_0,Q_0,U_0,0) falls on the mirror, an additional partial transformation of parameter U_0 to

$$V' \approx -U_0 \sin\Delta ,$$

occurs, where Δ is a phase shift, which in that experiment was found to be 26°52', 19°48' and 14°07' at the wavelengths of 361, 544 and 750 nm respectively. Therefore during the observations, for example, in the Cassegrain focus (two mirrors) a false circular polarization may appear

$$V''(\alpha) \approx -2\, U_0(\alpha) \sin\Delta = -2\, P(\alpha) \sin 2\psi \sin\Delta,$$

phase dependence and sign of which are determined by the degree P(α) and plane ψ of the linear polarization (at $0 < \psi < 90°$ a right-hand circular polarization appears and at $90° < \psi < 180°$ – left-handed). Thus, in accordance with the data of [3] and [10], in the light of comet Halley and the Galilean satellites of Jupiter a $V''(\alpha) \approx -(0.1–0.2)\%$ may arise when $25° \le \alpha \le 40°$ and $\alpha = 0.5°$ respectively.

As the parameter U was detected in the light of several asteroids (eg. Hebe [2], Perega [16] and Tautatys [8]), the reality of the appearance of a false circular polarization can be verified with observations of asteroids with Stocks parameters (I,Q,0,0) and (I,Q,U,0).

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