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STEREO/PLASTIC dataflow and simulation of anticipated solar wind measurements

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The STEREO (Solar Terrestrial Relations Observatory) mission will provide a totally new perspective on the Sun and its eruptions by imaging from two nearly identical space-based observatories simultaneously. Its primary goal is to advance the understanding of the 3-dimensional structure of the solar corona and its temporal evolution, especially regarding coronal mass ejections. The launch of the spacecraft carrying four instrument packages is currently scheduled for February 2006. The PLASTIC (Plasma and Suprathermal Ion Composition) experiment is the primary in situ solar wind ion instrument on board. It consists of an entrance system containing three apertures and an electrostatic analyser connected to a time-of-flight mass spectrometer with solid state detectors. The objective is to measure the abundance and charge state distributions of various solar wind species along with their velocity distributions. The paper discusses the planned dataflow and the simulation efforts to predict the measured energy-per-charge spectra for the most abundant elements in the solar wind. The goal of this study is to produce simulated test data to check both the onboard and ground software. This numerical simulation applies a Monte Carlo method and the empirical relations among the solar wind parameters deduced from previous missions to create hypothetical distribution functions. We convolve these distribution functions with the calibrated instrument response function to derive predicted measurements for the pre-launch data analysis.