Systems Engineering
(plus Data, Digital, Power)

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Who Am I?

• Recent history: Project Engineer for
  – RXTE: All Sky Monitor and Experiment Data System \textit{(in year 10 of operation)}
  – Chandra: CCD spectrometer \textit{(in year 6 of operation)}
  – VOILa: a virtual reality experiment on ISS; cancelled last Fall.

• Currently:
  – Chief Engineer for Center
  – CRaTER Project Engineer
Engineering Web Site
<http://snebulos.mit.edu/projects/crater/>

• Configuration Data Base
  – Repository for all past and present controlled documents, drawings, parts, etc.
  – Upload capability for ECOs and general info
  – Report generator

• Reference Documents
CRaTER Coincidence Logic

CRaTER Sensor Head Logic

- Detector geometry and coincidences between detector signals allow for determination of “good” versus “bad” particle event

- “Good” event is one in which pathlength through stack is well-determined and from which LET can be determined

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<tr>
<th>Coincidences</th>
<th>Comments on constraints of particle path lengths</th>
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<td>2•3•4•5</td>
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<td>Al1 and TEP1 ól's well constrained</td>
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<td>Scatter diagnostic</td>
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<td>Scatter diagnostic; TEP2 ól still well constrained</td>
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Flight Resources

• Mass Best Estimate
  – Proposal: 4.3Kg
  – Current WAG: 4.5Kg + x from Guilio

• Power Best Estimate
  – Proposal: 4.6W
  – Current WAG: 4.2W + A/D converters

• Data
  – Typical: 400bps  Flare: 100Kbps
Data System Requirements

- 1553 interface to spacecraft
- CCSDS packets to data system
- 12 bit resolution of science data
- Flexibility to handle detector noise
- Flexibility to handle data rates
- Flexibility to handle event selection
Thermal System

• Not staffed up yet.
• With single layer MLI over both apertures and multilayer elsewhere, not a difficult problem.
• Six feet through which to conduct heat.
• Curious as to what thermal environment is predicted (hot is noisier for detectors than cold).
Flight Operations

- Instrument has one operating mode (currently 16 bytes of configuration data)
- CCSDS packets up and down
- Internal calibration is a single command
- External (flight) calibration is the regular operating mode, pointed off nadir.
- Will request real time engineering data feed.
Current Issues

• Power
  – Overhead cost of regulated power supplies
  – Rad-hard A/D converters
• Field-of-View and Accomodations
• Telemetry architecture
  – Reserved bandwidth for specific event classes?
• SEU error handling
Questions

• What is the schedule for Instrument ICDs?
• When will we see the Contamination Control Plan?
• Who is our contact for radiation info on parts?