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Peer Review

Review of: "Improving Our Knowledge of the Solar Near-Surface Shear Layer: The Special Case of the Leptocline"

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Review on the article

“Improving Our Knowledge of the Solar Near-Surface Shear Layer:

The Special Case of the Leptocline”,

by Jean Pierre Rozelot, Alexander Kosovichev, and Irina Kitiashvili

The above article contains very interesting and important results, which I plan to refer to in my latest article, recently submitted to the journal "Advances in Space Research". In this article of mine, I obtained spectropolarimetric evidence in the D3 helium line that even in seemingly simple sunspots there can be very thin (spatially unresolved) directed upwards jets (‘fountains’) containing extremely strong magnetic fields and plasma ascent velocities up to 700 km/s. The obtained results can be explained by the assumption that these magnetic ‘fountains’ are associated with deeper subsurface layers of the Sun with faster rotation than the solar photosphere. This is in excellent agreement with the data of the authors of the reviewed article, which they presented in Figures 1-3. From these data, it is clear that in the leptocline region the rotation is indeed faster than in the photosphere. I was very pleased with this data reconciliation, and I am grateful to the journal editors for sending this material to me for review.

In my opinion, the introduction of the new term "leptocline" is quite justified. From Fig. 1, it is clear that there is indeed a quite obvious decrease in the angular velocity of rotation in the near-surface layers with a thickness of about 8 Mm. Regarding the suggestions for improving the design of the figures, I would advise the authors to make the lines on the graphs more contrasting and thicker, also using different lines (solid, dashed, and dotted) for a more confident separation of them in those

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places where they are adjacent on the graphs. As for the beautiful Fig. 3, it would be good to increase its contrast, also using lines not only of different colors but also with different hatching.

Another suggestion of mine for the future is that it would be good to obtain similar data in other spectral lines compared to those used on SoHO and SDO. It can be hoped that this will give new information, not identical to that presented in this article. However, I understand that this requires not only complex hardware solutions but also the accumulation of observational data over a very long time, since we are talking about the detection of very subtle spectral effects, heavily noisy with local and sporadic effects. Therefore, I do not declare this proposal as one that calls into question the value of the presented work, but only as a possible prospect for its continuation.

Sincerely,

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Declarations

Potential competing interests: No potential competing interests to declare.