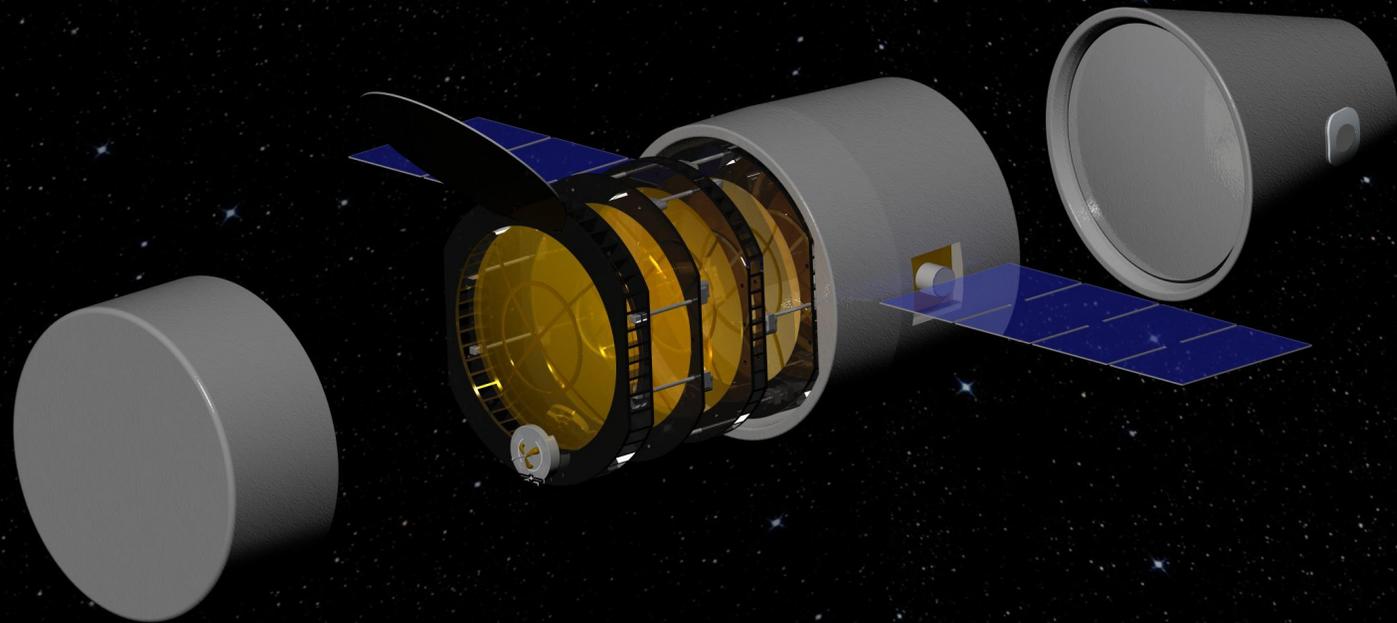


# JEM-EUSO Accommodation to SPACE-X Dragon Trunk



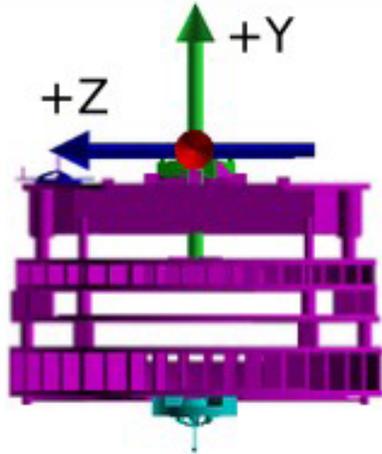
Roy Young & John Seixal  
NASA/MSFC

JEM-EUSO International Collaboration Meeting  
December 2-6, 2013

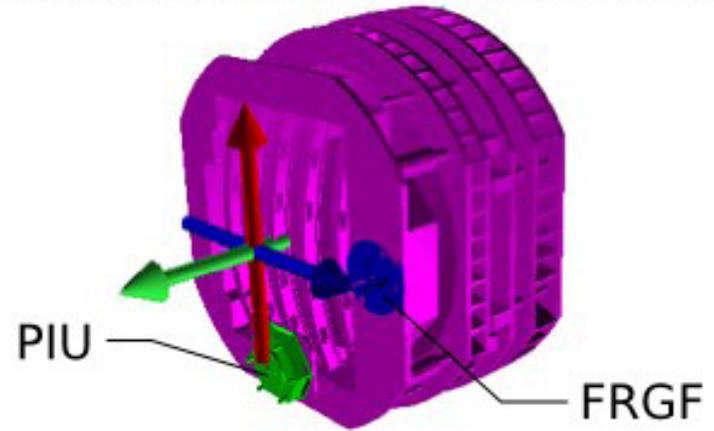
# Background

- In addition to the JEM-EUSO weight reduction effort requested by JAXA in March, 2013 a request was made to do an assessment of using the Space-X Dragon Trunk for transporting EUSO to the ISS
  - This request was hampered by the fact that at that time the Dragon Interface definition Document (IDD) was considered ITAR
  - Non-ITAR version of IDD has since been released
- John Seixal, MSFC design engineer, received EUSO subsystem models developed in various CAD packages and built a model that was compatible with the ISS Robotics team CAD standards and fit within a low fidelity Dragon Trunk CAD model developed from the IDD.
  - Access to high fidelity Trunk CAD model was not allowed by JSC
  - Many high fidelity models were available from JSC server and utilized
    - Flight Releasable Attachment Mechanism (FRAM), Power and Video Grapple Fixture (PVGF), Flight Releasable Grapple Fixture (FRGF), Payload Interface Unit (PIU)
- An assessment was performed by the ISS Robotics Team of the model produced by John and several issues were identified:
  - 2<sup>nd</sup> Stage cone cutout has been modified and not reflected in the IDD
  - Numerous protrusions into Trunk are not called out in IDD drawing
    - Solar Array actuators, 6 cameras and mounts, handrails
    - Robotics operations require 12" space from inside of Trunk (may be reduced to 6" - 8" with waiver by having the payload perform an assessment to show that if the payload does bump into SpX while it is being removed that it can handle the load (1 Joule))
- After NASA furlough and several discussions with Space-X Contracting Officer Technical Representative (COTR), John was granted access to high fidelity Trunk model
  - A more refined assessment of JEM-EUSO accommodation is under way

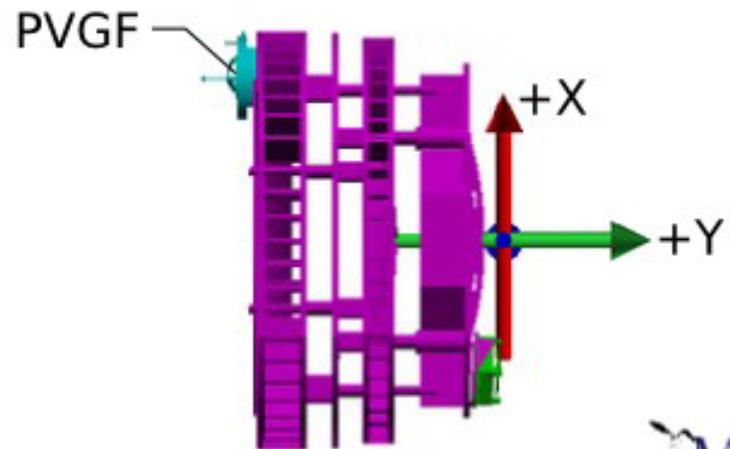
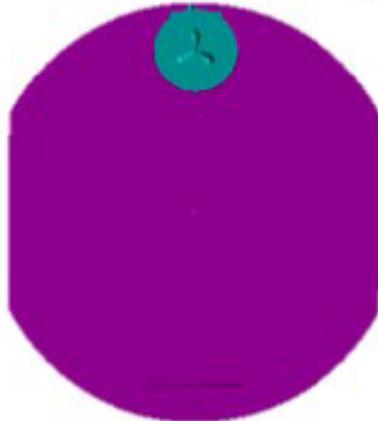
# JEM-EUSO Model



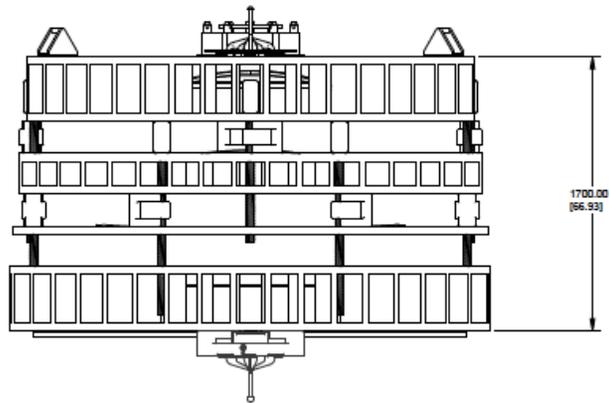
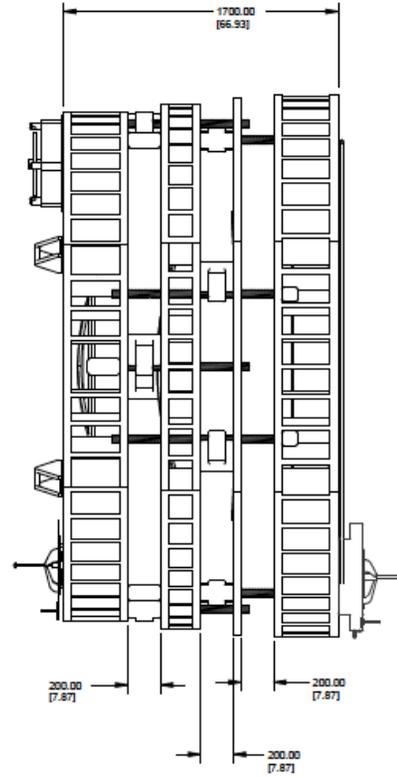
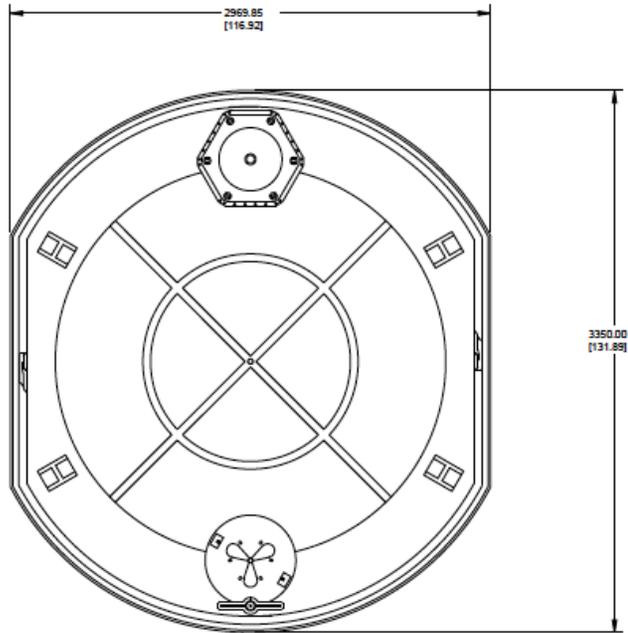
**Origin:** The YZ plane is coincident with the mating surface at manifest. The X-axis points away from the PIU. The Z-Axis points towards the FRGF. The Y-axis completes the right-hand Cartesian Coordinate System..



Grapple Fixture wrt EUSO CS	X (in)	Y (in)	Z (in)	Pitch (deg)	Yaw (deg)	Roll (deg)
FRGF	0.0	-9.4	43.2	0.0	90.0	0.0
PVGF	51.0	-84.0	0.0	0.0	-90.0	-90.0

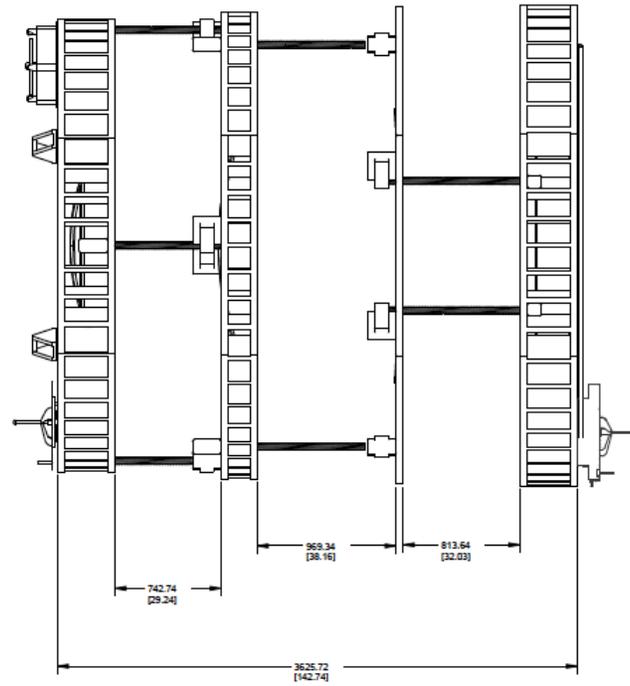
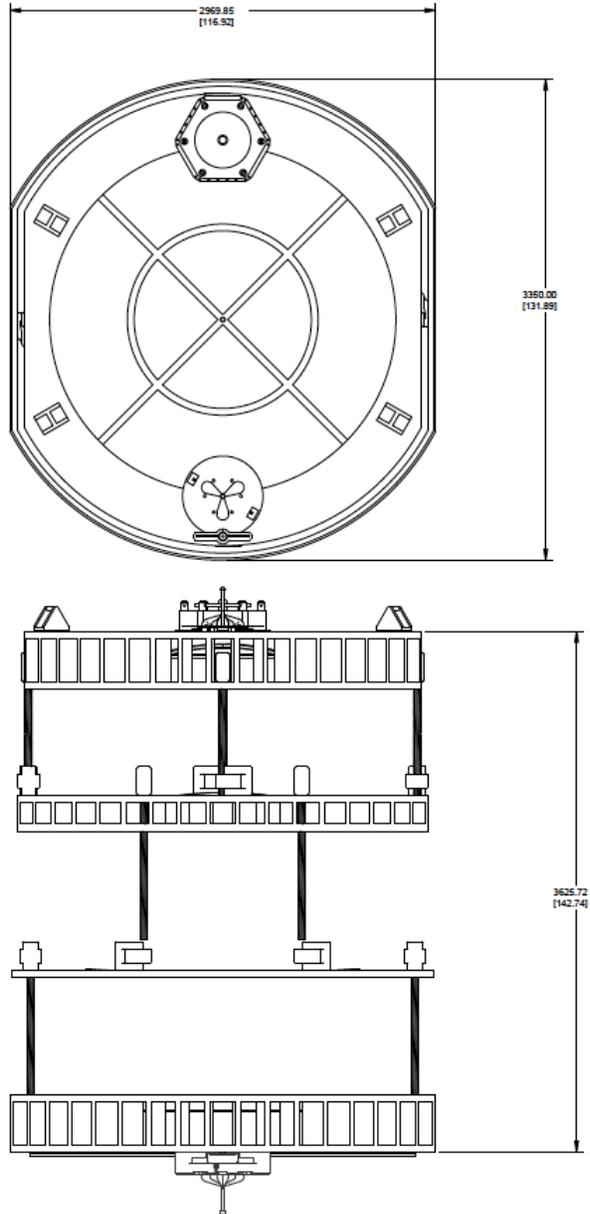


# Stowed



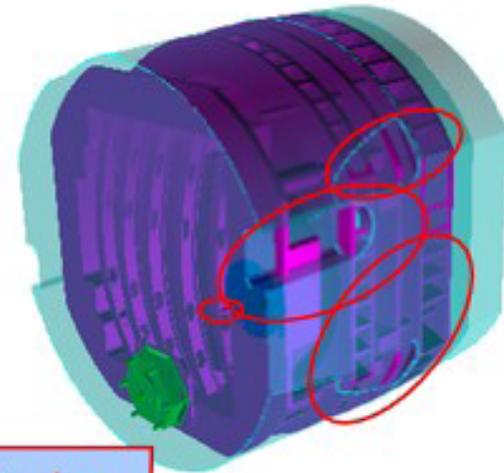
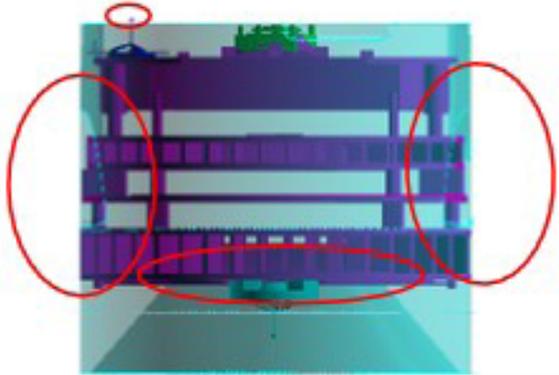
Contracted\_EUSO

# Deployed

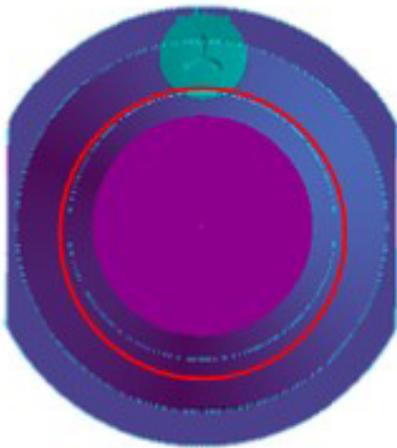


Extended\_EUSO

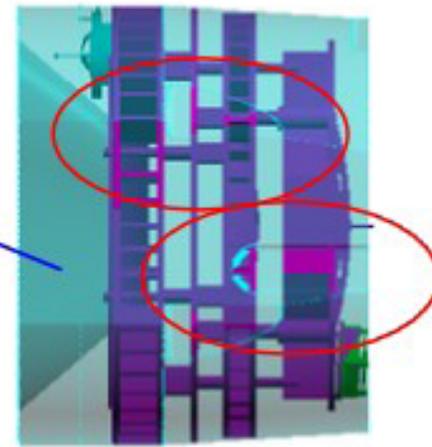
# JEM-EUSO Volume Conflicts



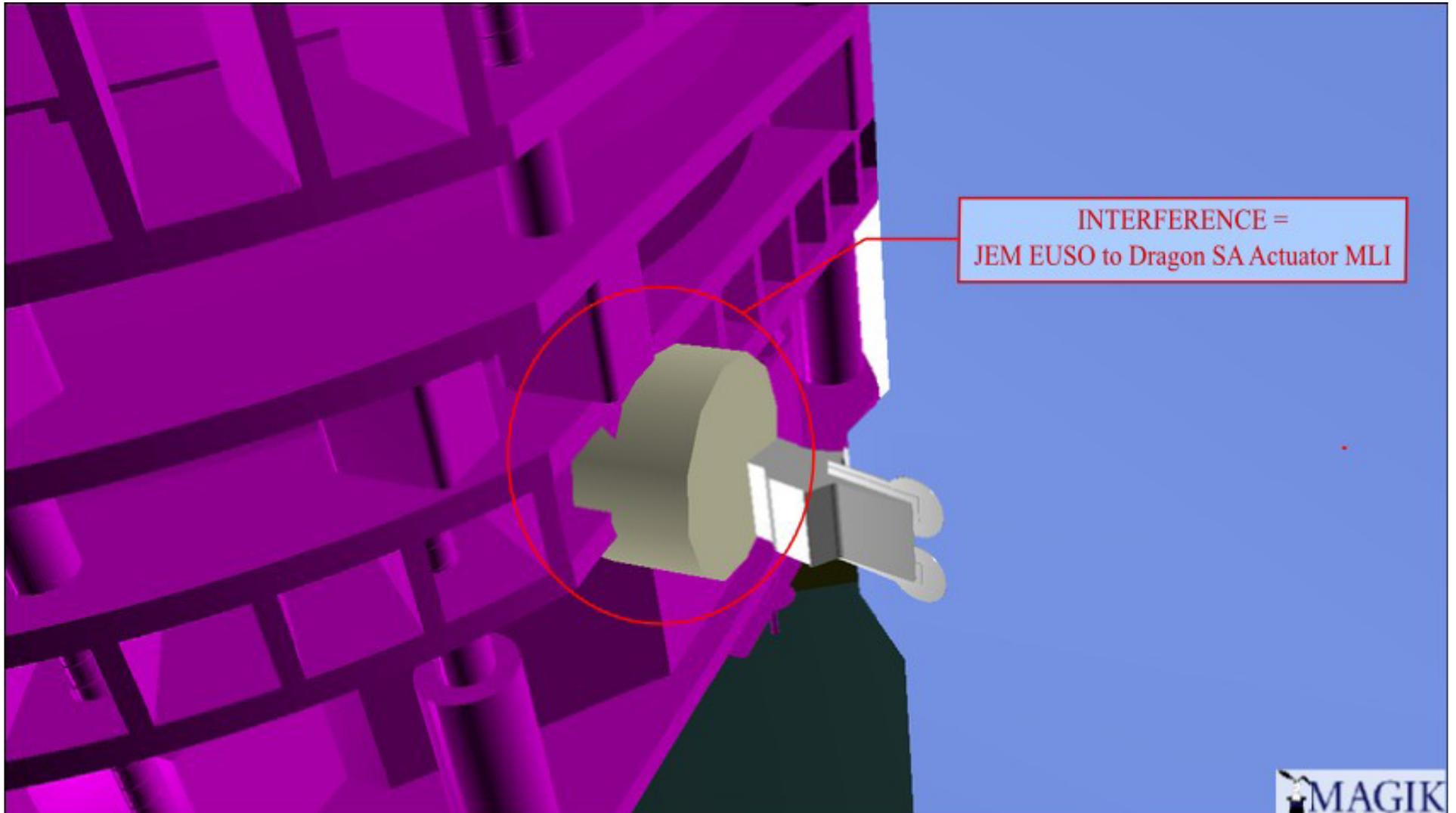
JEM EUSO Exceeds Cargo Volume Envelope



Dragon Cargo Volume Envelope



# JEM-EUSO Dragon Solar Array Conflict



# PVGF – SSRMS

