

## **Title: Seeking the presence of Electromagnetic waves and their significance in the Lunar wake**

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### **Abstract**

The lunar wake provides a natural plasma laboratory exhibiting an abundance of particle anisotropies and thus a variety of plasma waves. As the Moon has no intrinsic magnetic field, the magnetic field in the lunar environment is directly related to that embedded in the solar wind flow. Previous studies have shown the existence of numerous electromagnetic and electrostatic wave modes downstream from the Moon in the lunar wake. Consequently, the identification of low-frequency electromagnetic fluctuations inside the wake is still an active research topic. To understand the cause(s) of these waves, we present a detailed case study of ARTEMIS wave and particle observations inside and outside the lunar wake. In this case study, the low-frequency electromagnetic fluctuations do not exhibit a definite mode, but there is a polarization reversal at the center of the wake. Our study results may be applicable to other un-magnetized bodies in space.