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1. The solar rotation study

Hα filaments were used as test tracers to examine the accuracy of an analytical method providing a simultaneous determination of the true angular rotation velocity (eliminating the projection effects) and the height of the tracer.

The above mentioned method was applied to microwave Low brightness Temperature Regions (LTRs) at 37 GHz registered at the Metsähovi Radio Observatory in the years 1979, 1980, 1981, 1982, 1987, 1988, 1989, 1990, and 1991. The LTRs have been divided in two classes: those associated in location on the solar disc with Hα filaments and the non associated ones. In total about 500 LTRs stood at disposal. It was found that the Hα filament associated LTRs originate about 10000 km higher than the non associated ones.

Changes of the solar differential angular rotation velocity during the activity cycle measured using LTRs as tracers are explained by the measured cycle-dependence of the association rate between LTRs and Hα filaments. Similarly, the north–south asymmetry in the solar angular rotation velocity measured using LTRs as tracers is explained by the measured north–south asymmetry in the association rate between LTRs and Hα filaments. A preliminary study revealed that about 60 % of the LTRs is cospatial with the so called pivot points of filaments, i.e., that LTRs reveal a rigid component of the solar rotation.

2. Specific solar flares

47 Z-flares (flares where a flare ribbon protrudes over a major sunspot umbra) were analysed with respect to the associated radiation in the radio wavelength range. The sequence of events in the radio range was studied relative to the time of "contact" (the time when the flare Hα ribbon starts to pertrude over the spots umbra) indicating that stronger magnetic fields become involved in the flare process. It was found that most often the microwave burst peaks at the time of "contact". Two categories of type III bursts could be disclosed: one appearing simultaneously at the time of "contact" and the other one preceding the "contact" by about 10 minutes. Further it was found that no type III bursts appear if the microwaves peaks before the time of "contact".

3. Instrumentation

In collaboration with the Astronomical Institute of the Czech Academy of Sciences, Ondřejov, the modernization of the double Solar telescope at Hvar Observatory started. A video system developed at Ondřejov consisting of a CCD camera, video recorder and a PC was installed to the Photospheric telescope and the first test measurements have been performed.

4. Publications

The Hvar Observatory Bulletin Vol. 21 containing the Solar research topics presented at the IVth Hvar Astrophysical Colloquium (1–4 July, 1997, Hvar) was published and distributed.

5. Collaboration

The long lasting collaboration with the Astronomical Institute Ondřejov, Astrophysikalisches Institut Potsdam, Kandilli Observatory, Solar Observatory Kanzelhöhe, Kiepenheuer-Institut für Sonnenphysik Freiburg, Metsähovi Radio Observatory and Astronomical Observatory Trieste was continued.

Several visits were realized (V. Ruždjak and B. Vršnak: Kanzelhöhe; B. Vršnak: AI Potsdam; V. Ruždjak: AO Trieste).

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