



Measuring electron-scale turbulence with Debye

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Debye is a proposed and pre-selected mission concept in response to ESA's F-Class call. Debye will consist of a mother spacecraft with instrumentation to measure electrons, ions, electric fields, and magnetic fields; and three daughter spacecraft that measure magnetic fields only. The daughter spacecraft will fly in a tetrahedral formation around the mother spacecraft. In this configuration, Debye will measure electron-scale fluctuations and their effects on the electron distribution function. The key science question for the Debye mission is: How are electrons heated in space and astrophysical plasmas? In order to answer this top-level science question, Debye's first objective is to identify the nature of electron-scale turbulent fluctuations. Then it will study the rapid transfer of energy from the fields to the particles through high-cadence and high-resolution electron measurements. Finally, Debye will study the partition of energy between particle species and the dependence of the energy transfer on plasma parameters.

In this presentation, we discuss the science questions and our proposed pathways to science closure for the Debye mission. Moreover, we discuss the implications of Debye science for the space, astrophysics, and laboratory plasma research communities.