

OPTICAL POLARIZATION OF SOLAR CORONA – PROGRAM FOR TOTAL SOLAR ECLIPSE ON AVUGST 11, 1999.

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Abstract. It is proposed to observe the linear optical polarization in the inner solar corona as well as to measure the global polarization of the eclipsed Sun.

1. INTRODUCTION

In spite of a reasonably good van de Hulst's (1950) theoretical model describing general characteristics of solar corona optical polarization, it is still not in a satisfactory agreement with a number of observational facts. Due to the coronal fine structure and its variability, the real corona differs from the spherically symmetric model. This is especially seen in a different height dependence of optical polarization degree along the solar limb as well as in the polarization variations as a function of solar activity cycle.

2. THE PROPOSALS

Measurements of coronal polarization during a total solar eclipse is a good opportunity to answer some of the still open questions. Besides of many interesting polarization problems in small-scale coronal structures (streamers, condensations,...) there is a need to observe some large-scale, even global-scale, aspects of optical coronal polarization. Here we suggest two kinds of such observations for August 11, 1999. They compromise between the importance of the problems and our modest instrumental possibilities.

First program. Observation of linear optical polarization within the inner corona, right down to the chromospheric border, in order to re-measure its quite steep radial gradient. A special attention will be paid to the height interval 1.2 to 1.4 solar radii above the solar limb to corroborate - or not - the existence of a plateau in the polarization degree as a function of height in corona (Kim et al., 1996). This plateau was not anticipated by van de Hulst's model.

Here we'll rely on a Zeiss refractor 6/80 cm, mounted equatorially, with a polarizing filter movable in 60-degree steps and on a CCD receiver which still has to be selected.

Second program. The aim is to measure global (integral) linear optical polarization of solar corona. This would be a continuation of our efforts to observe the Sun as a star and find a possible time-dependance of its optical polarization during a solar activity cycle (Vuletić et al., 1993).

The observation will be carried out with a very short focal length refractor containing a polarizing filter, a Fabry lens and a special diaphragm enabling in alternation the observations of the whole corona and of the selected near-by sky areas. The measurements will be done photoelectrically.

References

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