

STEREO IMPACT STE Status

2006-12-11

On-Orbit Results

- **The STE-U-B unit is significantly saturated even with the door closed.**
 - High front end current, no counts
 - Consistent with significant light on the detector
- **The STE-U-A unit has an elevated reset rate with the door closed and is saturated with the door open**
- **The STE-D units work fine so long as the Earth is not in their FOV**
 - Given the nominal spacecraft orientation, this means STE-D-B is usually working and STE-D-A is kept closed in Phasing orbits.
 - Should be OK in heliocentric orbit
- **The STE units saturate in the magnetosphere**
 - due to high particle fluxes
 - Even with the doors closed the units start to saturate in the radiation belts
- **All 4 STE units worked well during the P1 eclipse with their doors opened. As soon as we came out of earth's shadow the STE units saturated.**
 - P3 eclipse was too high (6000km instead of 500km). STE units saturated with high particle fluxes when doors opened

On-Orbit Results, Continued

- **During off-pointing events, sometimes STE-U-B will come out of saturation**
 - even with as low an off-pointing angle as 1.6 degrees (A4)
 - Door still closed
 - Reset rates elevated
 - STE-U-A only seems to get worse with off-pointing
- **STE-U did not improve when TWTA powered off during P1**
 - Seems to invalidate theory that problem could have been from RF
 - STE-U-B is close to LGA
- **As yet no good theory of why STE-U-B is so much worse than STE-U-A in spite of having less glint issues**
 - It would take ~10 suns illumination directly on the closed door to explain the level of saturation we see
 - designed for no direct sunlight on door and no other path for light
 - Something damaged in launch or separation?

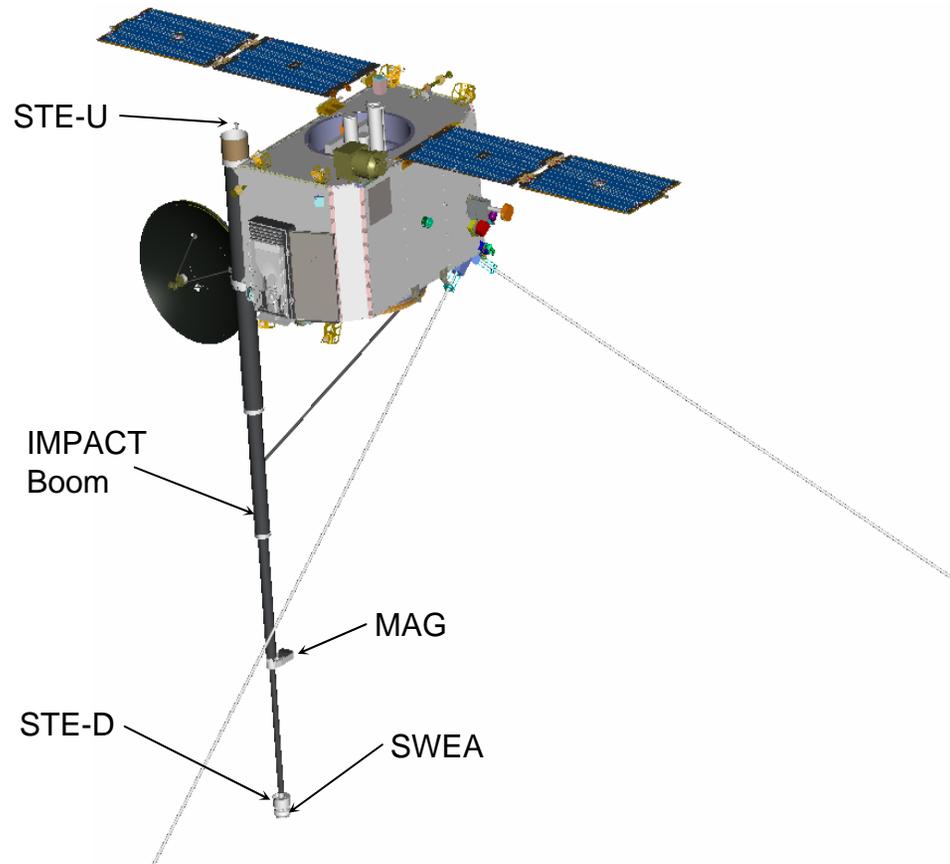
Plans

- **Investigations on-going using the ETU unit on the ground to try to understand what we see in space**
- **We are trying to get a special off-point maneuver over a range of small angles to help diagnose the sensitivity**

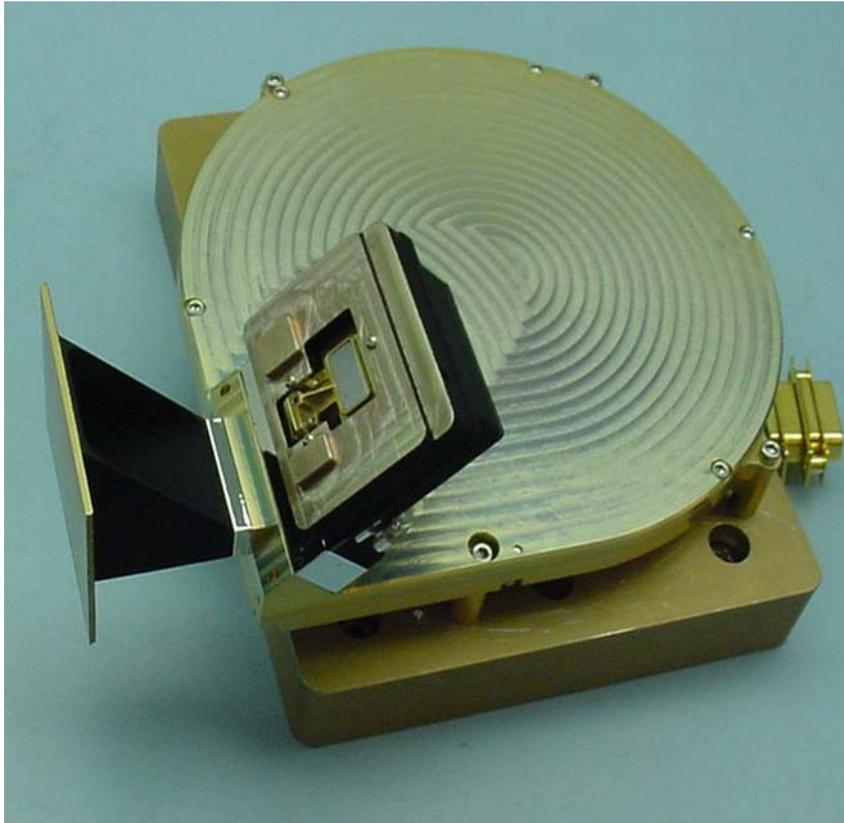
Backup Slides

STE Locations

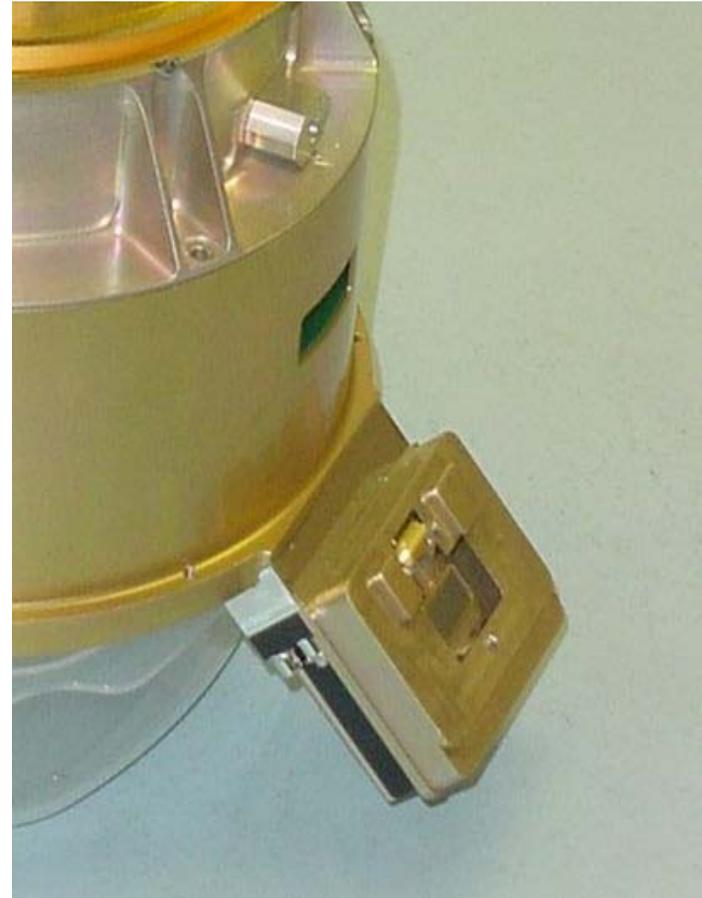
Ahead Spacecraft



STE-U



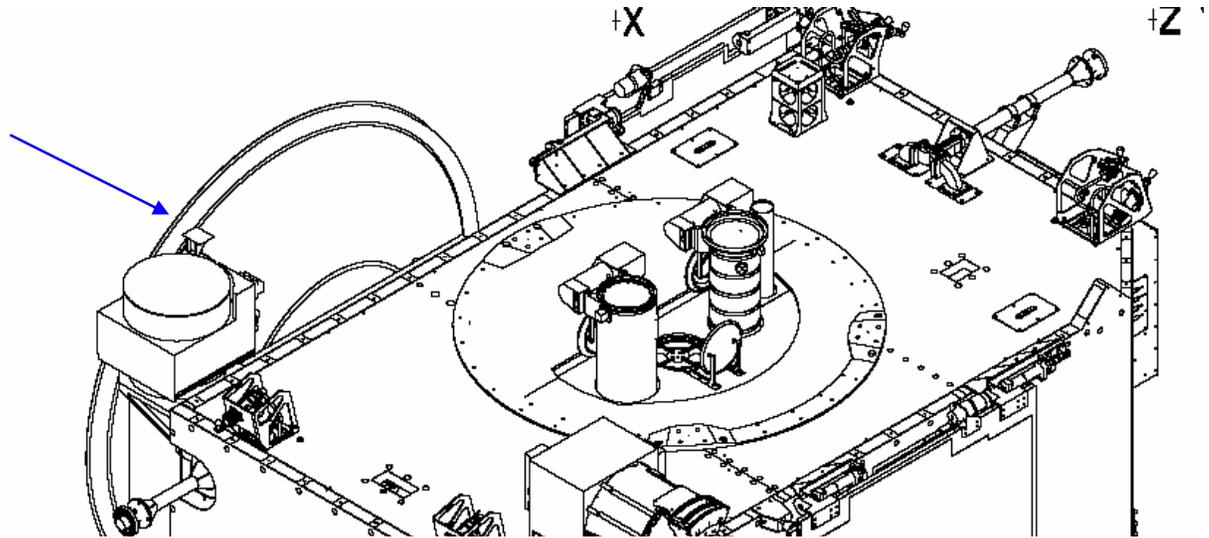
STE-D



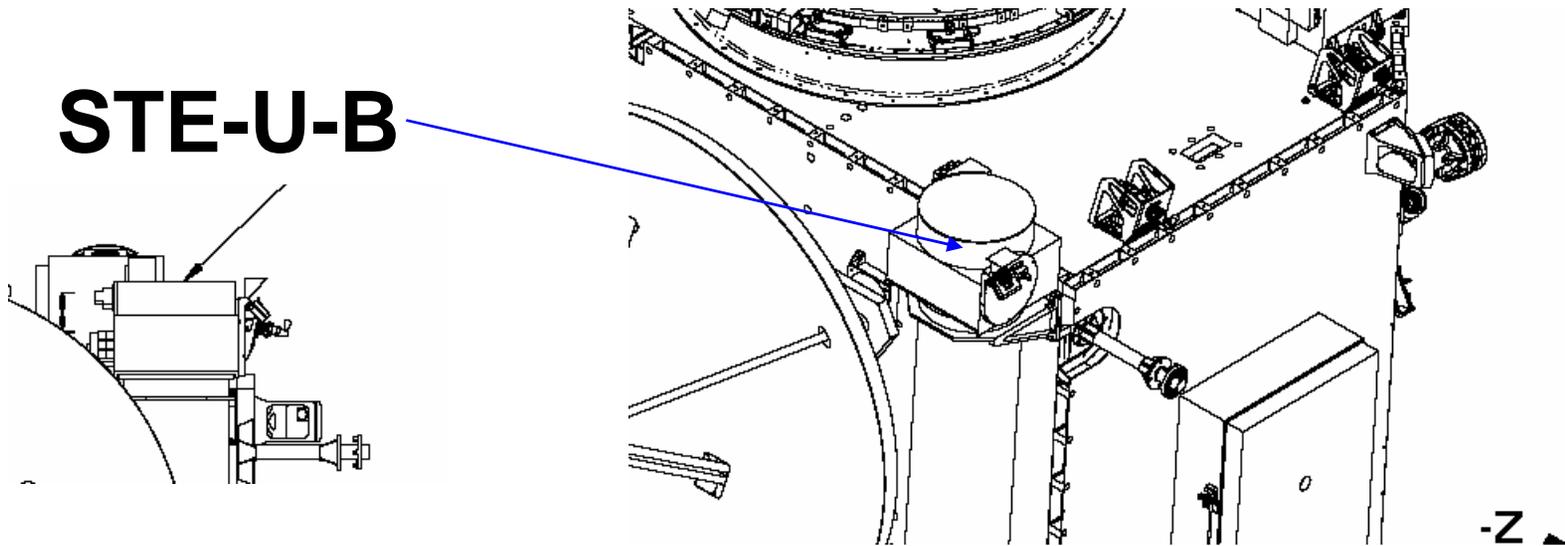
The STE units are sensitive to light

- Above $\sim 1E-5$ Suns it saturates (moonlight is not bright enough to saturate it, but earthlight)
 - With the door closed the unit works OK in room light, but is not perfectly sealed
- Saturation starts with increasing reset rates until at ~ 1000 resets/second the dead time due to reset paralyzes the system and no events are counted. The front end electronics current also starts to rise significantly at this point
- The STE instrument apertures are not sunlit and there is nothing in the STE FOV that can scatter light into the instrument, so sunlight takes at least 2 bounces to get onto the detector
- A simple scattered light analysis indicated we should be OK
 - STE-U-A was the biggest concern as there are a number of objects that can scatter light onto the front of the instrument (though not directly into the aperture).
 - STE-U-B has fewer items that can scatter light onto the front of the instrument
 - Note that the sun-shades on the STE-U unit are outside the FOV
 - STE-D units are in the dark and pointing away from the spacecraft.

STE-U-A

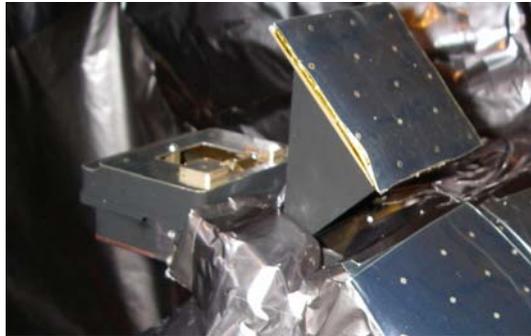


STE-U-B



Closeout Pictures

STE-U-A

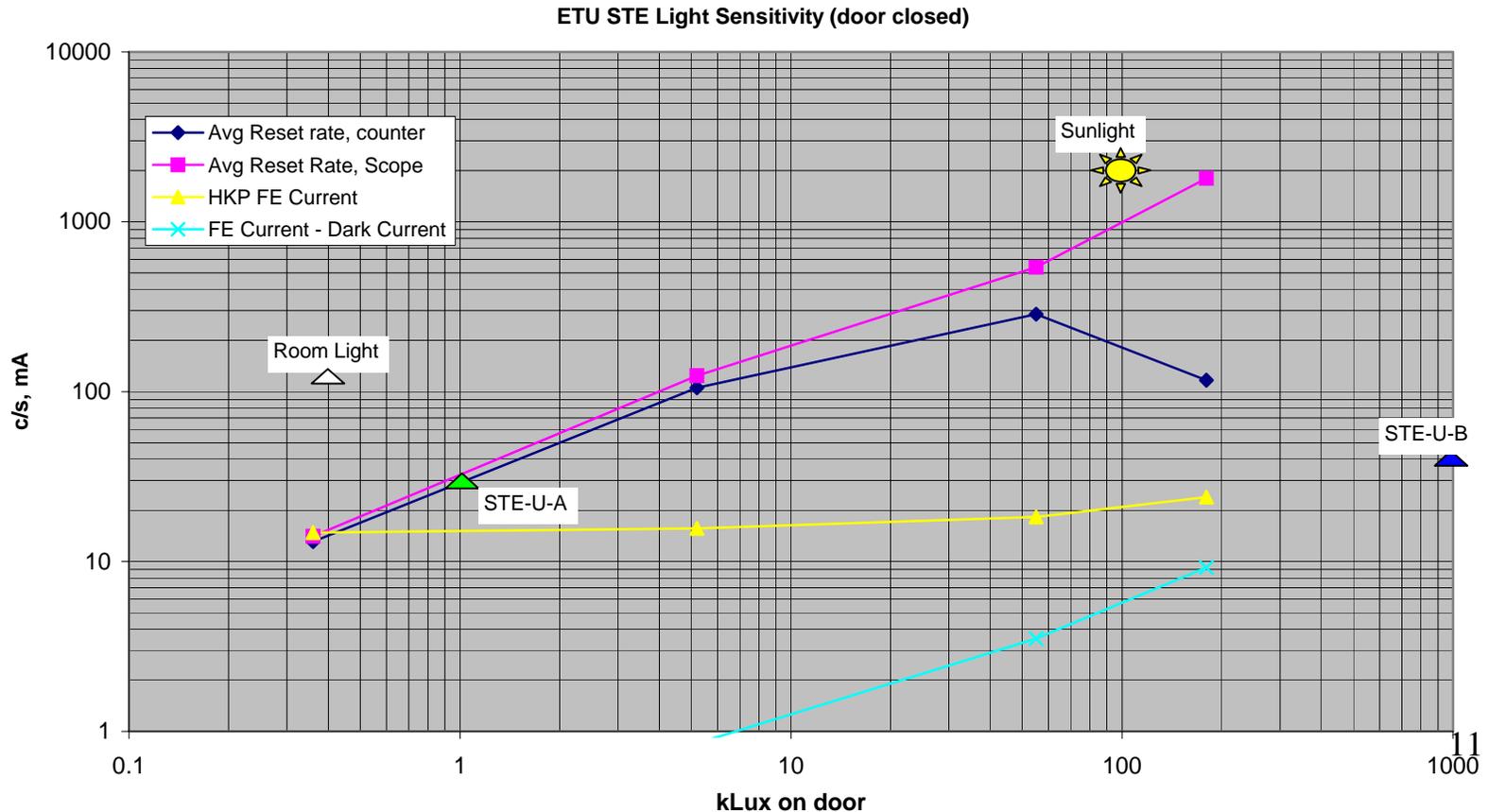


STE-U-B



ETU STE Tests on the ground

- Testing ETU STE on the ground with calibrated light source to attempt to replicate what we see on orbit with STE-U (door closed)
- Results indicate a significant light leak for STE-U-B



Sample STE-D-B Results

