



## **Cross-Scale: An ESA Cosmic Vision Mission to Study Multi-Scale Coupling**

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Cross-Scale is a mission under study by the European Space Agency and is a candidate for the first launch slot for the agency's Cosmic Vision 2015-2025 program. It will provide critical new information of several universal collisionless plasma processes (shocks, magnetic reconnection and turbulence) by performing the first exploration and quantification of simultaneous multi-scale coupling across three critical scales: electron, ion, fluid. It will answer fundamental questions in collisionless plasmas, notably "How do shocks accelerate and heat particles?", "How does reconnection convert magnetic energy?" and "How does turbulence control transport in plasmas?" These universal processes will be unravelled by a fleet of 12 specialised spacecraft built by ESA and partner agencies (e.g., JAXA, NASA, CSA). It's planned orbit, 10 x 25 RE, would allow the spacecraft to pass through all regions of interest (magnetotail, magnetopause, magnetosheath, bow shock, and solar wind). This contribution will focus on the science questions and how this Cosmic Vision mission will answer them.