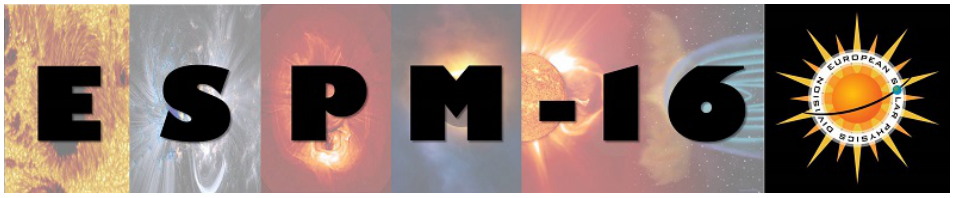

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Velocity Field Diagnostics of the Quiet Sun Using the Lambda-Meter Method: Si I 1082.7 nm Line

Wednesday 8 September 2021 17:48 (13 minutes)

The validity of the lambda-meter method for determining the quiet Sun velocity field using the Si I 1082.7 nm line is investigated. To this end, the intensity profiles of this line were calculated for the solar disk center by means of NLTE simulations in a three-dimensional model atmosphere describing the small-scale magnetic activity in the quiet solar photosphere. The velocity field recovered using the lambda-meter method from theoretical NLTE profiles of the Si I 1082.7 nm line was compared with the velocity field from the model atmosphere. The influence of atmospheric and instrumental effects on the results is considered. These effects are atmospheric turbulence and light diffraction by telescope aperture, such as VTT, GREGOR, and EST/DKIST. It is shown that in the case of observations of the Si I 1082.7 nm line on large-diameter telescopes like GREGOR and EST/DKIST with a spatial resolution substantially better than 0.27″, the lambda-meter method provides reliable values of the velocity field for the lower and upper solar photosphere. For the middle photosphere, the correlation between the inferred and the real velocities is worse, particularly when using the smaller diameter telescopes like VTT. Under a poor spatial resolution exceeding 2″, information about the velocity field can be obtained only for the uppermost photospheric layers. For this case, the lambda-meter velocities turn out to be noticeably smaller than the real values.

Student poster?

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