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Double-Cusp type electrostatic Analyzer for SupraThermal ions (DCAST)

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Measurements obtained over the last decade have led to a general consensus that the poorly understood suprathermal (ST) tail between $\sim 2-100$ keV/nucleon provides much of the seed population for CME-driven shocks near the Sun and in the interplanetary space. However, existing instruments are not only resource hungry (e.g., power and mass) but also require very long integration times (>days) to measure key properties of the ST ions e.g., anisotropy, energy spectra, composition, and spatial-temporal variations. Our proposed concept of the electrostatic analyzer, employing a toroidal double-shell structure, covers the ST energy between $\sim 3-200$ keV/q ions with higher temporal resolution while using significantly lower resources compared to conventional solar wind instruments covering ST energy range. In this presentation, we describe the concept and show testing results obtained with our laboratory prototype. We will give the expected performance (G-factor, analyzer constant, energy resolution, cross-shell contamination, and UV suppression) based on measurements and simulations.