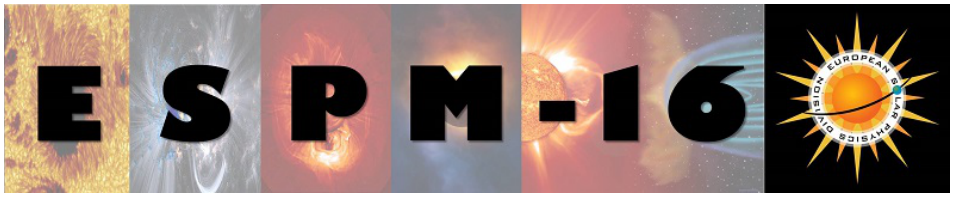

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Tilt Angle of the Magnetic-Field Axis of Sunspots from Microwave Observations: Method and Measurement Results

Thursday, 9 September 2021 09:26 (13 minutes)

We present our measurements of the tilt of the magnetic-field (MF) axis of sunspots, based on observations of the Sun with microwaves. In contrast to the methods that use **the coordinates of the maximum brightness** of radio sources located above the sunspots, the new method proposed by us uses measurements of its **brightness dynamics**. The method is based on a distinctive feature of the cyclotron radiation mechanism - strong suppression of radiation along the MF direction. For an "ideal" (stable, single, and regular) sunspot with a vertical MF, changes in radiation over time should be symmetric with respect to the moment when the sunspot passes through the central meridian of the Sun (PCM) with a **minimum brightness** at the moment of PCM. The **advance or lag** of the moment of the **minimum** relative to the **PCM** moment can be explained by the inclination of the MF axis to the photosphere surface. Testing of 10 active regions (ARs) of various morphological structures with the RATAN-600 radio telescope and the NoRH radio heliograph showed that in most cases (90%) the axis of the leading sunspot is inclined to the eastern limb and the angle does not depend on the AR morphology. The tilt values at the level of the lower part of the chromosphere –corona transition region are ~ 1–10° and demonstrates an increase with an increase in the height of the radiation source.

Student poster?

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