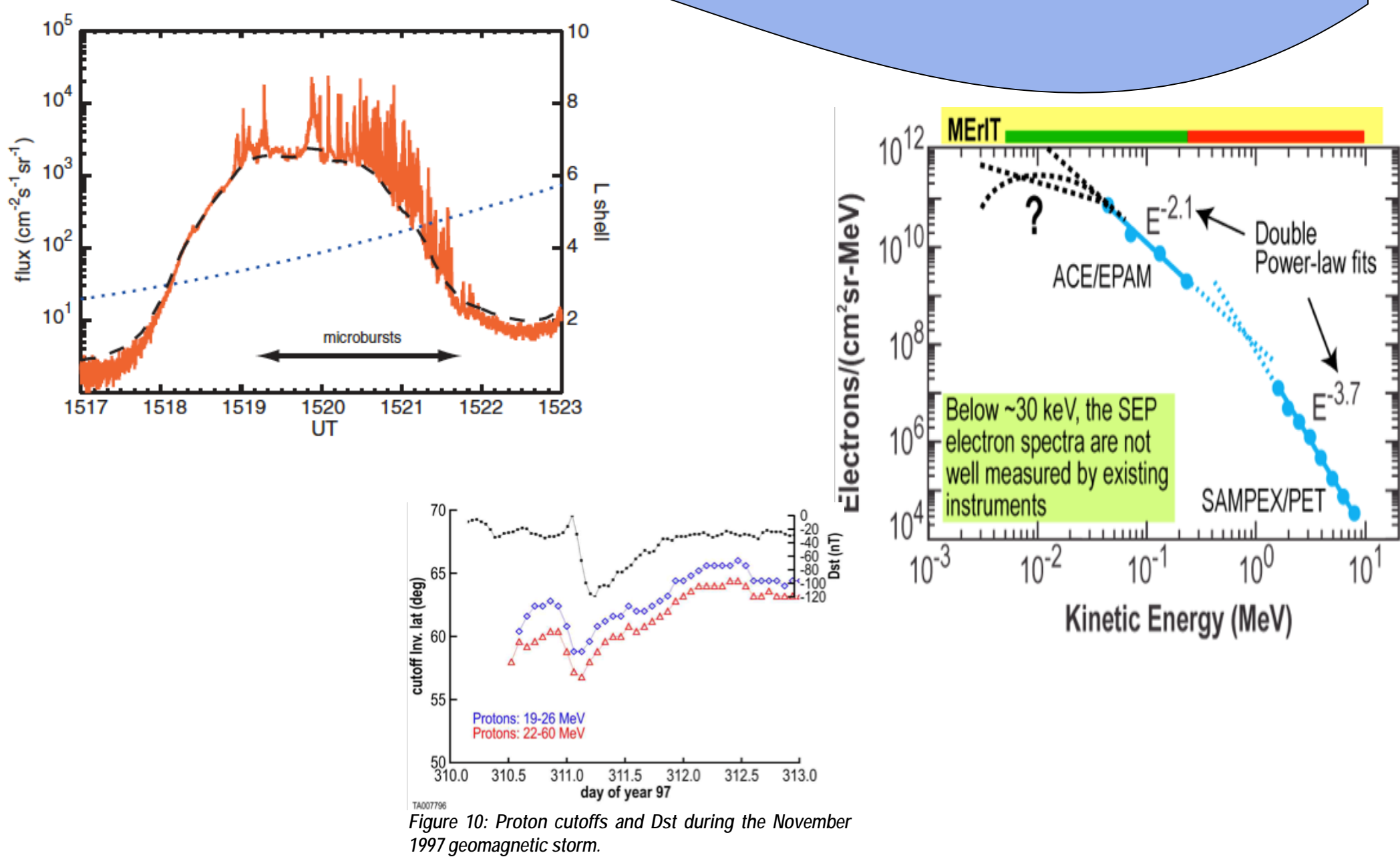


CeREs: a Compact Radiation bElt Explorer

PI: Shri Kanekal, Code 672

Mission Objective

To further our understanding of relativistic electron energizations and loss and in particular loss due to microbursts. The Secondary science objective is to study low energy solar flare electrons. In addition, we will also study the access of solar protons to the near Earth environment, an important aspect of space weather.

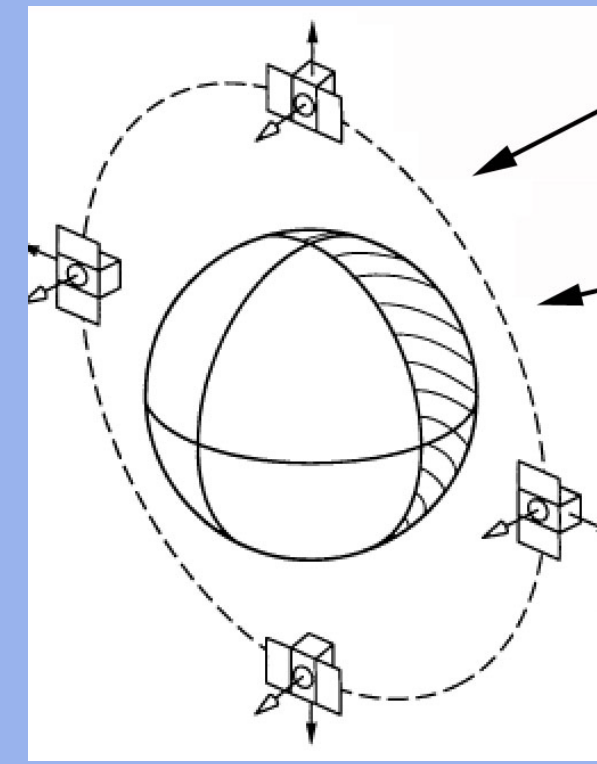


GSFC: Ashley Jones, Brent Randol, Deepak Patel, Errol Summerlin, Eric Gorman, Gary Crum, Georgia De Nolfo, Nikolaos Paschalidis, Sabrena Heyward, Sara Riall, Scott Schaire, Tom Flatley, Zach Boblitt, Allison Willingham

SWRI: Keiichi Ogasawara, Mehira Desai, Stefano Livi

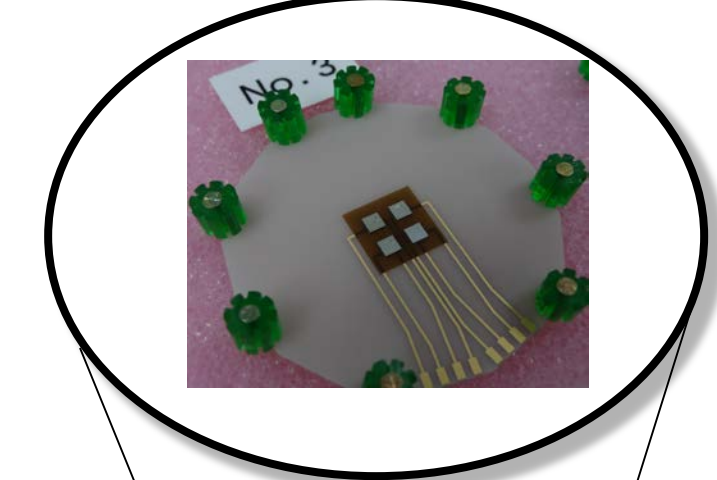
3U CubeSat in high inclination LEO

- 1U MERiT sensor
Miniaturized Electron Proton Telescope
SpaceCube Mini
- 1U Attitude control unit
(now 0.5U)
- 1U S/C control electronics,
batteries, C&DH boards
Synergistic science with Van Allen Probes

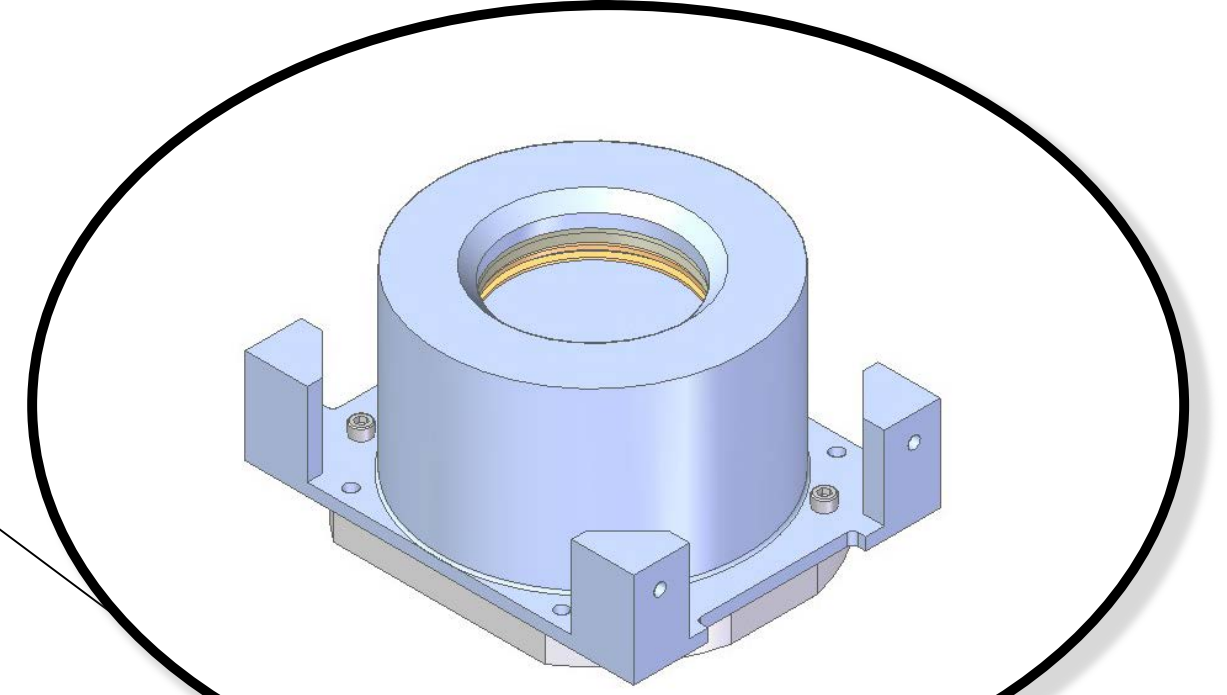
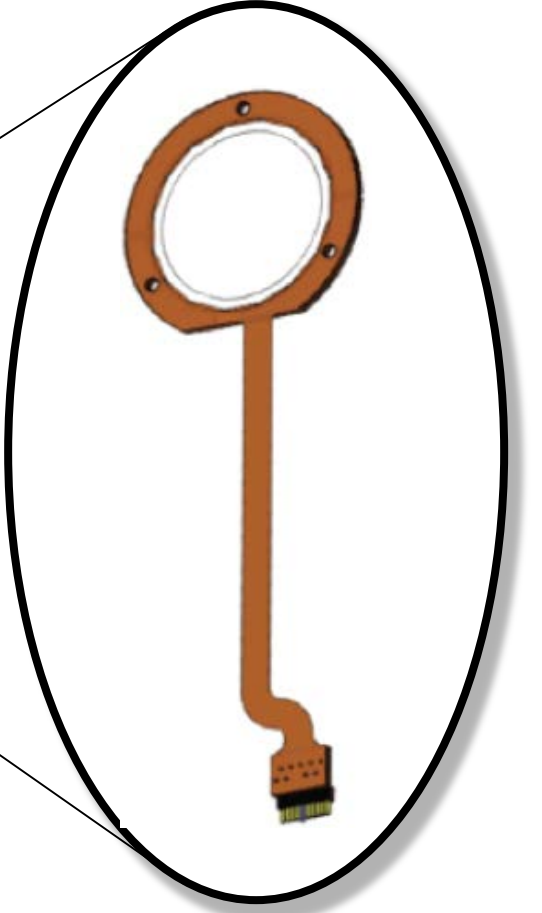


Objective	How are radiation belt electrons energized to relativistic energies and how are they lost?	
Measurements & Functional Parameters	Species & Energy range	
	Electrons	~5 keV-10 MeV
	Protons	~200 keV-100 MeV
	Energy Resolution	$\Delta E < 30\%$
	Cadence & Time Resolution	5ms - 1s
	Geometry Factor (cm ² sr)	~20 cm ² -sr
Resource Parameters	Power (W)	< 1 W
	Data Rate (kbps)	14.4 kbps

4 APDs mounted on AlN substrate



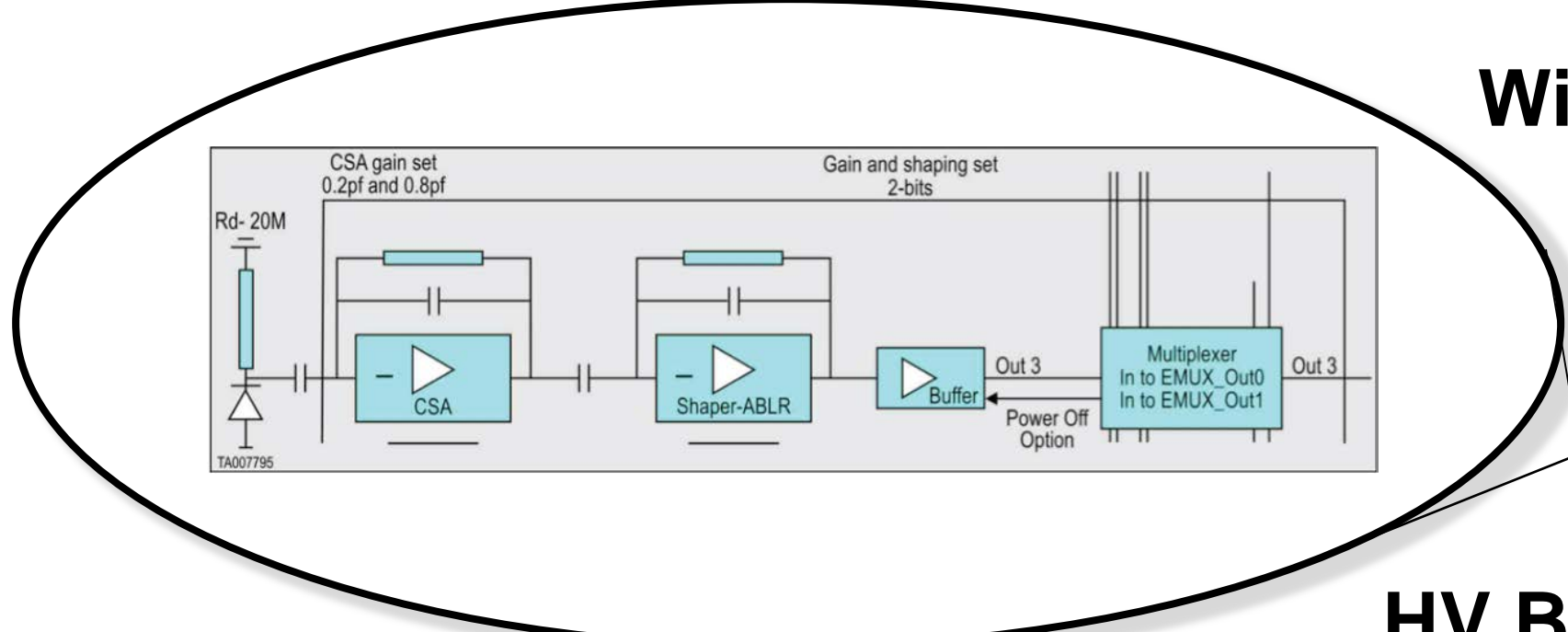
8 SSDs



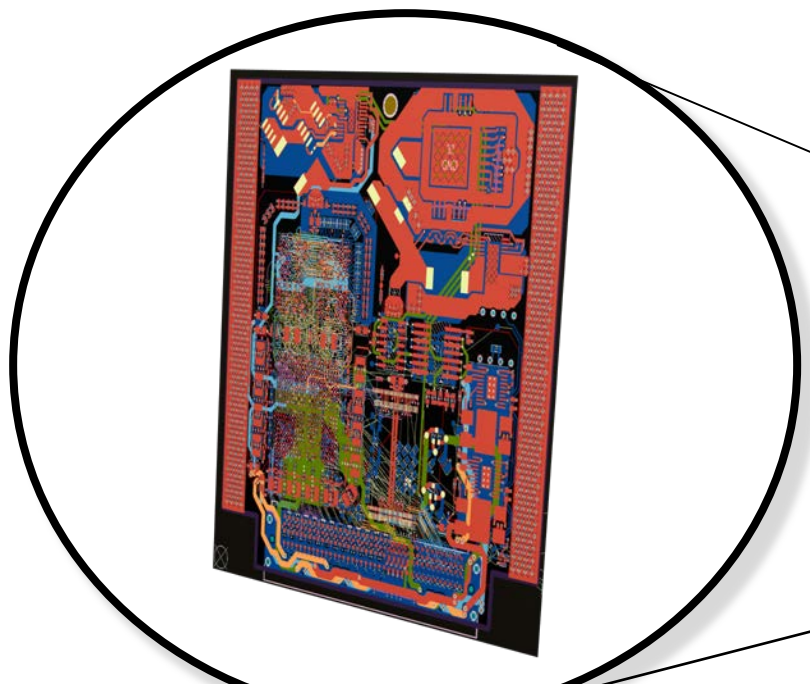
MeRiT housing

- ◆ Geometry factor ~.2 cm²-sr-sec
- ◆ Electrons: 5 keV – 200 keV APD
500 keV - 10MeV SSD
- ◆ Differential channels: protons – 6
electrons – 7
- ◆ $\Delta E \sim 30\%$

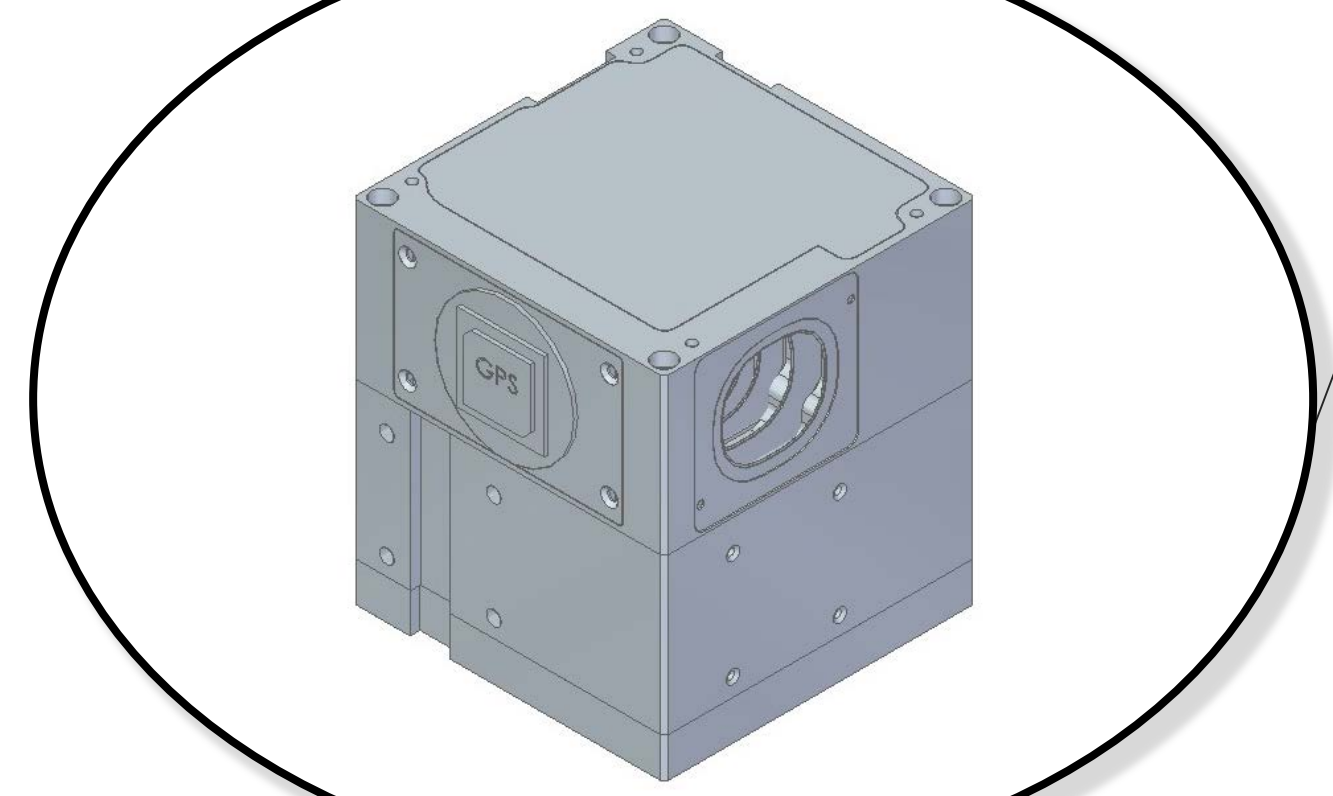
Front end electronics, 4 channels per chip



CHREC CSP



XB1



MERiT

Wiring Support

Energy ASIC

HV Bias/Comparator

HV Bias/Comparator

HV Bias/Comparator

CSP

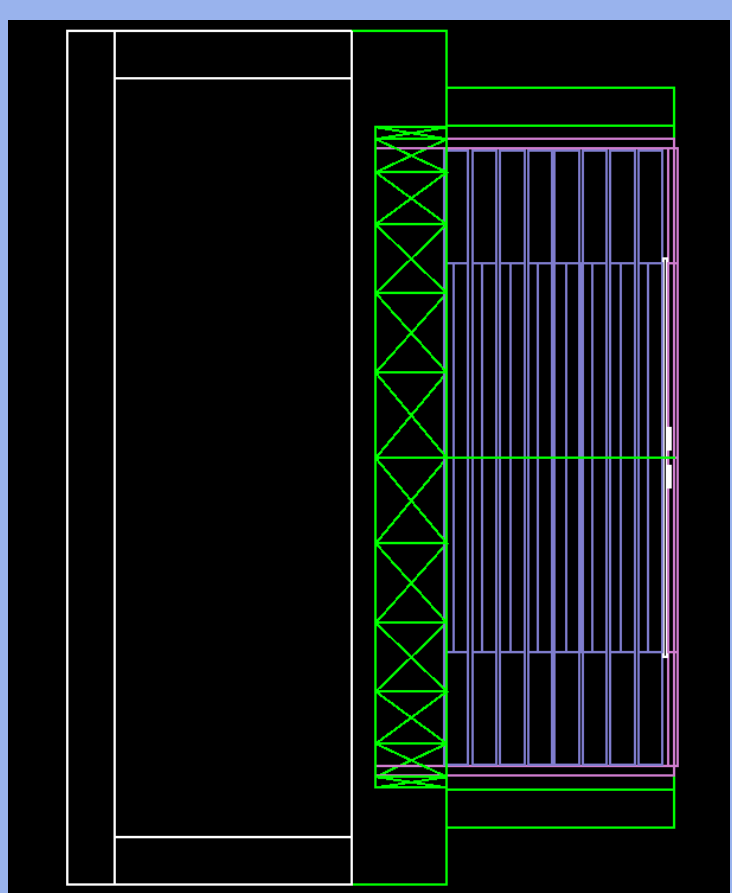
XB1

L3 Cadet Radio

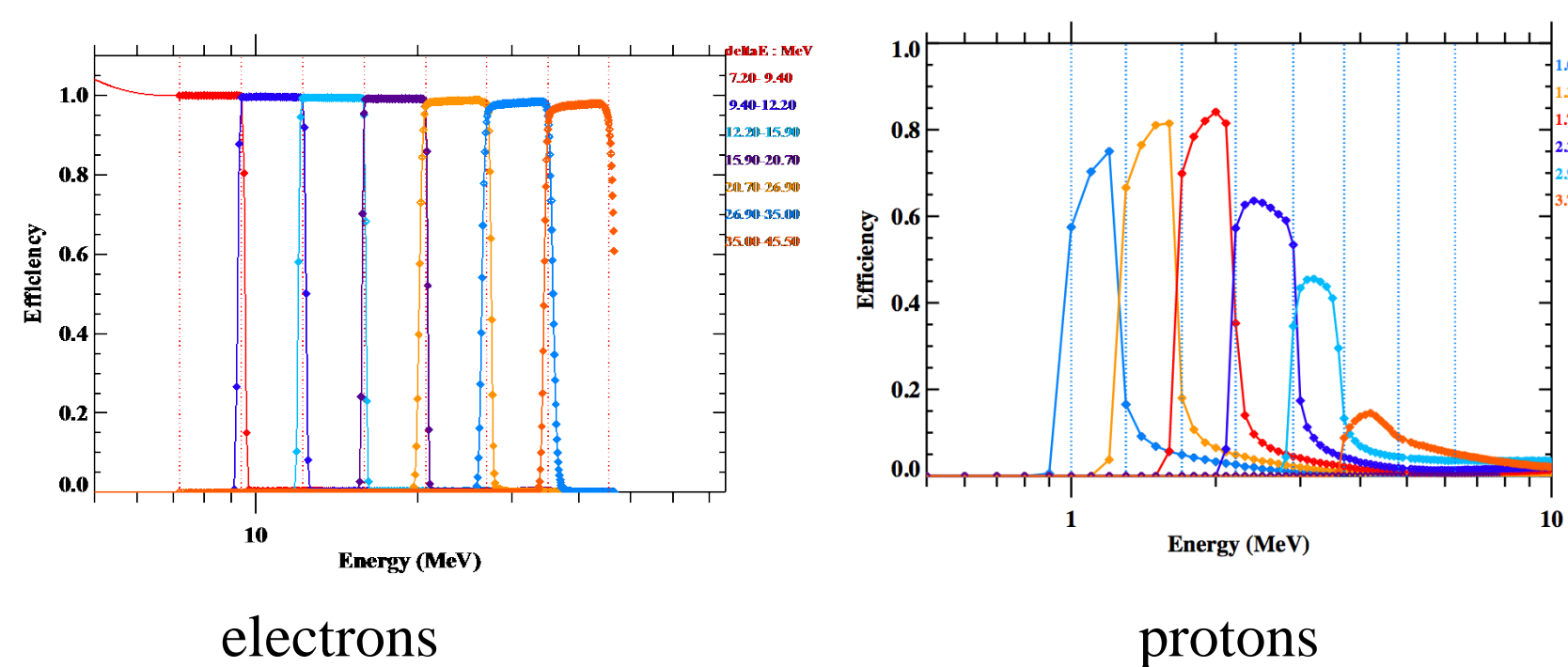
ISIS Antenna

Component	Mass (grams)		
	CBE	Contingency	Alloc.
Total CeREs Mass	4385.83	1.7%	4459.17
Payload Assembly	1769.99	3.8%	1836.65
XB1 Bus Assembly	1800.00	5.0%	1890.00
Clyde Space Solar Array Assembly	556.00	5.0%	583.80
AstroDev Lithium-1 Radio	52.00	5.0%	54.60
ISIS UHF Antenna	100.00	5.0%	105.00
GPS Antenna	14.20	25.0%	17.75
PPOD Interface Assembly	41.64	5.0%	43.72
Other	52.00	5.0%	54.60

MeRiT Design: Geant4

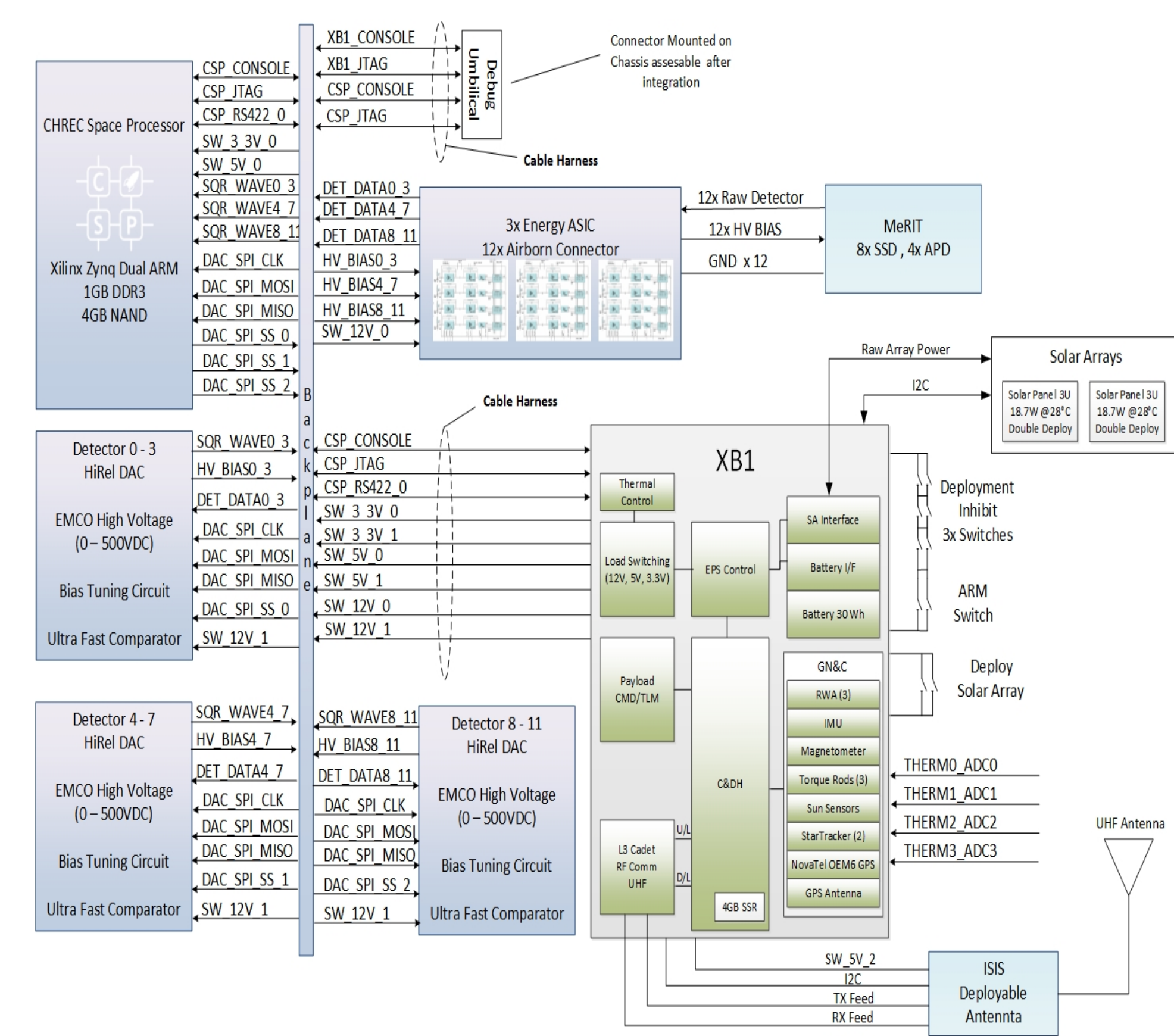


Detector efficiencies



Stats

- 3U Cubesat
 - 100 mm x 100 mm x 340.5 mm
 - 5 Subassemblies
 - Payload - 1.5U
 - In-House
 - Bus - 1.25U
 - Blue Canyon Technologies
 - Solar Clyde Space
 - PPOD Interface - 0.25U
 - In-House
 - UHF Antenna
 - Deployable
 - ISIS
 - Arrays (x2)
 - Deployable



First fully funded NASA Geo LCARS CubeSat
 ➤ Leveraged from GSFC IRAD
 ➤ CREPT – Compact Relativistic Electron Proton Telescope