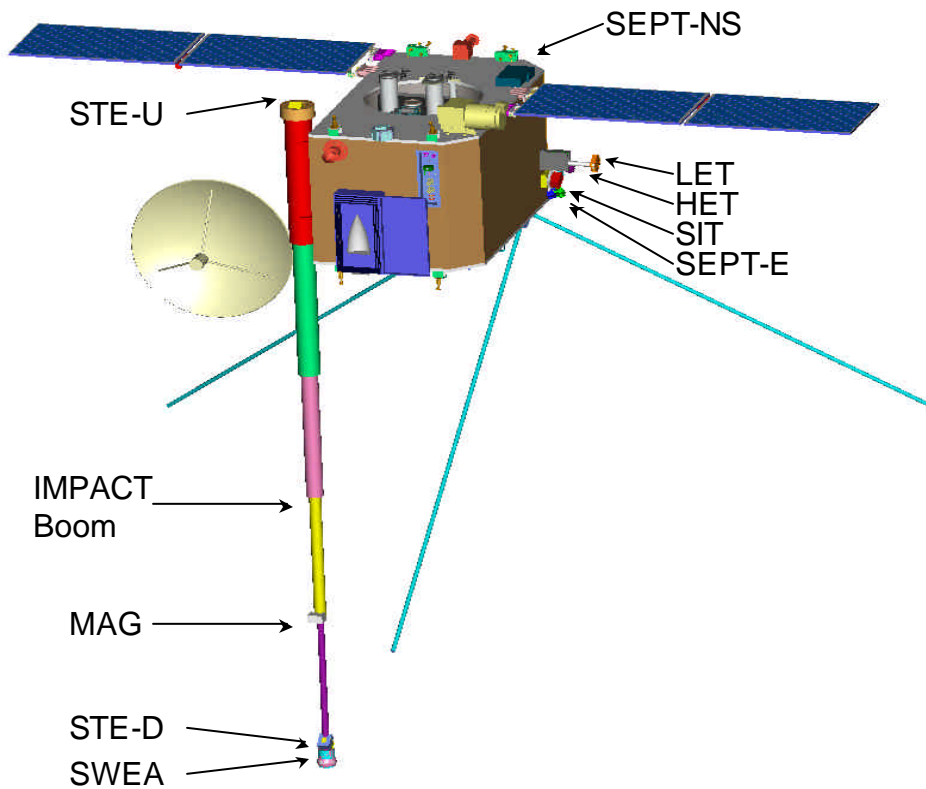


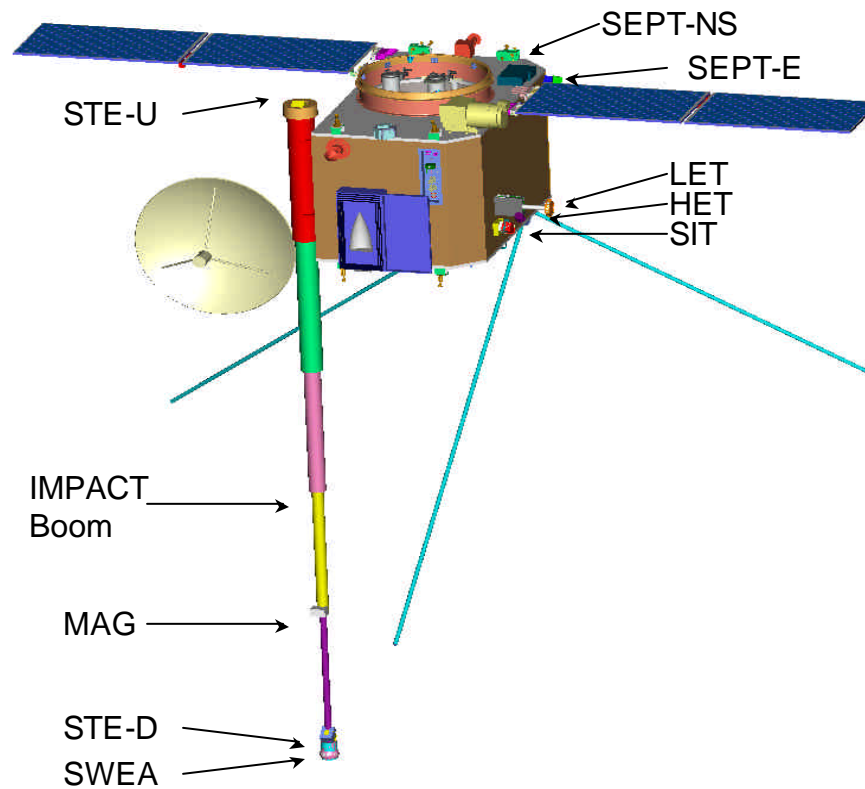
# **IMPACT Boom Suite**

## IMPACT Instrument Locations on the Spacecraft

### Ahead Spacecraft

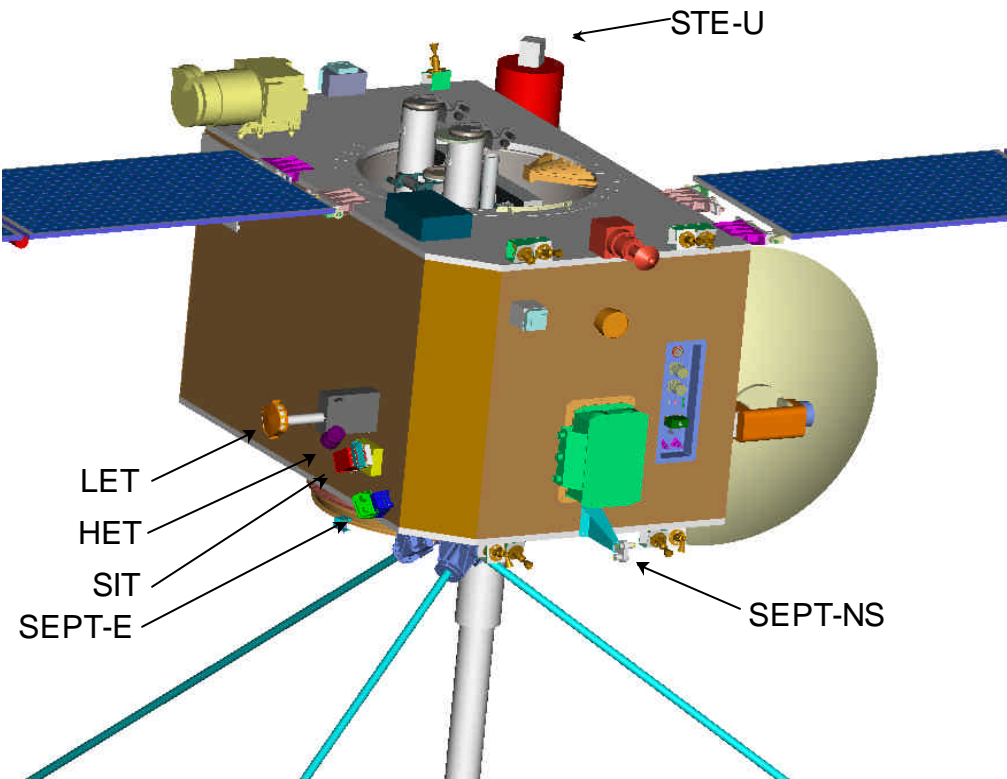


### Behind Spacecraft

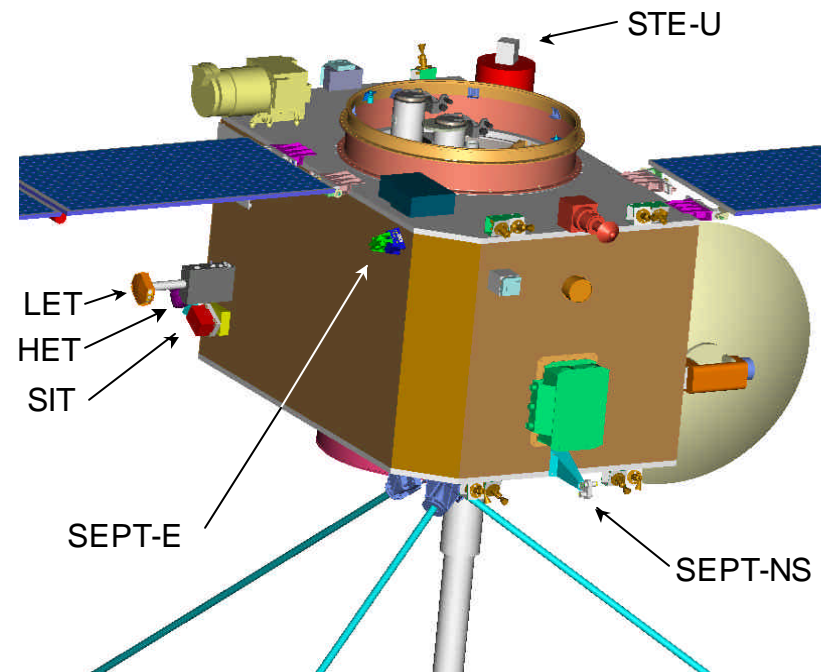


## IMPACT Instrument Locations on the Spacecraft

Ahead Spacecraft



Behind Spacecraft



## **Boom Contamination Issues**

- **Contamination Sensitivity:**
  - Good Housekeeping, Visibly Clean is adequate for mechanism (internal and external)
- **I&T Temperature & Humidity Issues:**
  - None
- **Venting:**
  - Boom volume will vent towards the open (-X) end
- **Exterior Surface:**
  - Most of the pre-deployed surface shall be blanketed using the proposed spacecraft blanketing material.
  - Once deployed, the exposed boom surface shall be Graphite/Epoxy.
  - A deployment contamination test of the prototype is planned soon.
- **Integration & Test:**
  - Boom components shall be cleaned to VC level prior to assembly
  - Boom shall be fabricated and tested in a class 100K environment
  - Late in the I&T flow the surfaces shall be wiped clean to a VCHS level, followed by a bake-out of the boom plus instruments.
  - Following bakeout the boom suite shall be kept bagged or in Class 100K until delivery to the spacecraft.

## **MAG Sensor Contamination Issues**

- **Contamination Sensitivity:**
  - No issues
- **I&T Temperature & Humidity Issues:**
  - None
- **Venting:**
  - Small volume, vents through joints & harness pigtail hole.
- **Exterior Surface:**
  - Entirely blanketed
- **Integration & Test:**
  - **MAG sensor internals shall be cleaned to VC level prior to encapsulation**
  - **MAG sensor shall be kept mostly bagged or in a class 100K clean environment**
  - **Late in the I&T flow the exterior surfaces shall be wiped clean to a VCHS level, followed by a bake-out of the boom plus instruments.**
  - **Following bakeout the boom suite shall be kept bagged or in Class 100K until delivery to the spacecraft**

## **IDPU Sensor Contamination Issues**

- **Contamination Sensitivity:**
  - No issues
- **I&T Temperature & Humidity Issues:**
  - None
- **Venting:**
  - Filtered vent
- **Exterior Surface:**
  - Mounted inside spacecraft
  - Exterior will be alodyne Aluminum
- **Integration & Test:**
  - IDPU internals shall be cleaned to VC level prior to encapsulation
  - IDPU shall be kept mostly bagged or in a class 100K clean environment
  - Late in the I&T flow the exterior surfaces shall be wiped clean to a VCHS level, followed by a bake-out.
  - Following bakeout the IDPU shall be kept bagged or in Class 100K until delivery to the spacecraft

## **SWEA Contamination Issues**

- **Contamination Sensitivity:**
  - Microchannel Plate (MCP) Detectors sensitive to dust, humidity, hydrocarbons (NVR)
  - High Voltage (up to 3.5kV) also must remain clean to avoid arcing
  - Internal contamination requirements level 50A/5
  - Internal cavity sealed and purged
  - Seal is maintained until post-launch by 1-time door
  - A secondary red-tag cover protects grids and keeps them dust-free
  - Exterior surface (outside grids) level 500B
- **I&T Temperature & Humidity Issues:**
  - Humidity concern mitigated by Purge
- **Venting:**
  - Venting concern due to High Voltage
  - Detector volume vented during launch via over-pressure release built into door
  - Detector volume fully vented following opening of door, at least 24 hours prior to HV turn on.
  - Separate electronics volume has filtered vent in sunward direction (into boom volume)
- **Exterior Surface:**
  - Exterior blanketed except aperture
  - Aperture covered by dual grid (metallic)

## **SWEA Contamination Issues (Continued)**

### **Integration & Test:**

- **Detectors shall be stored in vacuum or a dry nitrogen purged box**
- **MCP and internal parts shall be precision cleaned to VCHS level prior to assembly (ultrasonic isopropyl bath)**
- **Detector shall be integrated on a class 100 clean bench up to the point where the detector volume is sealed and the dust cover is in place**
- **SWEA Electronics internals shall be cleaned to VC level prior to encapsulation**
- **SWEA shall be kept mostly bagged or in a class 100K clean environment with the dust cover in place.**
- **Dust cover will be removed for short times only when the instrument is on a class 10k environment or better, or is bagged and purged, or in vacuum.**
- **Late in the I&T flow the exterior surfaces shall be wiped clean to a VCHS level, followed by a bake-out with the boom suite.**
- **Following bakeout the boom suite shall be kept bagged or in Class 100K until delivery to the spacecraft**
- **Cleaning in the vicinity of SWEA shall be with alcohol only and in the presence of an IMPACT team member**
- **SWEA shall be continuously purged with clean dry Nitrogen (LN2 boil-off preferred). Short interruptions are acceptable (few hours).**



## **STE Contamination Issues**

- **Contamination Sensitivity:**
  - Solid State Detector (SSD) with very thin dead layer is sensitive to dust and non volatile residue (NVR)
  - Internal contamination requirements level 50A/5
  - Internal cavity sealed and purged
  - In-flight reclosable cover used to avoid contamination from thrusters (detectors will be cold; have had experience with degradation from hydrazine thruster byproducts building up on detectors)
  - Exterior surface level 500B
- **I&T Temperature & Humidity Issues:**
  - Detectors have an upper temperature limit of +40C
- **Venting:**
  - Detector volume vents through door joints (not a hermetic seal)
- **Exterior Surface:**
  - Exterior blanketed except aperture
  - Inside aperture shall be TBD conductive black paint

## **STE Contamination Issues (Continued)**

### **Integration & Test:**

- **SSD and STE internal parts shall be precision cleaned to VCHS level prior to assembly (ultrasonic isopropyl bath)**
- **Detector shall be integrated on a class 100 clean bench up to the point where the detector volume is sealed**
- **STE shall be kept mostly bagged or in a class 100K clean environment**
- **Door shall be open for short intervals only when in a class 10K environment or better or when bagged or in vacuum**
- **Late in the I&T flow the exterior surfaces shall be wiped clean to a VCHS level, followed by a bake-out with the boom suite.**
- **Following bakeout the boom suite shall be kept bagged or in Class 100K until delivery to the spacecraft**
- **Cleaning in the vicinity of STE shall be with alcohol only and in the presence of an IMPACT team member**
- **STE shall be continuously purged with clean dry Nitrogen (LN2 boil-off preferred). Short interruptions are acceptable (few hours).**

## **CESR Materials Outgassing Response**

- **For the Stycast 1218, there is no problem because we will not use it. It is outgassing too much and I will remove it from our material list. We were using it in the past for coating on the transformer. On SWEA we will not put anything.**
- **For the Stycast 1269, we plan to use it for a potting on optocouplers for the HV regulation. It is the best material we have tested for this purpose on a wide temperature range. We agree to send you some gram of samples to test it. To who, do we have to send it ? name, address, phone number? Robert S. Kiwak ?**
- **For the Solithane 113/C113-300 we have noted the comment and we are trying to have contact to get the Uralane 5753LV proposed there.**

## IMPACT Contamination Sensitivity

- Sensitive surfaces (SSD, MCP, etc) are enclosed by covers and purged
- MCP detectors remain inaccessible even when covers are opened (long path to space)
- Mil-Std-1246 limits are goals. Internal cleanliness shall be verified by inspection under magnification prior to closing the units.
- MAG sensor, Boom, IDPU have no significant sensitivities, but will be cleaned to meet Project requirements (as will all exterior surfaces), currently 300A BOL.

### IMPACT Instrument Contamination Sensitivities

Subassembly	BOL	EOL
<b>SEPT</b>		
SSD	300, 5E-7g/cm <sup>2</sup>	500, 5E-6g/cm <sup>2</sup>
Magnets	5E-7g/cm <sup>2</sup>	5E-6g/cm <sup>2</sup>
Paralene Foils	300	500
Exterior (*)	500A	500A
<b>HET, LET</b>		
SSD	300A/2	500A
Exterior (*)	500A	500B
<b>SIT</b>		
MCP	200A/5	250A/2
SSD	300A/2	500A
Internals (HV)	250A/3	300A/2
Exterior (*)	500A	500B
<b>SWEA</b>		
MCP	200A/5	250A/2
Internals (HV)	250A/3	300A/2
Exterior (*)	500A	500B
<b>STE</b>		
SSD	300A/2	500A
Exterior (*)	500A	500B

(\*) Exterior surfaces will meet spacecraft requirements