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Star Planet Interaction from Solar System to Exoplanets

The interaction between stellar winds and planetary magnetospheres has been a focus of research for decades. Within the heliospheric context, star-planet interactions similar to that between the Sun and the Earth reshapes the planet's local magnetic environment leading to the formation of magnetospheres. In the context of exoplanetary systems, star-planet interactions vary depending on the planet's orbital location. For close-in orbits located in the sub-Alfvénic stellar wind, the Poynting flux generated by star-planet interactions can propagate toward the star, giving rise to chromospheric hotspots. Our current work characterises and quantifies the efficiency of this energy transfer between the planet and the star, revealing that a significant portion of the energy is reflected by the stellar transition region back toward the planet. The firm detection and characterisation of such magnetic interactions from observations of chromospheric hotspots would lead to constraints on the amplitude of the magnetic field of exoplanets, to which we are blind so far. Future research, utilising the previously developed magnetosphere-ionosphere model, will explore how the presence or absence of a planetary ionosphere influences the Poynting flux generated by the planet.

Contribution Type

Theme

Solar - Stellar Connections

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