



## **Unusual plasma and particle signatures at Mars and STEREO-A related to inhibited expansion caused by CME-CME interaction**

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On July 25 2017 a multi-step Forbush decrease (FD) with the total amplitude of more than 15% was observed by MSL/RAD at Mars and this is one of the biggest FDs ever detected on Mars. We find that these particle signatures are related to very pronounced plasma and magnetic field signatures detected in situ by STEREO-A on July 24 2017, with a higher than average total magnetic field strength reaching more than 60 nT. In the observed time period STEREO-A was longitudinally close to Mars and both were located at the back side of Sun as viewed from Earth. Using multi-spacecraft and multi-instrument (both in situ and remote-sensing) observations, as well as modelling, we find that the solar sources of these in situ signatures are 2 CMEs which erupted on July 23 2017 from the same source region on the back side of the Sun as viewed from Earth and interacted in the interplanetary space, inhibiting the expansion of one of the CMEs. We present a detailed investigation on this complex interaction event on its way from Sun to Mars. This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 745782.