



THOR - Turbulence Heating Observer

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THOR (Turbulence Heating Observer) is one of the three candidates for selection as the next ESA M-class mission (M4). THOR will be the first mission ever flown in space that is fully dedicated to study plasma turbulent fluctuations and associated energization mechanisms. Turbulent fluctuations are ubiquitous in astrophysical plasmas and reach up scales as large as stars, bubbles and clouds blown out by stellar winds as well as entire galaxies. However, most of the irreversible energy dissipation associated to turbulent fluctuations occurs at very small scales, the so-called kinetic scales, where the plasma no longer behaves as a fluid and the properties of individual plasma species (electrons, protons, and other ions) become important. THOR will explore the kinetic plasma processes that determine the fundamental behavior of plasma in the universe. THOR will lead to an understanding of the basic plasma heating and particle acceleration mechanisms, of their effect on different plasma species and of their relative importance in different turbulent regimes. THOR will achieve this by making detailed in situ measurements of the closest available dilute and turbulent magnetized plasmas - the Near-Earth's space - at unprecedented temporal and spatial resolution. THOR focuses on particular regions in space: the pristine solar wind, the Earth's bow shock and interplanetary shocks, and the compressed solar wind regions downstream of shocks. These regions are selected because of their different turbulence properties and they reflect the properties of a number of distant astrophysical environments. Here we present THOR's science and summarize the results of the mission and payload studies that finished earlier this year.