
STEREO
IMPACT
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U of MI - JHU/APL - MPAe - U of Kiel - CESR/CNRS - ESA/ESTEC -
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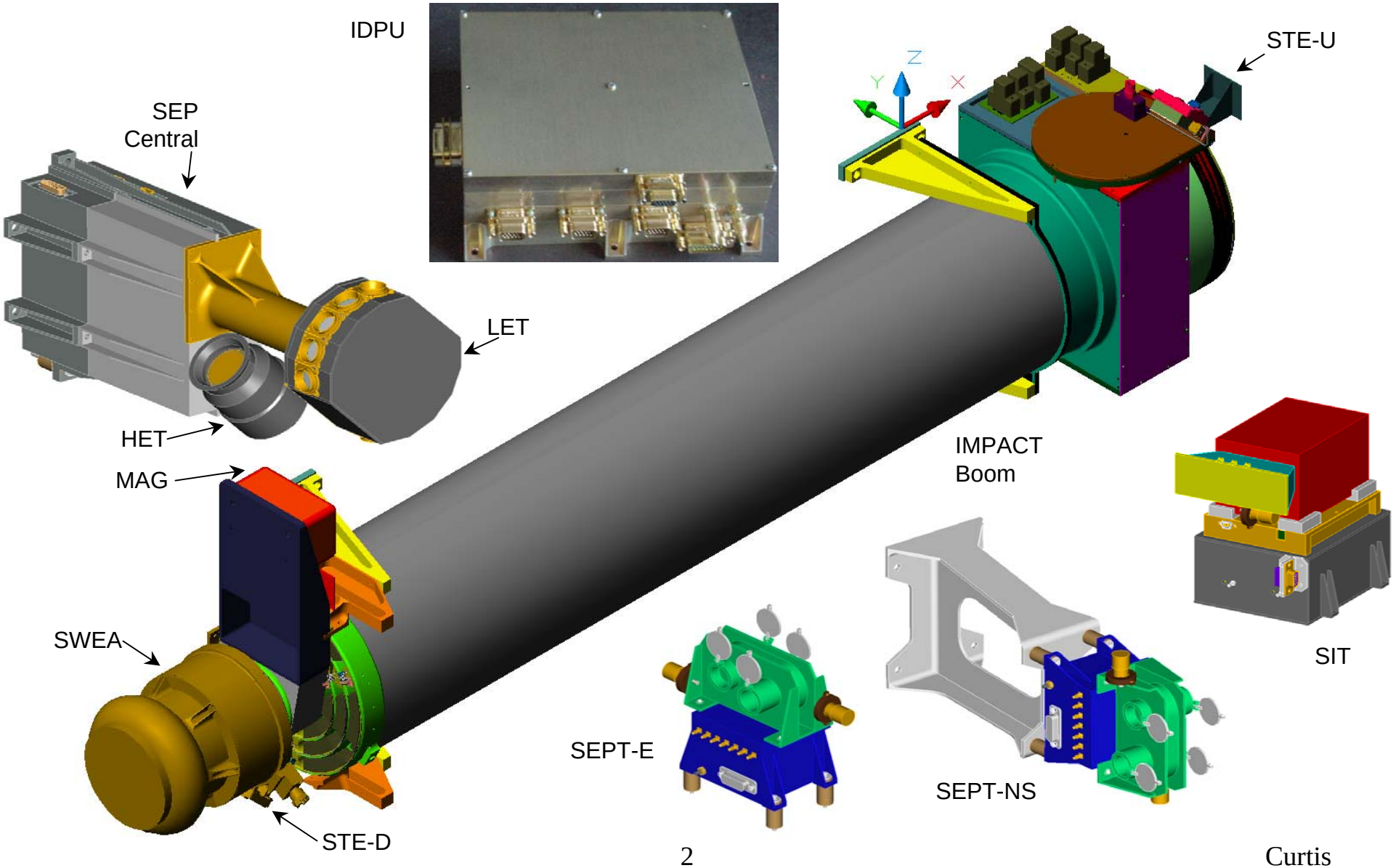
STEREO IMPACT



IDPU CPT Evaluation

- **Subsystems Tested**
  - **Power supply (secondary voltages, primary current)** — **In Limits, trend flat**
  - **Telemetry Output Format** — **OK**
  - **Command Processing** — **OK**
  - **Housekeeping packet contents** — **In Limits**
  - **EEPROM Write/dump** — **OK**
  - **Spacecraft, Instrument, and SWAVES status transfers** — **OK**
  - **Memory Test** — **OK**
  - **Watchdog Timer Test** — **OK**
  - **Instrument Interfaces tested in instrument CPT subsections**

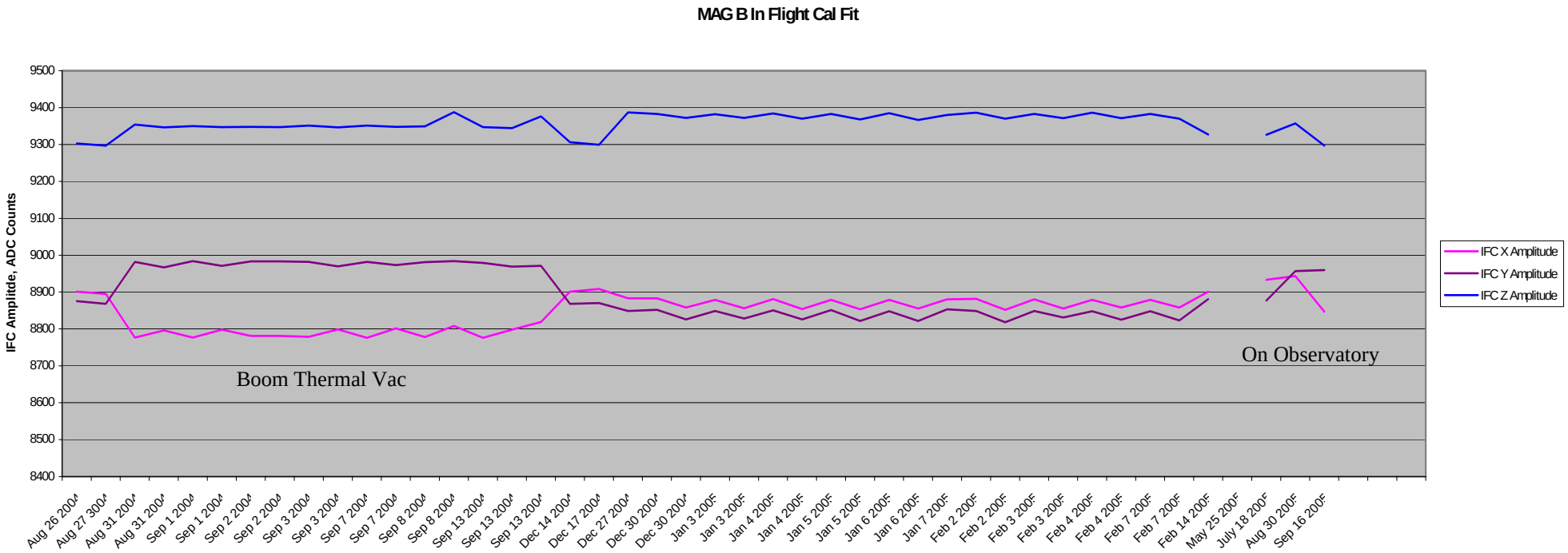
Boom Evaluation

- **Subsystems Tested**
  - **Boom Deployment** — **Not Tested**
    - **Next (last) test EMC deployment**
  - **Boom Deployment Heater** — **Not Tested**
    - **Tested in thermal vac**
  - **Harnessing** — **OK**
    - **Tested as part of SWEA/STE Instrument tests**

MAG Instrument Evaluation

- **Subsystems Tested:**
  - **MAG Housekeeping** — **In Limits**
  - **MAG Data** — **In Range**
  - **MAG In-Flight Cal (IFC) Mode** — **In Limits**
  - **MAG Heater** — **Nominal**
    - **NOTE: only standby current can be tested except in thermal vac**
- **Performance Data:**
  - **MAG IFC trending, amplitude** — **Nominal**
  - **MAG IFC trending, timing** — **Nominal**

Sample MAG Trending Data



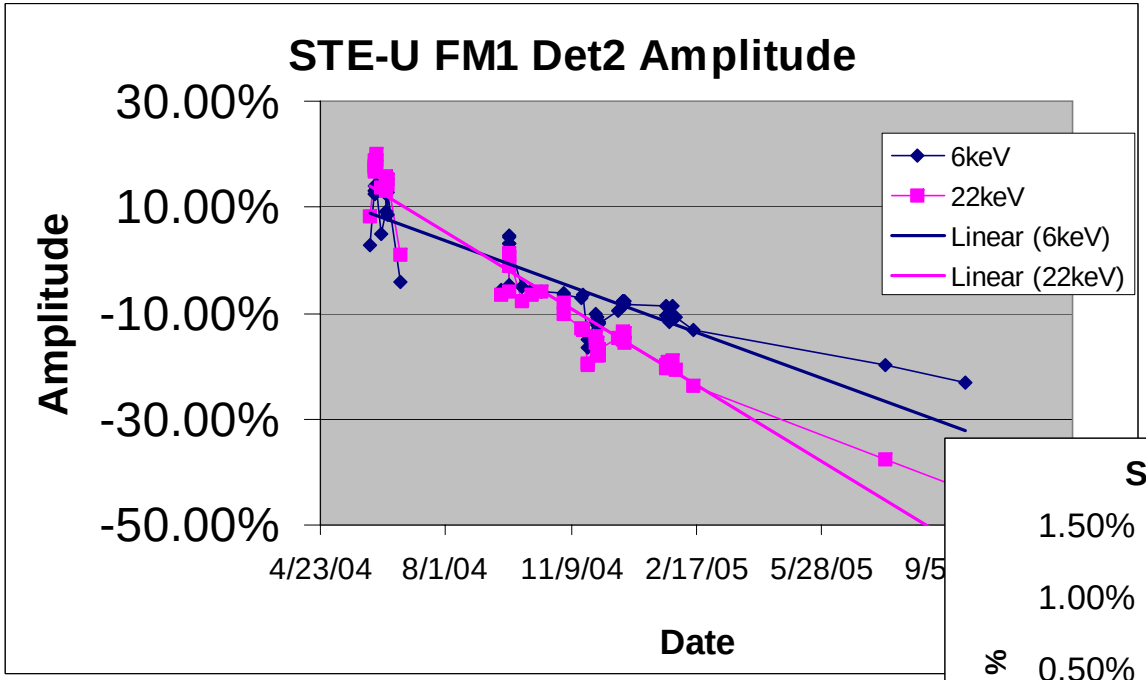
SWEA Instrument Evaluation

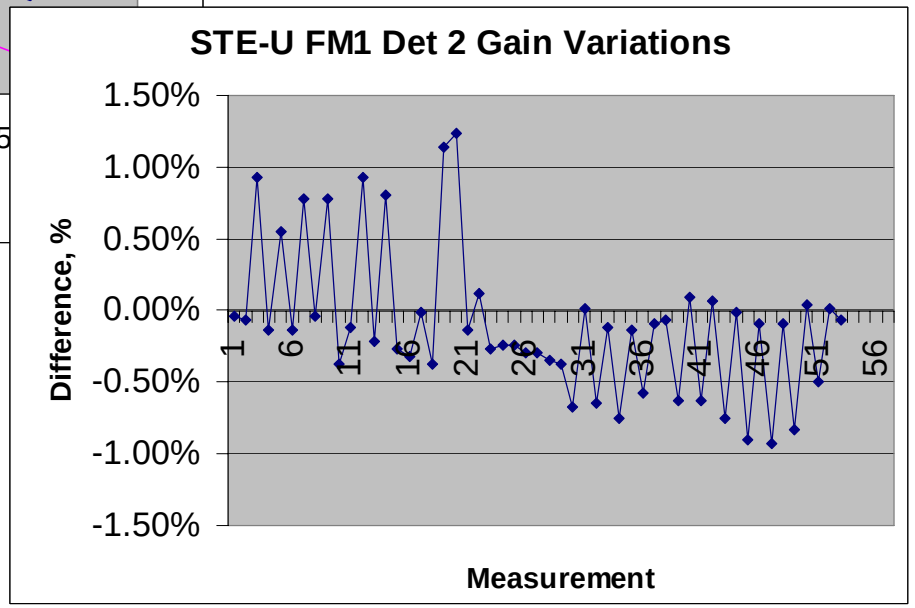
- **Subsystems Tested:**
  - **Power supply (secondary voltages, primary current)** — **In Limits, trend flat**
  - **Analyzer High Voltage Supply** — **In limits**
  - **MCP High Voltage Supply** — **Not Tested**
  - **Detector end-to-end, background** — **Not Tested**
    - **MCP, analyzer also not tested with particles except in vacuum**
    - **Last tested in instrument thermal vac,**
  - **SWEA Housekeeping** — **In Limits**
  - **Preamps, signal chain** — **OK**
  - **SWEA Door** — **Not Tested**
    - **Tested subsequently, OK**
  - **SWEA Operational Heater** — **OK**
  - **SWEA Survival Heater** — **Not Tested**
    - **Tested in thermal vac**

STE Instrument Evaluation

- **Subsystems Tested:**
  - **STE-U Housekeeping** — **In Limits**
  - **STE-D Housekeeping** — **In Limits**
  - **STE Noise Thresholds (Background)** — **Nominal**
  - **STE Test Pulser Response** — **Nominal**
  - **STE Door Source Calibrations** — **Trend OK**
  - **STE Door Open/Close** — **Nominal**

STE Trending Samples





SEPT Instrument Evaluation

- **Subsystems tested:**
  - **SEPT Housekeeping**
    - **Detector leakage currents** — **In limits, trend with temperature**
    - **Temperature** — **In limits**
    - **Voltage rails 2.6D, 5.3D, 5.6A** — **In limits, trend flat**
  - **Detector end-to-end, background** — **OK, tested with ^{60}Co source**
  - **Analog electronics** — **OK, tested with inflight test pulser**
  - **Digital electronics** — **OK, tested with inflight test pulser**
  - **Commands** — **OK**
  - **SEPT Science data** — **OK**
  - **SEPT Doors**
    - **Limited life items** — **Not tested routinely**
    - **Tested subsequently** — **OK**
  - **SEPT Operational Heater** — **Not tested except in thermal vac**
  - **SEPT Non-Operational Heater** — **Not tested except in thermal vac**

FM1 SEP_Central CPT Evaluation

- **Subsystems Tested**
  - **LVPS (secondary voltages, primary current)** — **In limits, trend flat***
  - **Post-Regulator for SIT (voltage only monitored)** — **In limits, trend flat***
  - **Bias Supply (pos. & neg. voltage taps)** — **In limits, trend flat***
  - **Housekeeping packet contents** — **In limits**
  - **SEP_Central boot message, checksums** — **OK**
  - **Sensor boot messages, checksums** — **OK**
  - **Sensor science packet App Id** — **OK**
  - **Sensor interfaces** — **OK**
  - **SEPT science packet format** — **OK**
  - **SEPT Operational Heater control** — **OK**

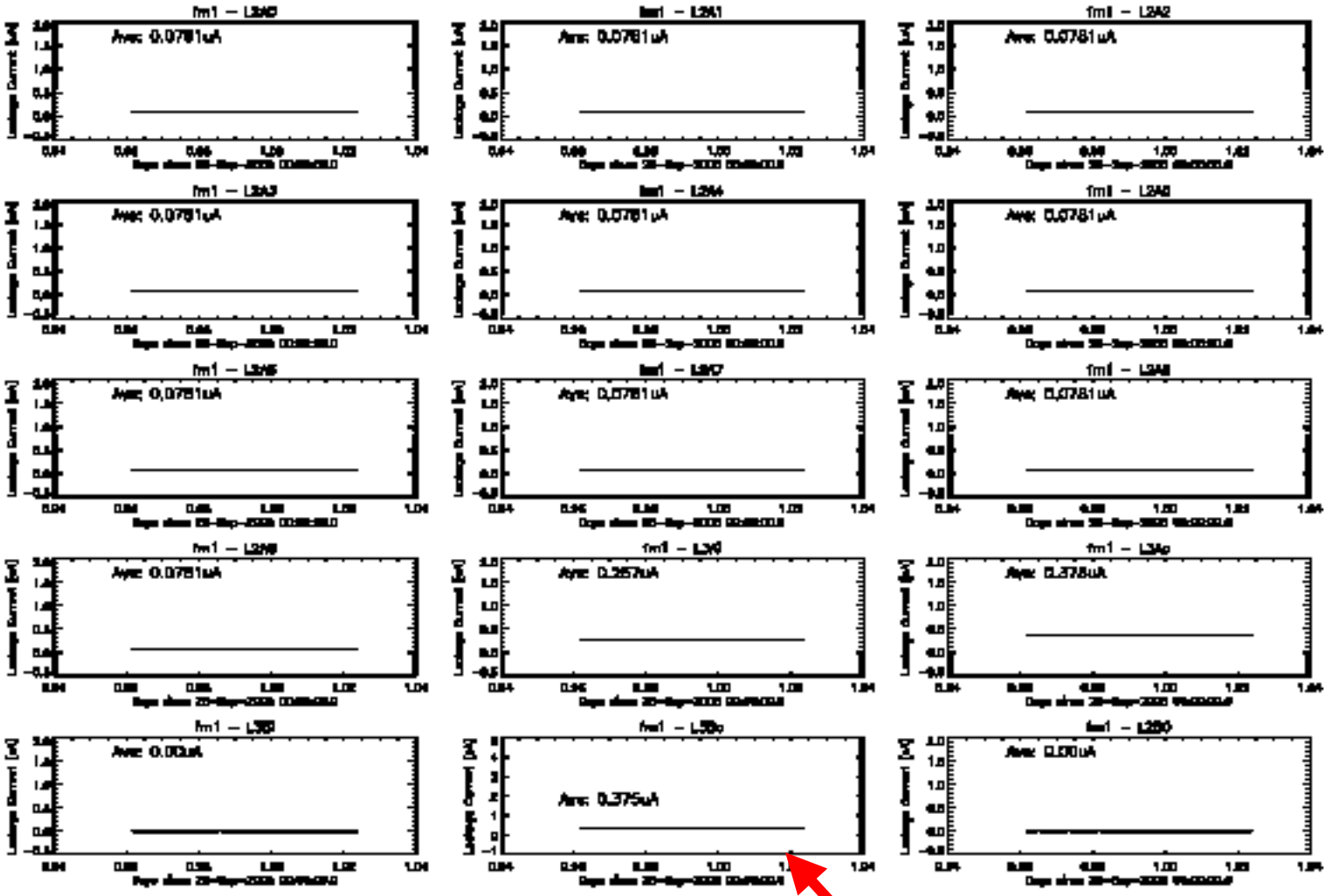
* **Due to SEP sensor development at different institutions, SEP suite was mainly tested in piece-meal fashion before full integration on S/C. The housekeeping parameters show a predictable step in trending when loads change because of sensor configuration change.**

FM1 LET CPT Evaluation

- **Subsystems Tested:**
  - Housekeeping (leakage currents & temperatures) — In limits
  - MISC boot message, checksums — OK
  - Internal Pulser — OK
  - Quiet Mode — OK
  - ADC Mode — OK
  - Threshold Mode — OK
  - Detector end-to-end — Not routine CPT test
    - Tested during LET Source Test on S/C on 9/28/05 — OK
  - Preamps, signal chain — OK
  - Operational Heater — OK

- **Performance Data:**
  - Gains & Offsets trending — Nominal
  - Leakage Currents vs. Temperature trending — Nominal

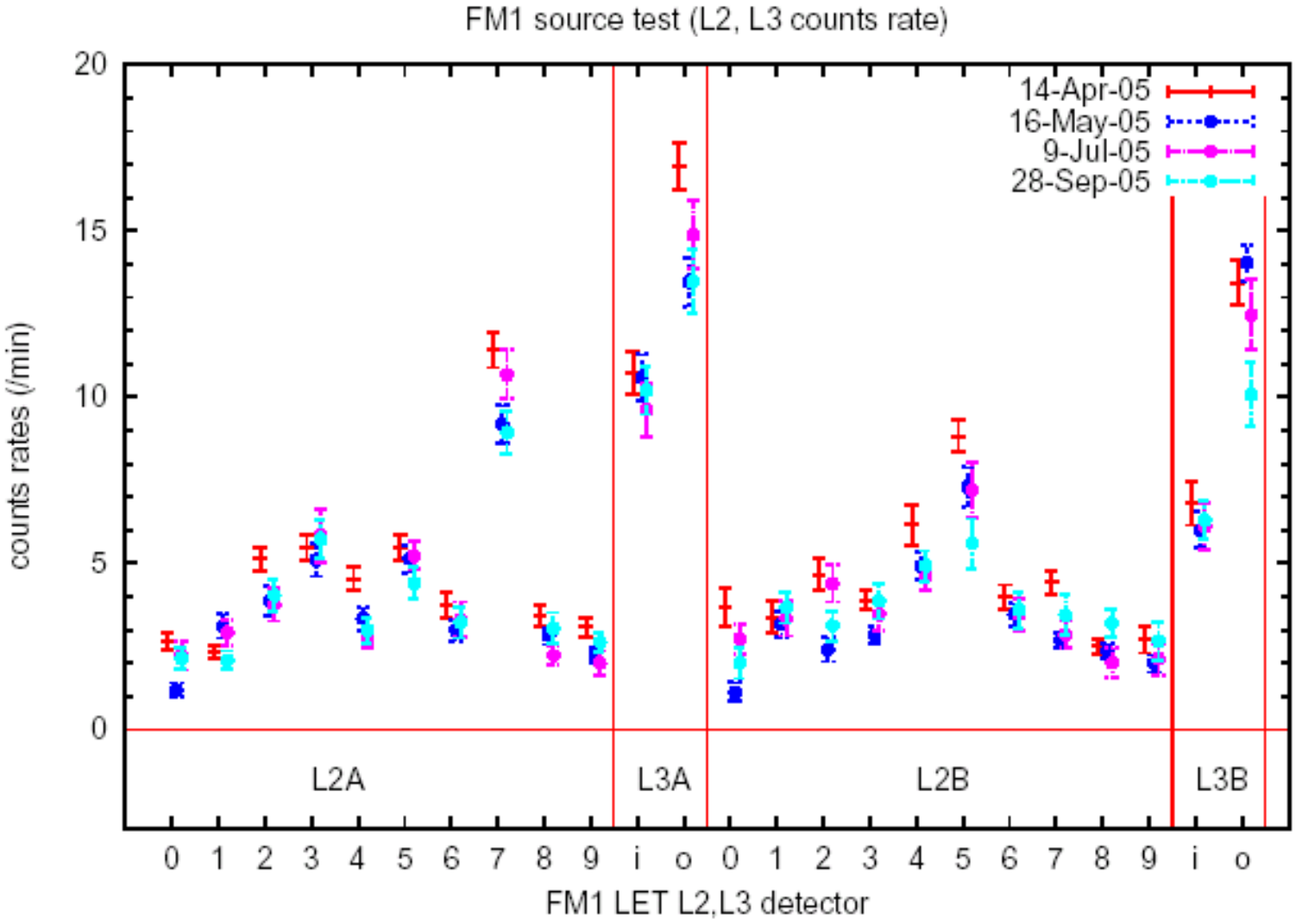
Sample FM1 LET leakage currents vs time during CPT



FM1 L3B detector looks OK but should be watched closely in upcoming environmental testing – it's a suspect double-oxide device and was showing leakage current growth before delivery.

something to watch

Sample FM 1 LET Trending Data (Source Tests)



Curtis

FM2 SEP_Central CPT Evaluation

- **Subsystems Tested**
  - **LVPS (secondary voltages, primary current)** — **In limits, trend flat***
  - **Post-Regulator for SIT (voltage only monitored)** — **In limits, trend flat***
  - **Bias Supply (pos. & neg. voltage taps)** — **In limits, trend flat***
  - **Housekeeping packet contents** — **In limits**
  - **SEP_Central boot message, checksums** — **OK**
  - **Sensor boot messages, checksums** — **OK**
  - **Sensor science packet App Id** — **OK**
  - **Sensor interfaces** — **OK**
  - **SEPT science packet format** — **OK**
  - **SEPT Operational Heater control** — **OK**

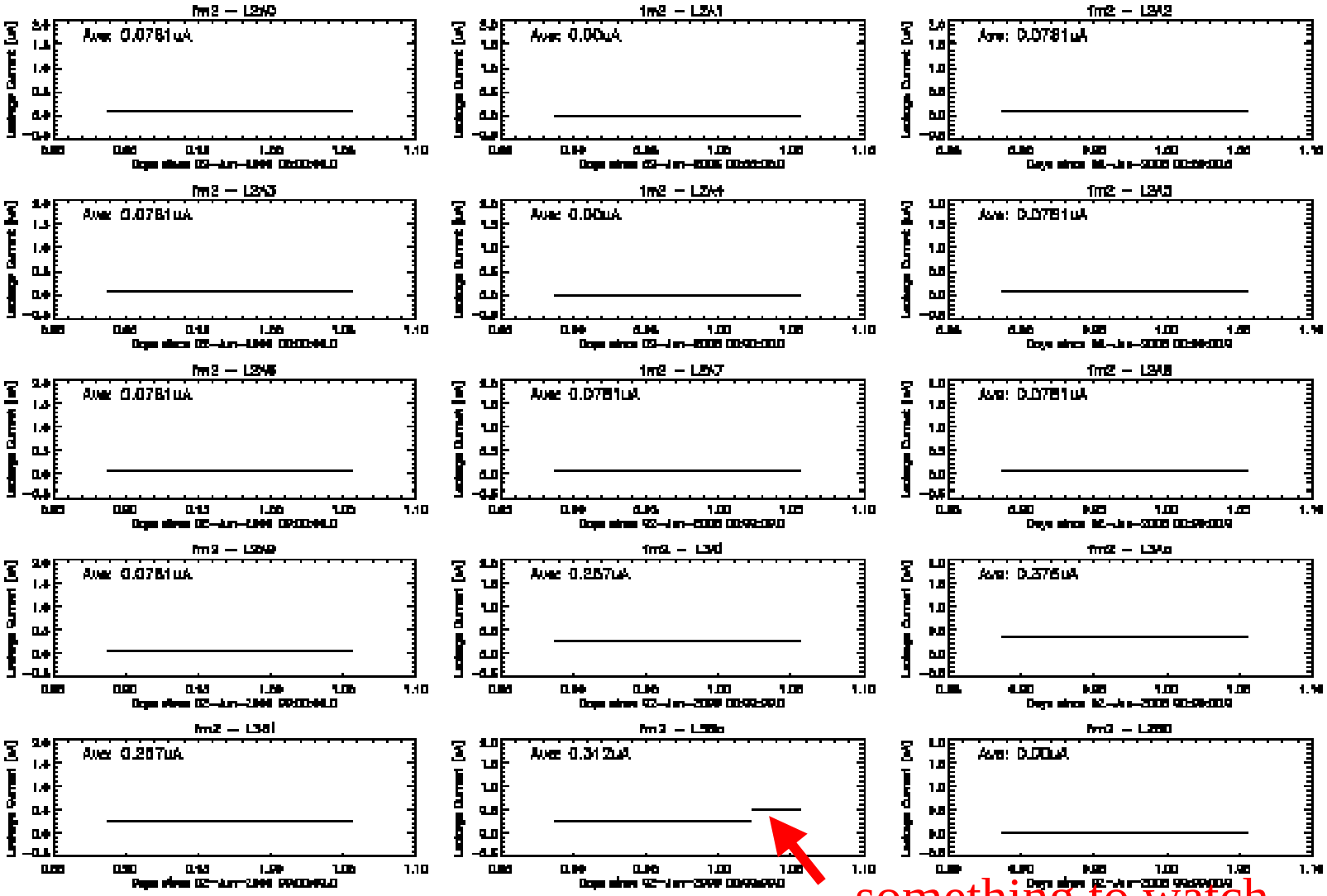
***** **Due to SEP sensor development at different institutions, SEP suite was mainly tested in piece-meal fashion before full integration on S/C. The housekeeping parameters show a predictable step in trending when loads change because of sensor configuration change.**

FM2 LET CPT Evaluation

- **Subsystems Tested:**
  - Housekeeping (leakage currents & temperatures) — In limits
    - L3B (suspect double-oxide device) may be showing growing leakage current
  - MISC boot message, checksums — OK
  - Internal Pulser — OK
  - Quiet Mode/ADC Mode/Threshold Mode — OK/OK/OK
  - Detector end-to-end — Not routine CPT test
    - Tested during LET Source Test on S/C on 9/19/05 — OK
  - Preamps, signal chain — OK
  - Operational Heater — OK

- **Performance Data:**
  - Gains & Offsets trending — Nominal
  - Leakage Currents vs. Temperature trending — Nominal but see above

Sample FM2 LET leakage currents vs time during CPT

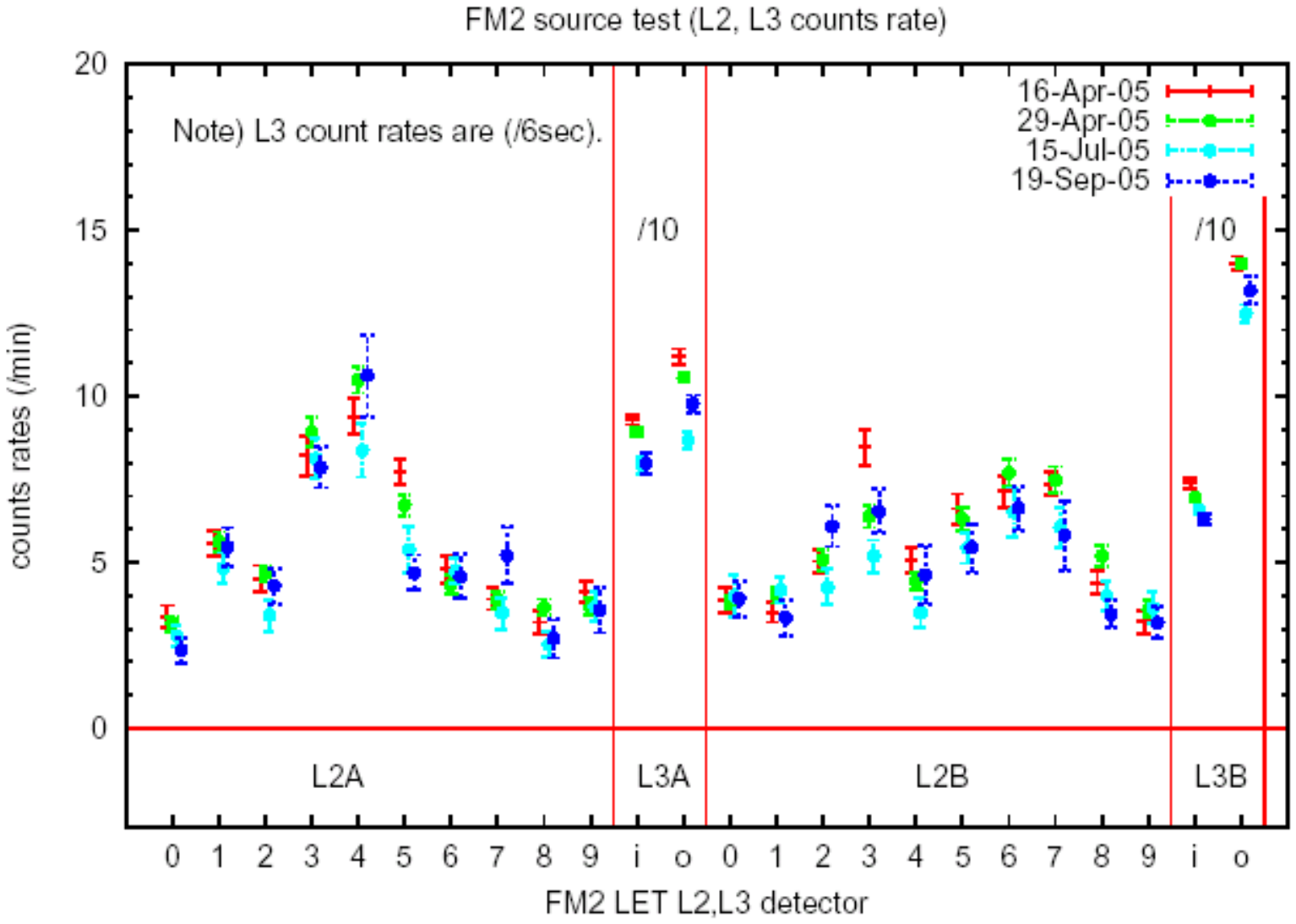


FM 2 L3B detector should be watched closely in upcoming environmental testing – it's a suspect double-oxide device and may be showing leakage current growth.

something to watch

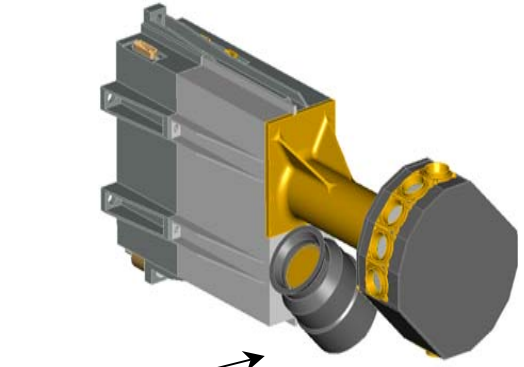
Curtis

Sample FM 2 LET Trending Data (Source Tests)



HET Sensor Test Objectives

- **Subsystems**
  - **Power supply (low voltage and bias)**
  - **MISC processor/logic**
  - **Serial communications with SEP Central**
  - **PHASIC chips command registers**
  - **Detector health**
  - **Internal stimulus pulser**
  - **Preamplifier voltage**
  - **Housekeeping and Thermistors**
  - **Software modes and processing checks**



HET Subsystem Tests and Verification

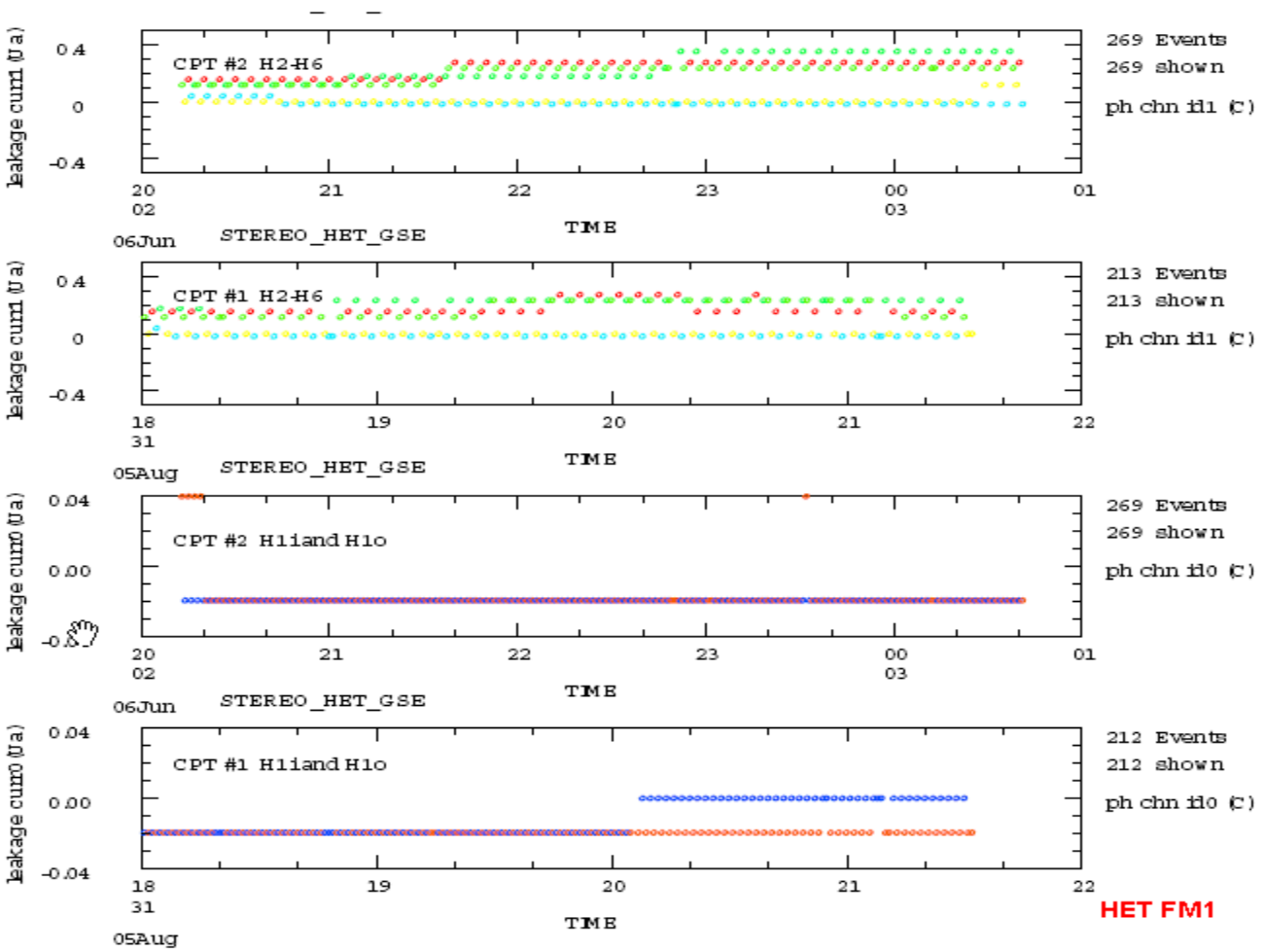
Subsystem Tests	Verification Parameters	FM1	FM2
Load binary into MISC memory *	Boot messages and checksums	Verified	Verified
Lookup table memory loads *	Table checksums and HK contents	Verified	Verified
Telemetry packet flow *	Science and HK contents	Verified	Verified
Command software modes *	Science and response packet contents	Verified	Verified
Command PHASIC chip registers (verifies interface with PHASIC chips)	PHASIC chips configured, HK and science packet contents	Verified	Verified
Detector leakage currents	HK contents	In range	In range
Noise level on detector channels	High (<100) and low gain (<20) rate counts	In range	In range

* Verifies communications with SEP Central

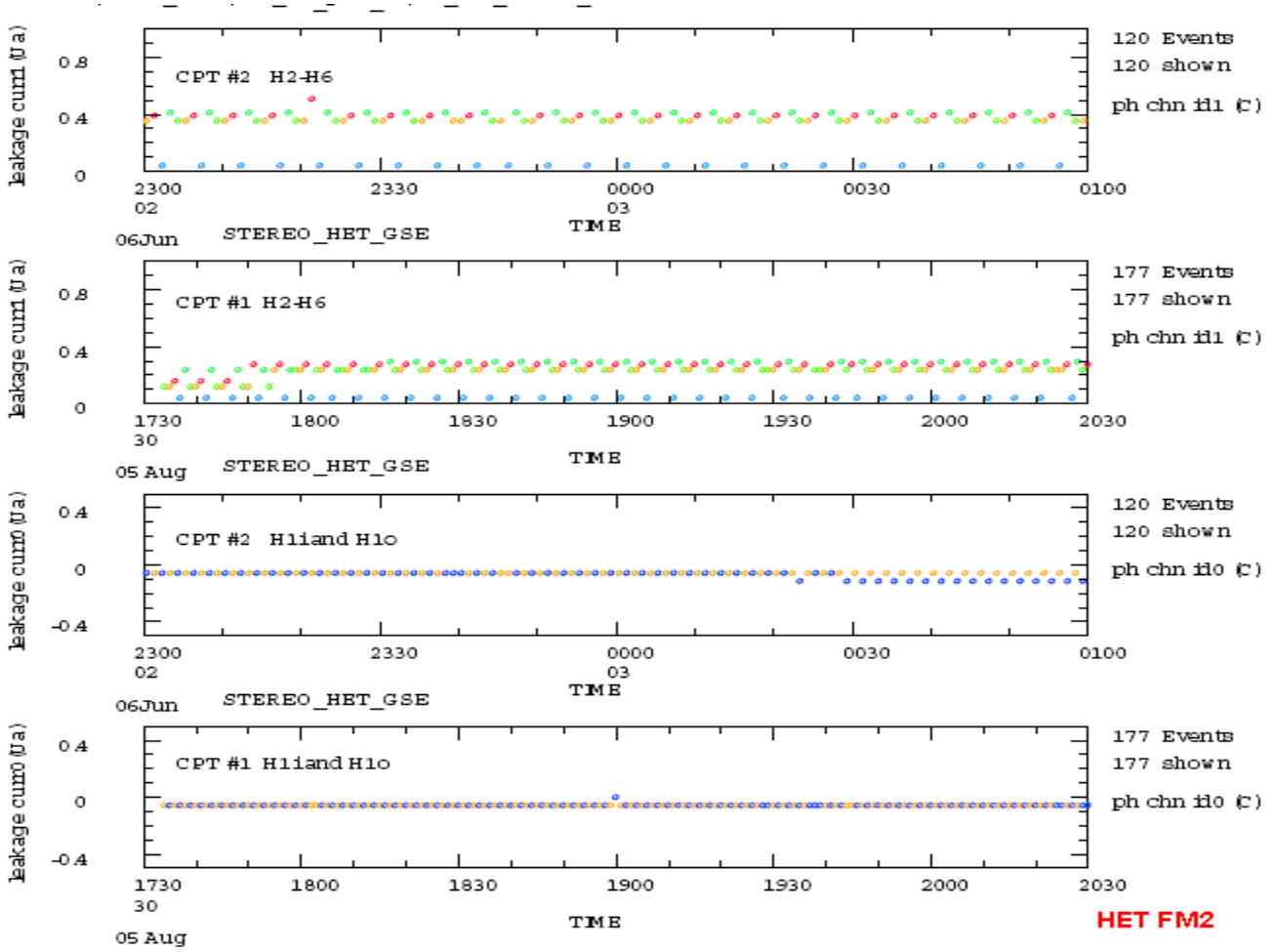
HET Subsystem Tests and Verification

Subsystem Tests	Verification Parameters	FM1	FM2
Internal stimulus pulser setup to pulse different event types	Stimulus events generated, read from PHASIC buffers, event types identified, queued and processed	Correct	Correct
Internal stimulus pulser setup to pulse channels with different offsets and gains	Offsets, gains and rate counts from science packets	In range	In range
Thermistors operation	Temperature values in HK packet	In range	In range
Software control of preamplifier voltage	Preamplifier voltage in HK packet	In range	In range
106 Ruthenium beta source placed over telescope (special test)	Events read from PHASIC buffers, types identified, queued and processed	In range	In range

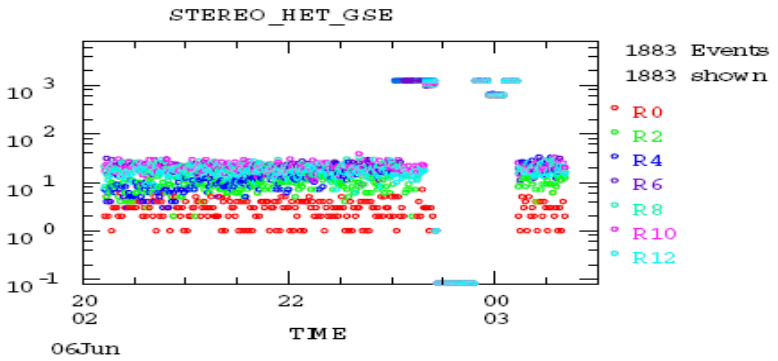
HET FM1 Detector Leakage Currents

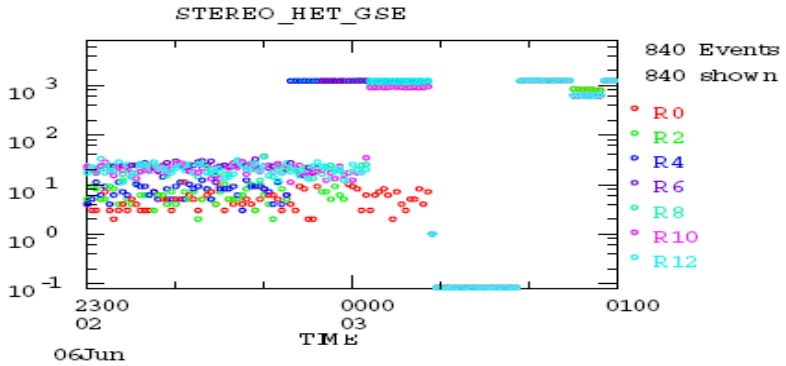


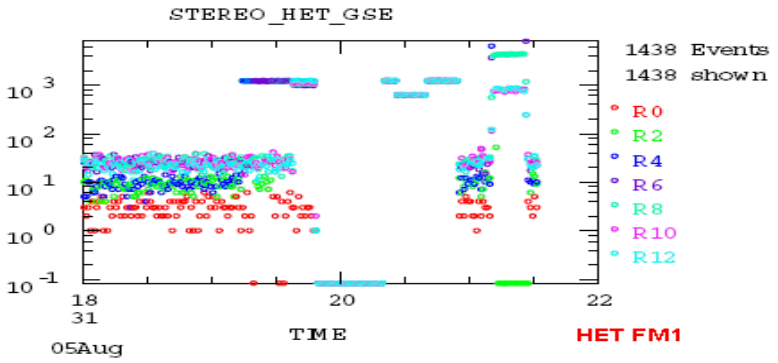
HET FM2 Detector Leakage Currents

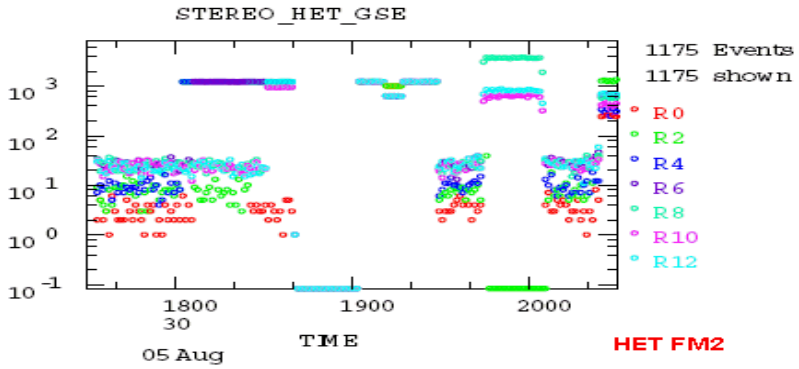


HET High Gain Singles Rates









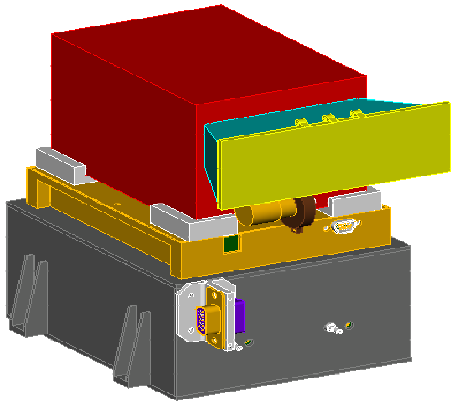
* High counts periods during pulser test runs

HET Sensor Test Summary

- **Subsystems**
  - **Power supply (low voltage and bias)** — **OK**
  - **MISC processor/logic** — **OK**
  - **Serial communications with SEP Central** — **OK**
  - **PHASIC chips command registers** — **OK**
  - **Detector health** — **OK - Trended**
  - **Internal stimulus pulser** — **OK**
  - **Preamplifier voltage** — **OK - Trended**
  - **Houskeeping Thermistors** — **OK - Trended**
  - **Software modes and processing checks** — **Verified**

SIT Sensor Test Objectives

- **Subsystems**
  - **Power supply (low voltage, high voltage, bias)**
  - **MISC processor/logic**
  - **Serial communications with SEP Central**
  - **Solid State Detector health**
  - **Time of flight electronics**
  - **Energy electronics**
  - **Housekeeping and Thermistors**
  - **Door actuator (not part of the normal CPT)**
  - **Software modes and processing checks**



SIT Subsystem Tests and Verification

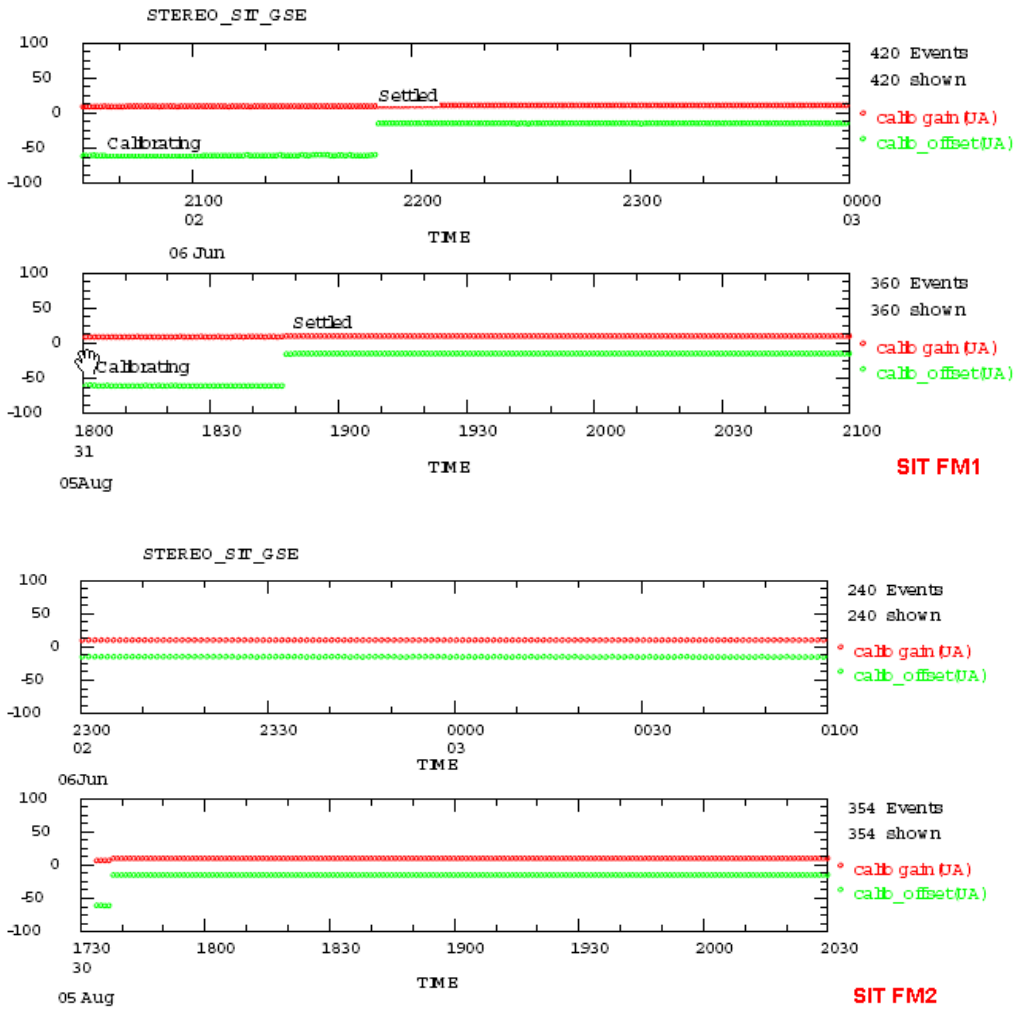
Subsystem Test	Verification Parameters	FM1	FM2
Load binary into MISC memory *	**Boot messages and checksums**	**Verified**	**Verified**
Lookup table memory loads *	**Table checksums and HK contents**	**Verified**	**Verified**
Telemetry packet flow *	**Science and HK contents**	**Verified**	**Verified**
Command software modes (command system) *	**Science and response packet contents**	**Verified**	**Verified**
External pulser (functionality test for the energy, tof and logic)	**Stimulus events generated, queued and processed**	**Correct**	**Correct**
HK and Thermistors (verifies low voltage and HK circuitry is working)	**Temperature values in HK packet (Tof, Foil and SSD), ToF calibration offset and gain**	In range	In range
High voltage enabled (verifies high voltage turn on)	**Ramp to 26v (HV disable plug installed)**	Ok	Ok
Noise level on detectors (monitors detector health)	Stop (0), Start (0), SSD (<20)	**In range**	**In range**

* Verifies communications with SEP Central

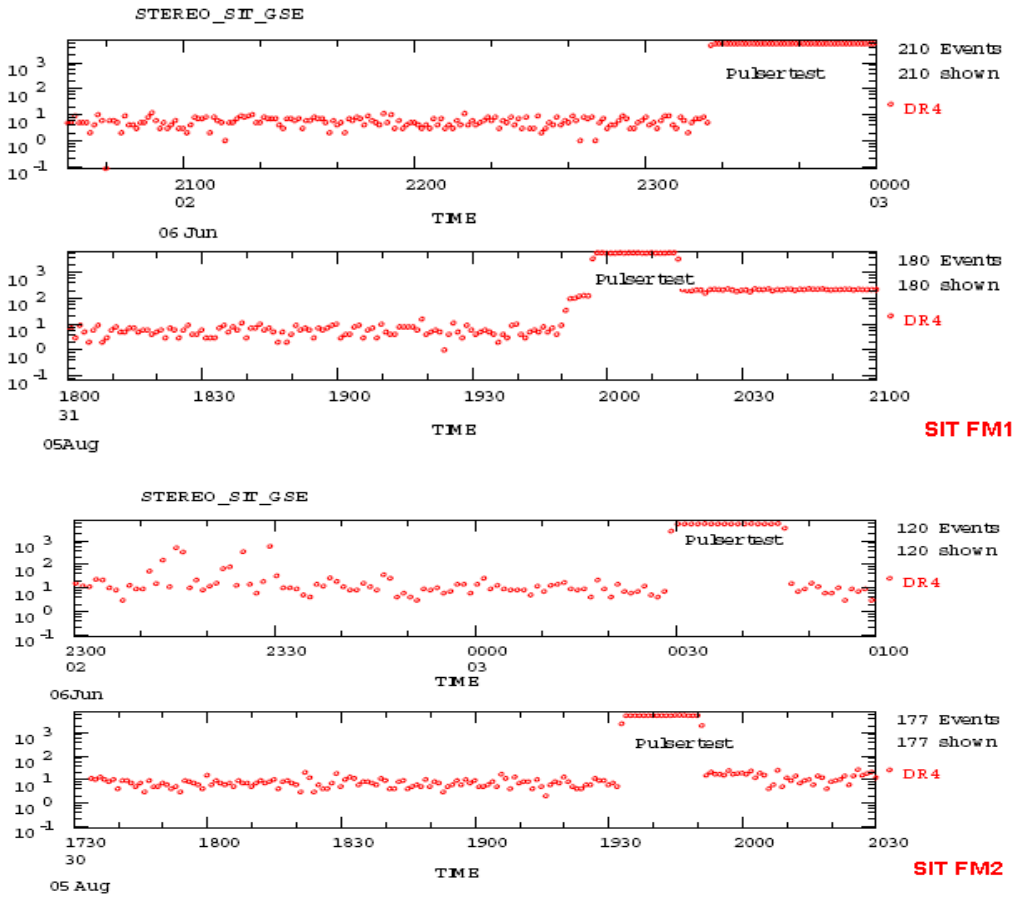
SIT Subsystem Tests and Verification

- Door actuator tests were successfully conducted on FM1 and FM2 during instrument TV and after spacecraft integration (not part of the normal CPT) .
- Alpha tests were previously conducted on FM1 and FM2 under vacuum during TV (not part of the normal CPT) . The Alpha tests perform a true end-to-end test of the SIT instrument, including high voltage at operating levels, all electronics and SSD and ToF detector systems.
- High voltage can only be turned up to operating voltages in high vaccum and with the disable plug removed.

SIT Tof Calibrations



SIT SSD Singles Rates



SIT Sensor Test Summary

- **Subsystems**
  - **Power supply (low voltage, high voltage, bias)** — **OK**
  - **MISC processor /logic** — **OK**
  - **Serial communications with SEP Central** — **OK**
  - **Solid State Detector health** — **Variable**
  - **Time of flight electronics** — **OK - trended**
  - **Energy electronics** — **OK**
  - **Housekeeping and Thermistors** — **OK - trended**
  - **Door actuator (not part of the normal CPT)** — **OK**
  - **Software modes and processing checks** — **OK**