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THOR Cold Solar Wind (CSW) instrument

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Turbulence Heating ObserveR (THOR) is the first mission ever flown in space dedicated to the study of plasma turbulence. We present the Cold Solar Wind (CSW) instrument that is being designed for THOR. CSW will measure the full three dimensional distribution functions of solar wind protons and alphas with unprecedented accuracies. It will measure solar wind proton distributions in 150 ms with energy resolution of 5-7% and angular resolution of 3°. CSW is based on a top-hat electrostatic analyzer (with very large geometric factor) design with deflectors at the entrance. The particle detection system uses Channel Electron Multipliers (CEM) and an Application-Specific Integrated Circuit (ASIC) for charge amplification. CSW electronics comprises a fast sweeping high voltage board, as well as an FPGA and low voltage power supply boards to perform its operations. CSW is designed to address many of the key science objectives of THOR, in particular regarding ion-scale kinetic aspects of solar wind turbulence.