

Debye: a multi-spacecraft mission to solve the electron energization problem in the solar wind

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Sub-ion (kinetic) scale turbulence has been the main focus of research in space plasmas in the last decade because of the crucial role that those scales play in energy dissipation and thus particle energization (heating or acceleration). These research topics are relevant to many (more distant) astrophysical plasmas that are not accessible to in-situ measurements (e.g., solar corona, ISM or accretion flows). In the solar wind, orbiting spacecraft such as Cluster, Themis and more recently MMS have allowed us to make a significant progress in understanding the problem of turbulence and energy dissipation at sub-ion and electron scales in space plasmas. Yet, key questions cannot be addressed by those missions or by the upcoming ones (e.g., Parker Solar Probe and Solar Orbiter) because of their instrumental limitations. We will discuss some of these scientific questions and instrumental limitations, then present a new multi-spacecraft mission concept, Debye, designed to solve the problem of turbulence and energy dissipation at electron scales in the solar wind. This mission is currently being considered for selection within the ESA/F1-class call released in 2018 with a strong participation from the Japanese space physics community.