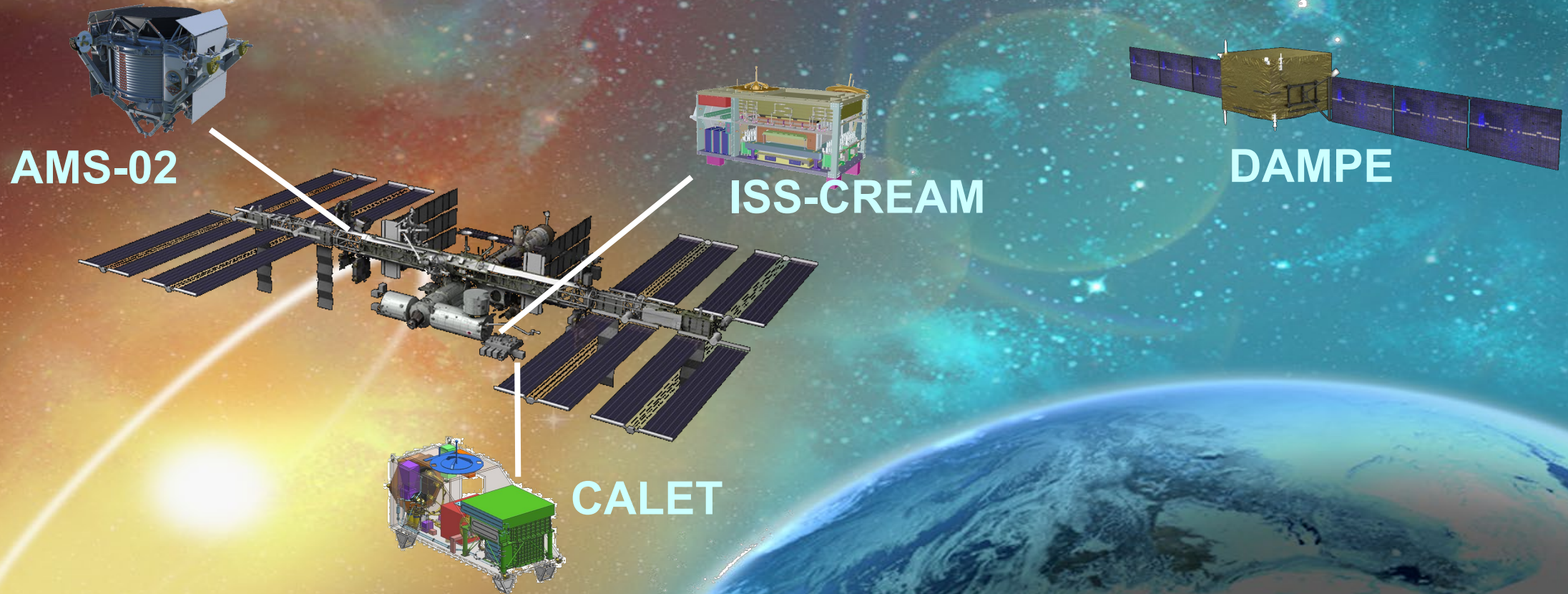


CRD 17

Nuclear CR spectra: theory and observations

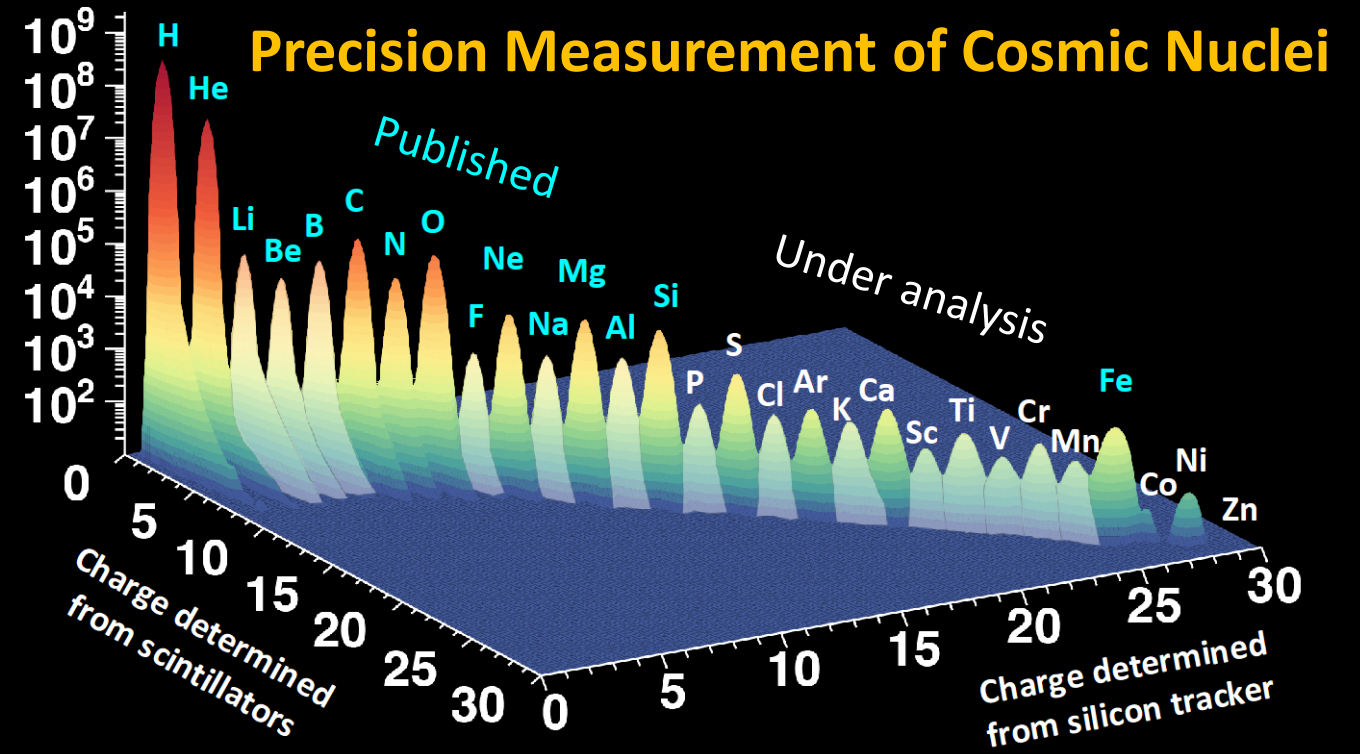
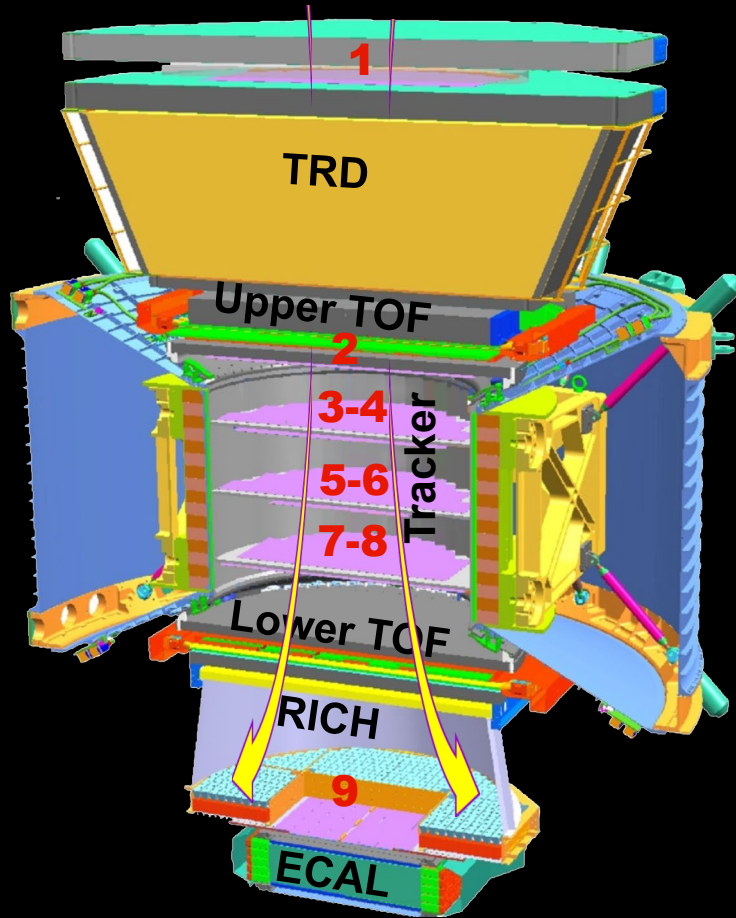
Conveners: Paolo Maestro, Brian Rauch, Eun-Suk Seo



Alpha Magnetic Spectrometer (AMS)

Launch:
Space Shuttle *Endeavour*
May 16, 2011

~180 Billion Events



Cosmic Ray Energetics And Mass CREAM for the ISS (ISS-CREAM)

Silicon Charge Detector (SCD)

- Precise charge measurements with charge resolution of $\sim 0.2e$
- 4 layers of 79 cm x 79 cm active area (2.12 cm^2 pixels)

Carbon Targets

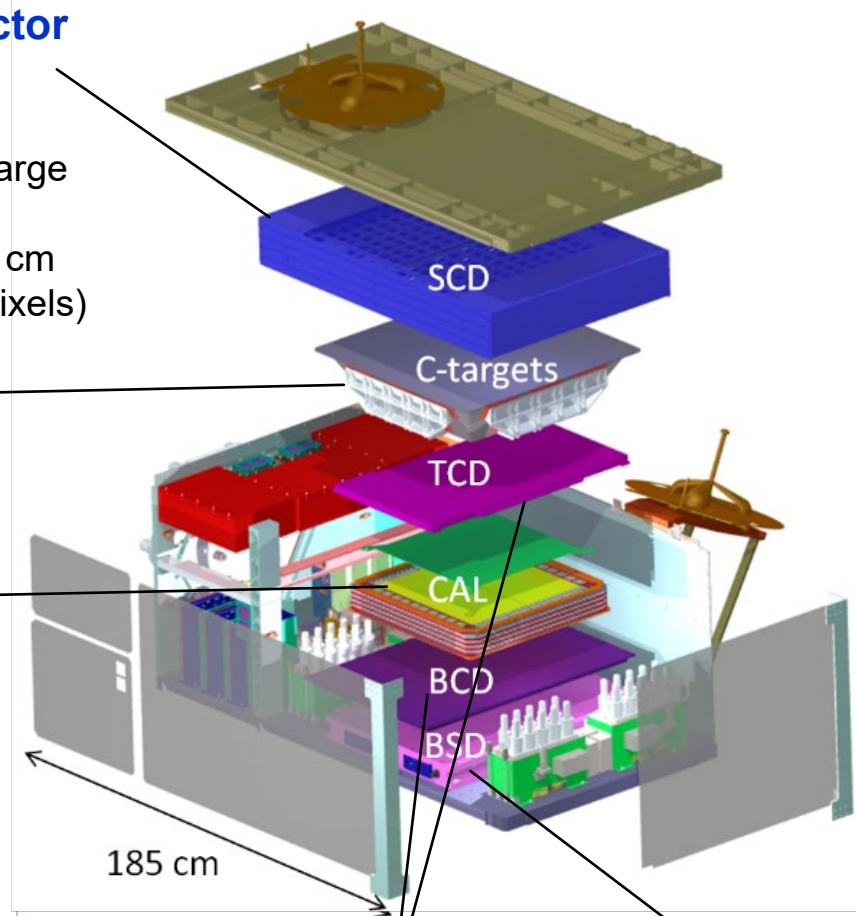
- Induces hadronic interactions

Calorimeter

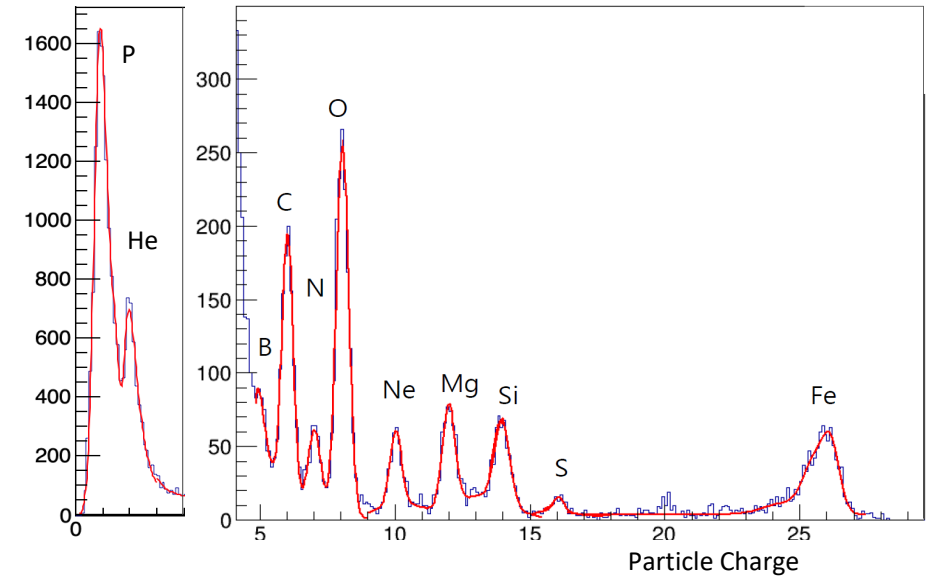
- 20 layers of alternating tungsten plates and scintillating fibers
- Determines energy
- Provides tracking and high energy trigger

Top/Bottom Counting Detector (T/BCD)

- Plastic scintillator instrumented with an array of 20 x 20 photodiodes for e/p separation
- Low energy trigger



Launch
SpaceX-12
8/14/2017 – 2/12/2019
539 days

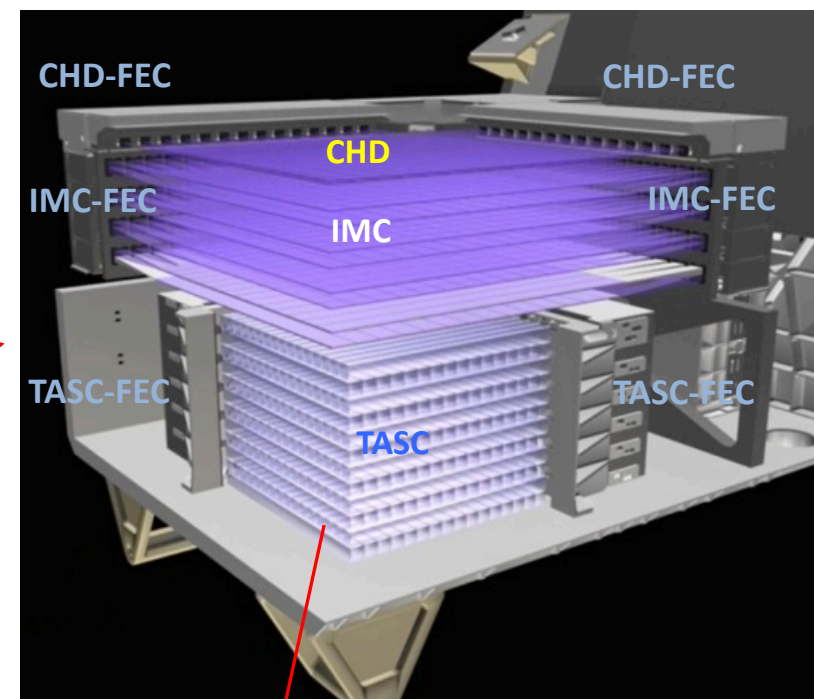
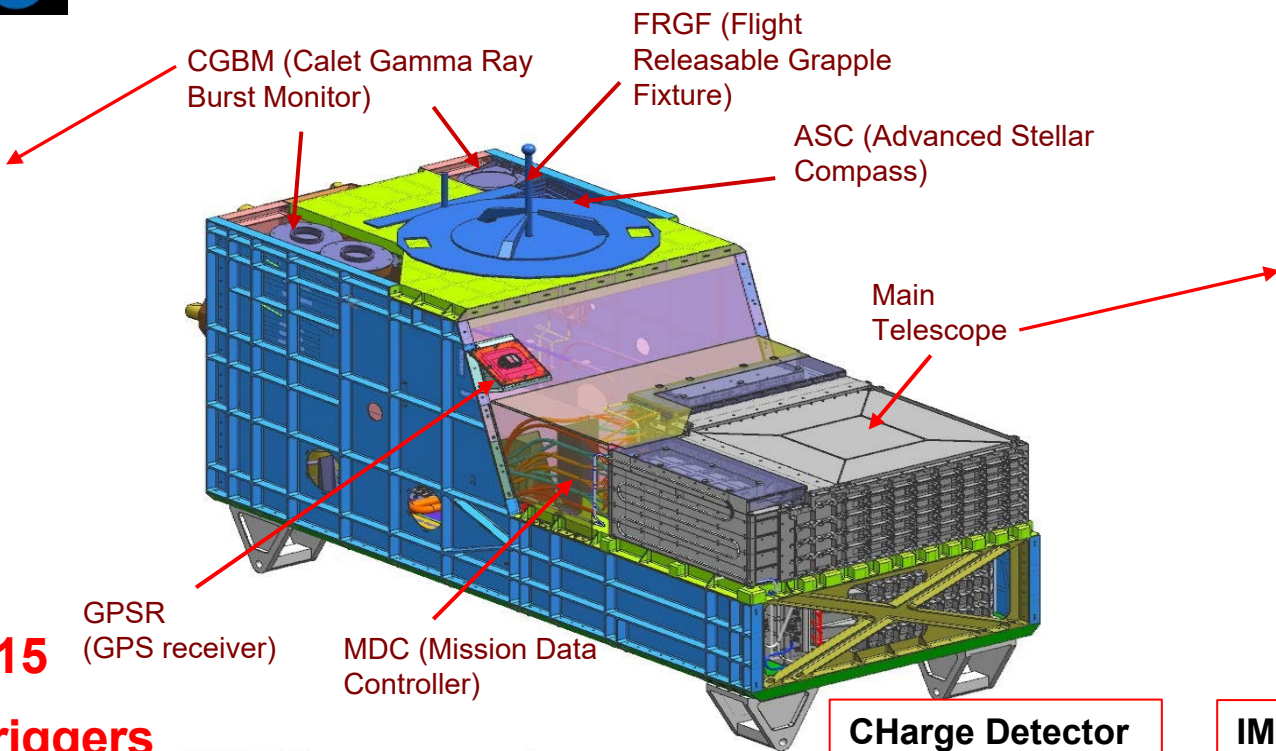


Boronated Scintillator Detector (BSD)

- Additional e/p separation by detection of thermal neutrons

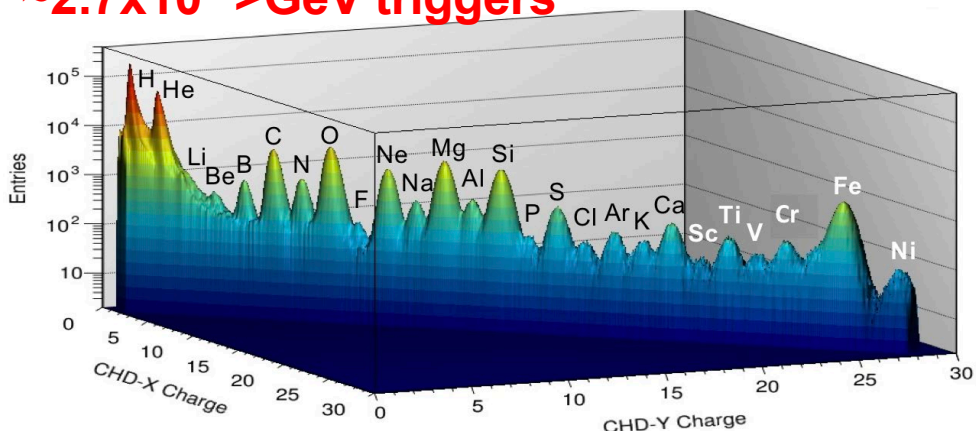


The CALET detector



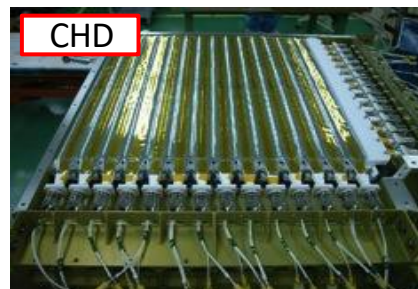
Stable operation since Oct. 13, 2015

~2.7x10⁹ >GeV triggers

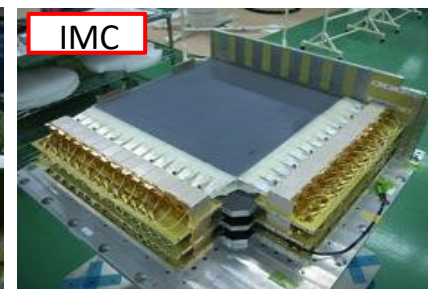


Wide dynamic range (1-10⁶ MIP)
Large thickness (30 X₀, ~1.3 λ)
Excellent charge ID (~0.2 e)

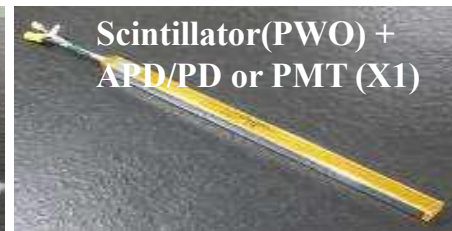
CHarge Detector
Charge ID Z=1-40



IMaging Calorimeter
Tracking, Charge ID



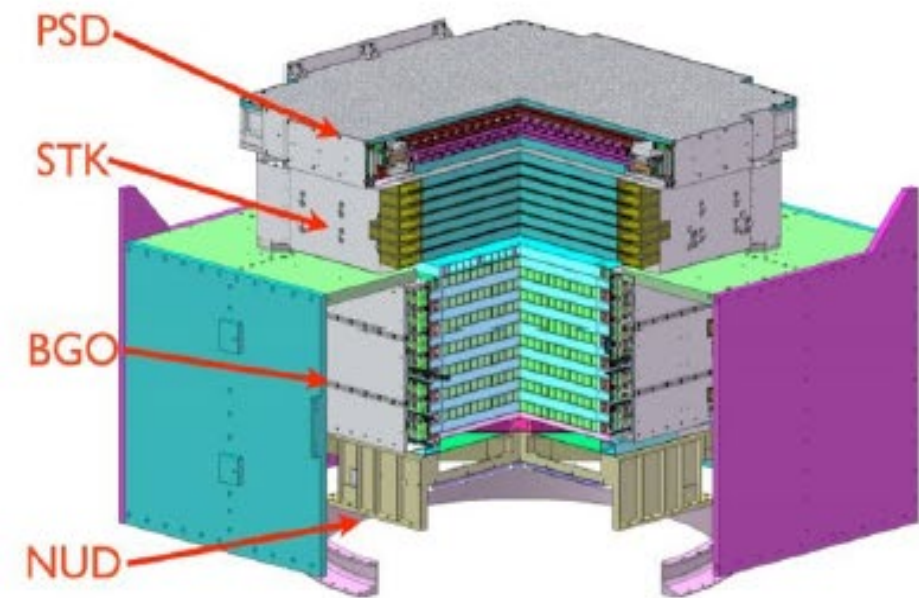
Total AbSorption Calorimeter
Energy, e/p separation



Detector structure

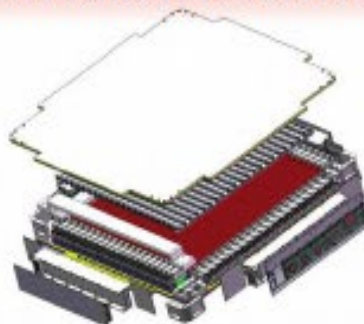
Launched on December 17th, 2015
500 km 95 minute sun-synchronous orbit

J. Chang et al., Astrop. Phys. 95(2017)6-24



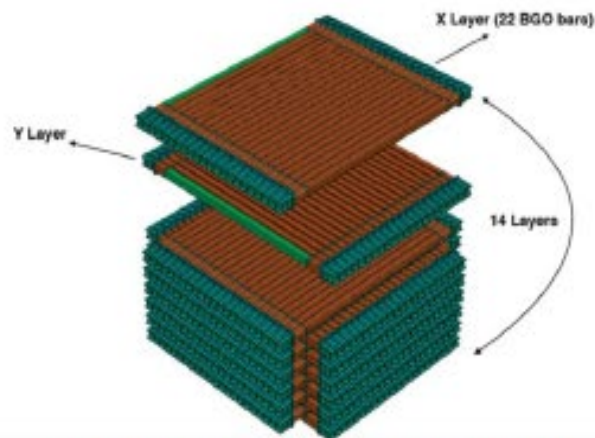
$\sim 33 X_0$: BGO $32 X_0$, STK $\sim 1 X_0$
Charge resolution $\leq 25\%$ for $Z = 1$
GF for e^- $0.3 \text{ m}^2 \text{ sr}$ above 30 GeV

Plastic Scintillator Detector (PSD)



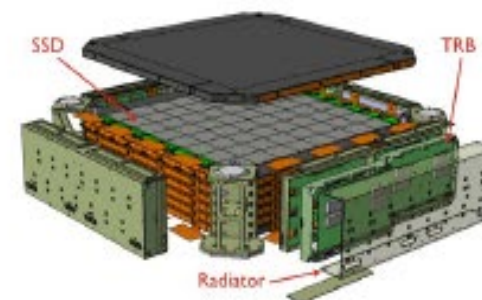
*Charge measurement +
identification of electrons and
gamma-rays*

BGO Calorimeter (BGO)



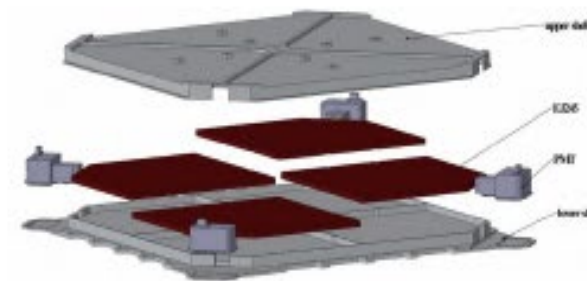
*Energy measurement + e/p
separation*

Silicon-Tungsten tracker (STK)



*Silicon strips (precise tracking) +
tungsten converter (pair production)*

Neutron Detector (NUD)



Additional hadrons rejection

Boron-loaded plastic scintillator