

ON THE ORIGIN OF THE OPEN MAGNETIC FLUX PROBLEM IN HELIOSPHERE

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One of the important space weather questions is the problem of open magnetic flux (OMF) [1]: the presence of a significant difference between observed in situ and calculated (based on the remote measurements of surface solar magnetic fields in different observatories) values of the interplanetary magnetic field strength. Namely, the calculations give strength values 2-4 times lower, than the experimentally observed ones. There are some investigations [1-3] devoted to this issue, but it is not solved yet.

Recently [3] the results of a new study have appeared, where a special hypothesis was suggested to explain the OMF problem in observations at the Wilcox Solar (WSO) and Mount Wilson (MWO) observatories. The idea of this hypothesis is: because measurements in these two observatories have been made in the Fe I 525.02 nm spectral line and since this line is too sensitive to the magnetic field and has small value of low level excitation potential, then the measurements in this line should be significantly corrected. Observations in other observatories, where other spectral lines are used, demonstrate a less significant OMF problem.

However, some of the conclusions obtained in [3] are not obvious and rather controversial. In this study the new results based on the Stokesmeter measurements in different spectral lines with STOP telescope (Sayan solar observatory, SSO) are presented in connection with OMF problem. In some aspects they contradict to conclusions made in [3], what is probably connected with differences in observations at MWO and SSO. New investigations of the OMF problem are required.

REFERENCES

1. Linker J.A., Caplan R.M., Downs C. et al. The Open Flux Problem. *Astrophys. Journ.* 2017. V. 848, N 70. P. 11.
2. Linker J.A., Riley P., Downs C. et al. The Open Flux Problem: The Need for High Latitude Observations. *Bull. AAS.* 2023. V. 55, N 3.
3. Wang Y.-M., Ulrich R.K., Harvey J.W. Magnetograph Saturation and Open Flux Problem. *Astrophys. Journ.* 2022. V. 926, N 113. P. 14.