

A. IMPACT Investigation Instrument Summary - Phase A Status

The IMPACT (In-Situ Measurements of Particles and CME (Coronal Mass Ejection) Transients) investigation provides the solar wind electrons, interplanetary magnetic fields, and solar energetic particles (SEP) measurements for the STEREO mission. These measurements characterize, with the UNH PLASTIC solar wind ion measurements, the conditions in interplanetary space resulting from a CME observed remotely by the SECCHI imagers and SWAVES radio tracker. The information obtained allows both multipoint measurement-based reconstruction of the interplanetary transient launched by the CME (called the Interplanetary CME or ICME), and as the spacecraft separation grows, the in-situ detection of ICMEs on one spacecraft of CMEs observed leaving the Sun by the imagers on the other spacecraft.

IMPACT consists of seven instruments: SWEA (Solar Wind Electron Analyzer), STE (Suprathermal Electron Telescope), MAG (Magnetometer), SEPT (Solar Electron Proton Telescope comprised of SEPT-E and SEPT-NS), SIT (Suprathermal Ion Telescope), LET (Low Energy Telescope), and HET (High Energy Telescope). The first three of these are located on the IMPACT boom/mast that extends a total of 4.5m

antisunward on each spacecraft. (MAG is 3m from the spacecraft, SWEA is at the end of the boom, at 4.5m). The latter four instruments make up the SEP subsystem which is mounted on the spacecraft body. The SEP instruments are packaged together except for a part of the SEPT instrument mounted on the spacecraft at a different location for FOV reasons. Figure A.1 shows one of the STEREO spacecraft with the instruments' configuration as of late Phase A.

All instruments use a common IMPACT IDPU that also serves the UNH PLASTIC investigation for data processing and as the spacecraft interface. The IDPU is mounted inside the spacecraft. The space weather (Beacon) data products for all IMPACT instruments and UNH PLASTIC are also accessed through the common IMPACT IDPU spacecraft interface. Initial processing of the SEP data, including the space weather data, occurs in a dedicated SEP package DPU prior to transfer to the IMPACT IDPU.

The IMPACT resource requirements and primary data products are summarized in the table below.

Table A.1 IMPACT Summary

Experiment	Instrument	Measurement	Energy or Mag. field range	Mass (kg)	Power (w)	Data Rate (bps)	Time Res.	Instrument provider
SW	STE	Electron flux and anisotropy	2-100 keV	0.35	0.20	64	16 s	UCB (Lin)
	SWEA	3D electron distrib., core & halo density, temp. & anisotropy	~0-3 keV	1.71	1.10	394	3D=1 min 2D=8s Mom.=2s	CESR (Sauvaud) + UCB (Lin)
MAG	MAG	Vector field	±500nT, ±65536 nT	0.25	0.0	154	1/8 s	GSFC (Acuna)
SEP	SIT	He to Fe ions	0.03-2 MeV/nuc	0.93	0.66	240	30 s	U. of Md. (Mason) + MPAE (Korth) +UCB (Curtis)
		³ He	0.15-0.25 MeV/nuc				30 s	
	SEPT	Diff. electron flux	20-400 keV	0.90	1.04	120	1 min	U. of Kiel (Mueller-Mellin) + ESTEC (Sanderson)
		Diff. proton flux	20-7000 keV				1 min	
		Anisotropies of e,p	As above				15 min	
	LET	Ion mass 2-28 & anisotropy	1.5-40 MeV/nuc	0.51	0.18	320	1-15 min.	GSFC (von Rosenvinge) + Caltech (Mewaldt) + JPL (Wiedenbeck)
		³ He ions flux & anisotropy	1.5-1.6 MeV/nuc				15 min.	
		H ions flux & anisotropy	1.5-3.5 MeV				1-15 min.	
	HET	Electrons flux & anisotropy	1-8 MeV	0.70	0.07	120	1-15 min.	Caltech (Mewaldt) + GSFC (von Rosenvinge) + JPL (Wiedenbeck)
		H	13-100 MeV				1-15 min.	
He		13-100 MeV	1-15 min.					
³ He		15-60 MeV/nuc	15 min					
SEP Common	----	----	1.69	1.55	----	----	Caltech (Mewaldt) + GSFC (von Rosenvinge)	
IMPACT Common	IDPU (+Mag Analog)	----	----	1.73	3.60	164 +524 Burst	----	UCB (Curtis)

