

CROSS SCALE: A MISSION TO STUDY MULTI-SCALE COUPLING IN PLASMAS

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Cross-Scale is a mission under study by the European Space Agency (ESA) and is a candidate for the first launch slot for the agency's Cosmic Vision 2015-2025 program. It will provide critical new information on several universal collisionless plasma processes by performing the first exploration and quantification of simultaneous multi-scale coupling across three critical scales: electron, ion, fluid. A fleet of 12 specialised spacecraft is planned to built by ESA and partner agencies (e.g., JAXA, NASA, CSA). The science questions Cross-Scale will answer are: "How do shocks accelerate and heat particles?", "How does reconnection convert magnetic energy?" and "How does turbulence control transport in plasmas?" In this talk we will highlight the key sciences on reconnection, shock, and turbulence, which will be explored by Cross-Scale and which are fundamental to understand particle acceleration, energy and momentum exchange and transport within the Solar System (the solar corona; the solar wind; planetary magnetospheres; cometary comas) and throughout the Universe.

Reconnection, Turbulence, Shock

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