

Replies to Editor after minor revisions

Comment: My only additional comment, in response also to one non-reviewer comment in the interactive discussion, is to consider adding a panel in Fig. 12 showing the time series of the solid angle available for SEP/GCR access to BERM/Bepi-Colombo. You may do that in the same sense shown in this paper here: <https://www.sciencedirect.com/science/article/pii/S0019103517305705?via%3Dihub> (see Figure 10 and associated discussion).

Answer: Thank you so much for this comment. The part not-shadowed by the solid angle has been included in the Figure. We note that we have followed a different approach for this calculation as it was not clear to us how the authors of the the mentioned paper calculated the flux units shown in their Figure 10. Our approach is explained in the text as follows:

The reason for this reduction is unknown and could be consequence of a solid angle effect from Venus, similar to those observed at Mars at an orbiter periapsis [e.g. Semkova et al., 2018]. For this reason, panel (b) shows the part of the BepiColombo's solid angle not shadowed by Venus in orange, where 1 stands for null shadowed (null solid angle). The solid angle has been calculated as $\omega = 2\pi(1 - \cos\theta)$, where theta is the linear angle between the BepiColombo's distance to the center of the planet and the BepiColombo's distance to the limb of the planet, which in turn is calculated as the arcsine of the ratio between the Venus' radius and the BepiColombo's distance to the center of the planet. The part of space not shadowed by the solid angle (orange line) is calculated as $1 - (\omega/4\pi)$. We note that the BERM flux level reduction that can be attributed to the solid angle effect lasts much shorter than the actual nearly constant reduction found. Nevertheless, other effects more difficult to discern may be also playing a role, such as shadowing from the own spacecraft due to attitude changes.

Comment: That paper also shows short and longer term variations on GCR/SEP flux at Mars (a Venus-type object when it comes to its solar wind interaction), so some comparisons may be drawn with depletions/dropouts you show in your Fig. 12, in addition to the reference to the 67p observations recommended in the interactive discussion.

Answer: A mention to those dropouts has been done in the text (see previous reply).

Finally, it may be useful to provide some basic information about BERM - e.g. what is the energy threshold of the measurements shown, e.g. ≥ 40 MeV, ≥ 100 MeV - what are the proton gyroradii involved? That may play a role in the solid angle shadowing, too.

Answer: BERM energy information is now provided in the Data section as well as a reference. This reference is a paper that is currently under review at the BepiColombo's special issue in the journal Space Science Review. We know that it is not the best practice to cite a paper under review, but this is the only reference available at the moment. Regarding the observations in Figure 13, a general sentence about other possible sources has been added (see first reply). However, we would like to not go into more details as BERM is currently being calibrated and the energy limits and capability of each channel are being tested. Despite this, we think it is good to show the observations together with MPO-MAG and MEA1, so other reserarchers can see the full picture taken by BepiColombo.

Many thanks for all your comments!

References

- Pinto, M., Sanchez-Cano, B., Moissl, R., Cardoso, C., Gonçalves, P., Assis, P., Vainio, R., Oleynik, P., Lehtolainen, A., Grande, M. and McComas, A., [2021], ‘The Bepicolombo Radiation Monitor, BERM’, Space Sci. Rev. p. Submitted(?).
- Semkova, J., Koleva, R., Benghin, V., Dachev, T., Matviichuk, Y., Tomov, B., Krastev, K., Maltchev, S., Dimitrov, P., Mitrofanov, I., Malahov, A., Golovin, D., Mokrousov, M., Sanin, A., Litvak, M., Kozyrev, A., Tretyakov, V., Nikiforov, S., Vostrukhin, A., Fedosov, F., Grebennikova, N., Zelenyi, L., Shurshakov, V. and Drobishev, S. [2018], ‘Charged particles radiation measurements with Liulin-MO dosimeter of FRENDA instrument aboard ExoMars Trace Gas Orbiter during the transit and in high elliptic Mars orbit, ’, Icarus **303**, 53 – 66.