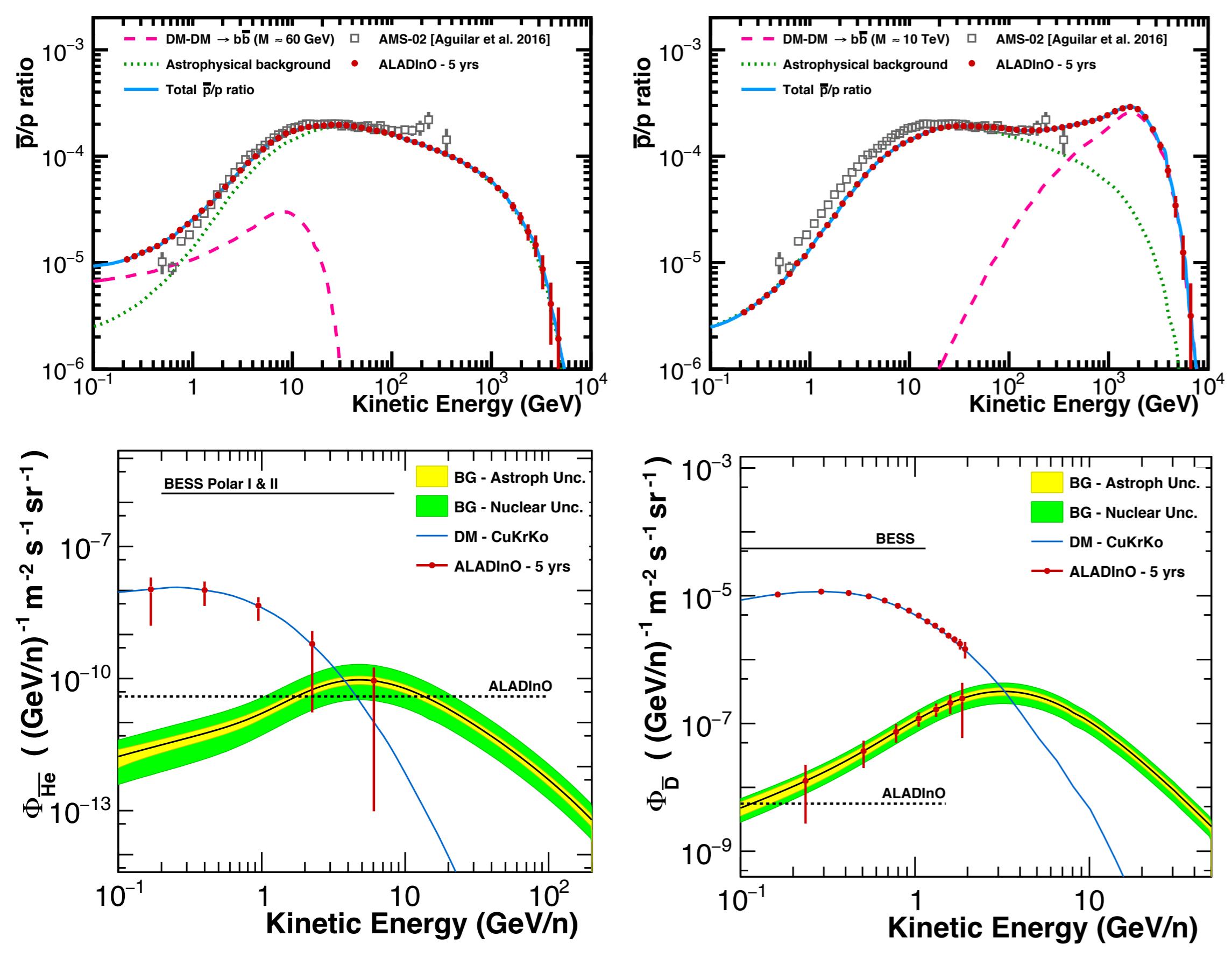




ALADInO: an Antimatter Large Acceptance Detector In Orbit

Science:



Detector:

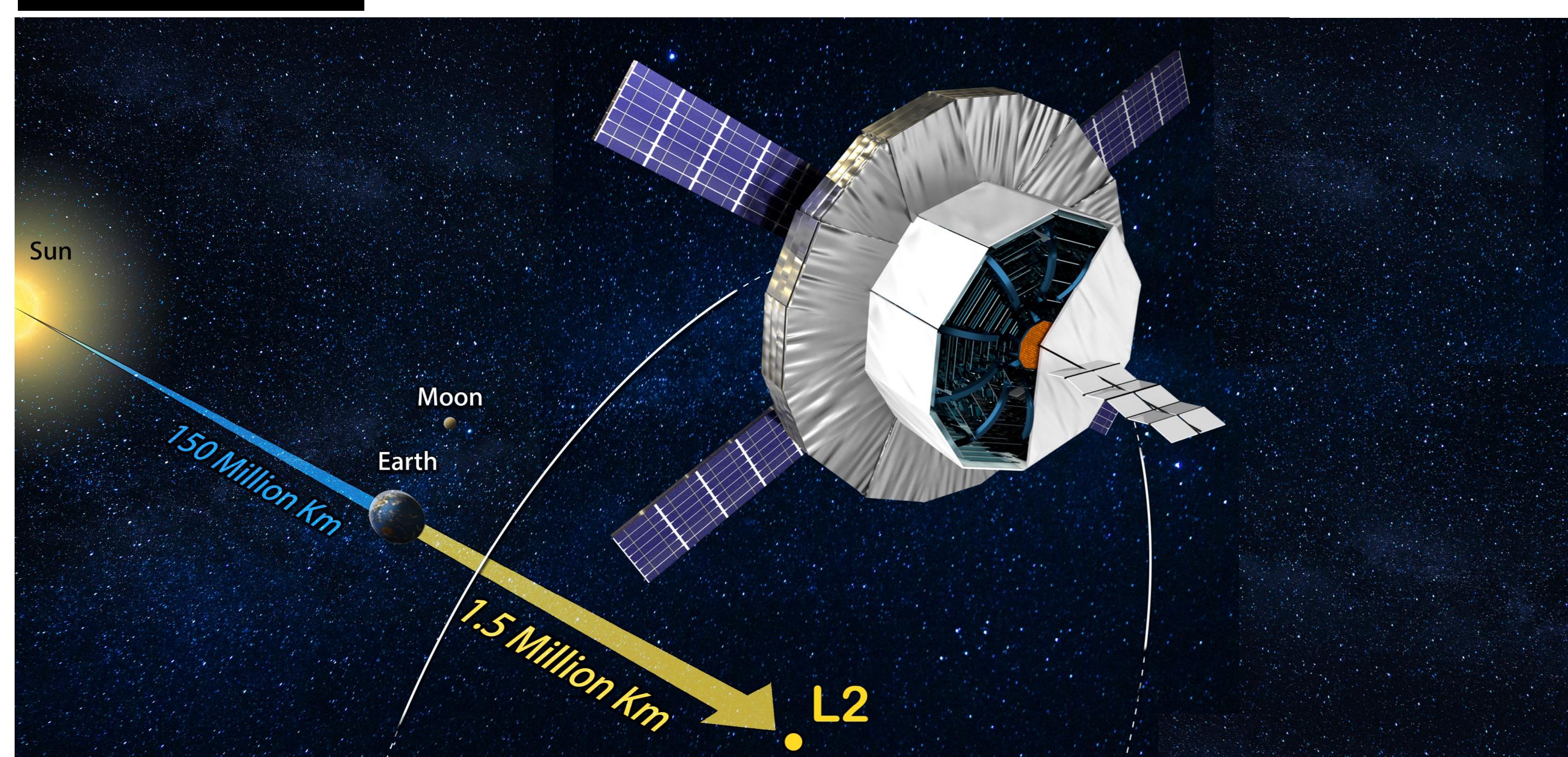
ALADInO	
Spectrometer acceptance	>10 m ² sr
Calorimeter acceptance	9 m ² sr
Spectrometer MDR	>20 TV
Combined acceptance	3 m ² sr
Calorimeter depth	61 X ₀ – 3.5 λ _T
Calorimeter energy resolution	25% – 35% (h) 2% (e [±])
e/p separation	>10 ⁵
Time-of-flight resolution	<100 ps
Tracker spatial resolution	<5 μm
Detector weight	<6.5 t
Power consumption	~3 kW
Readout channels	~2 M
Bandwidth	~50 Mbps
Preferred orbit	around Sun-Earth L2
Mission operation time	>5 yr

ALADInO Mass Budget	
Calorimeter	~2.3 t
Magnet and Cryogenics	~2.0 t
Time of Flight + Si-Tracker	~1.5 t
Electronics and Power	~0.5 t
Total	<6.5 t

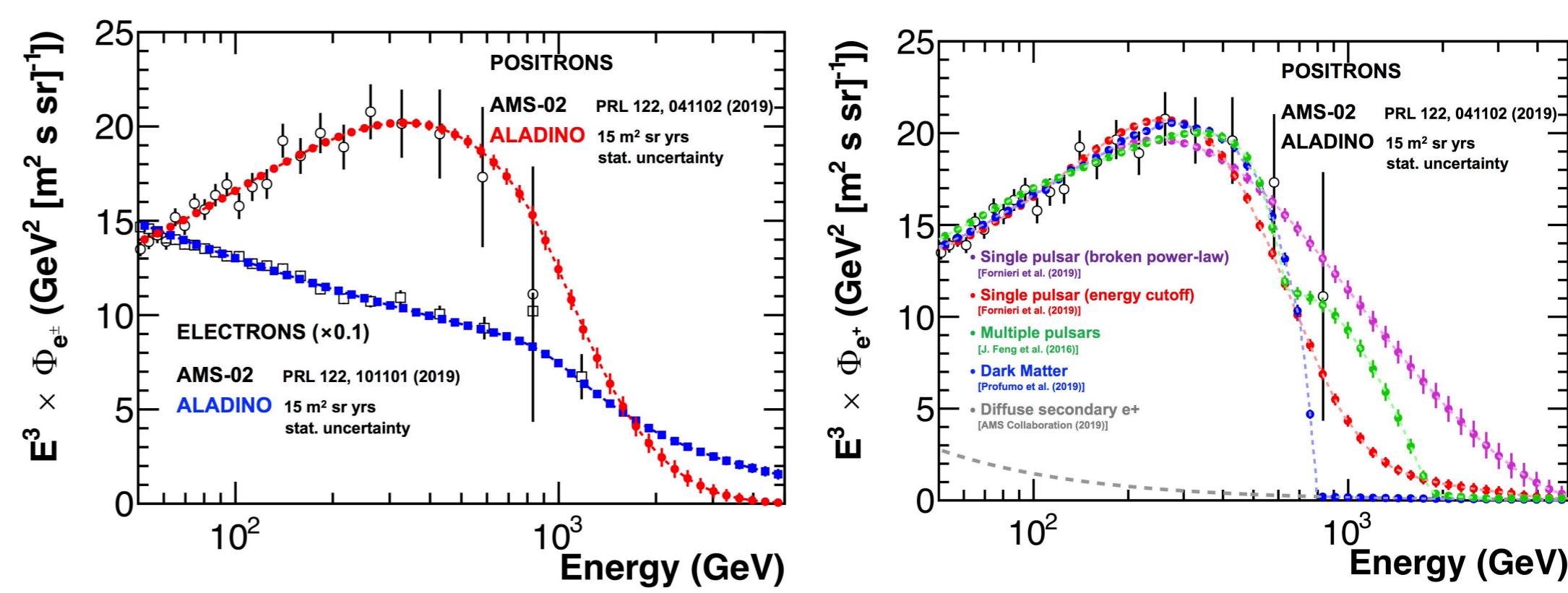
ALADInO Power Budget	
Time of Flight	0.4 kW
Calorimeter	0.2 kW
Si-Tracker	1.4 kW
Cryogenics	1.0 kW
Total	3.0 kW

Mission:

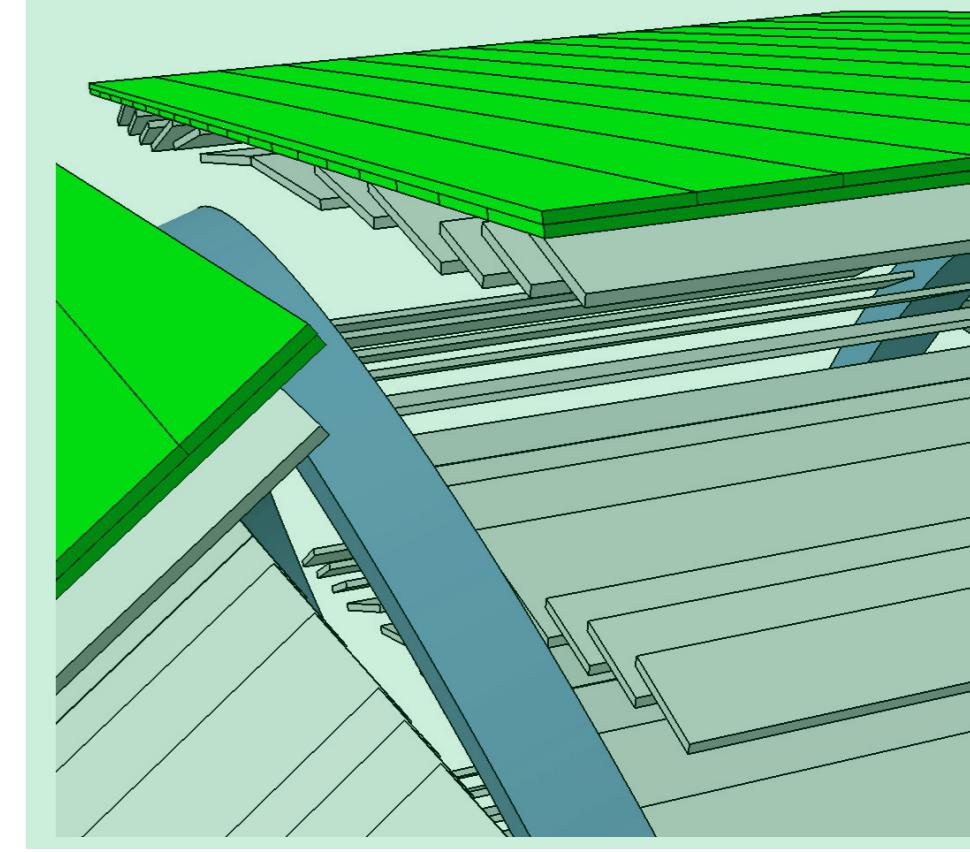
At least 5 years of operations in the Sun-Earth Lagrangian Point L2



M. Duranti on behalf of the
ALADInO Collaboration
INFN Sez. di Perugia



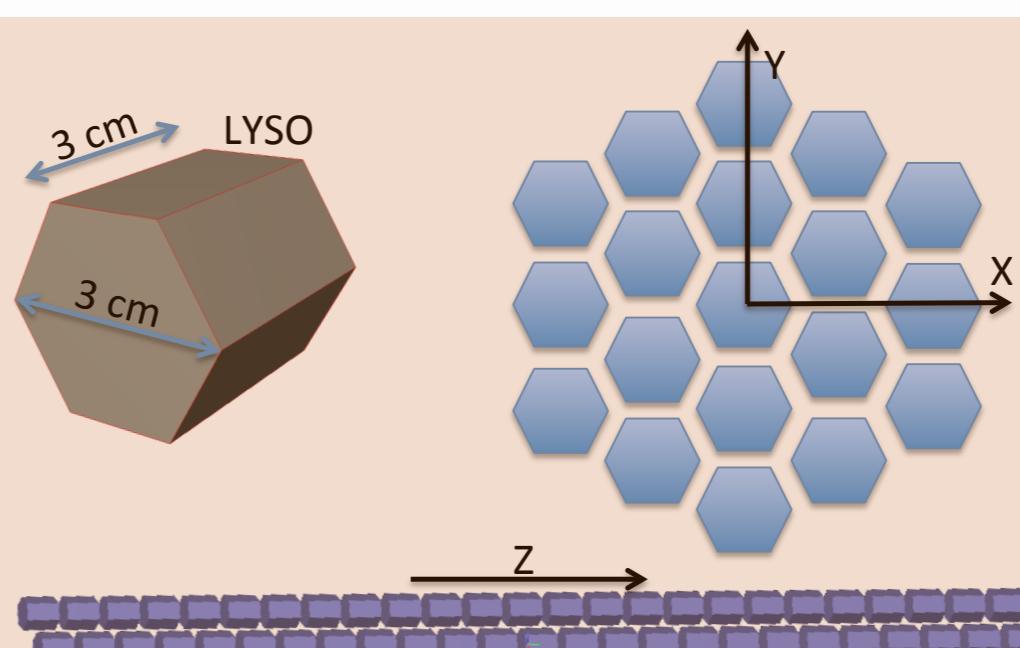
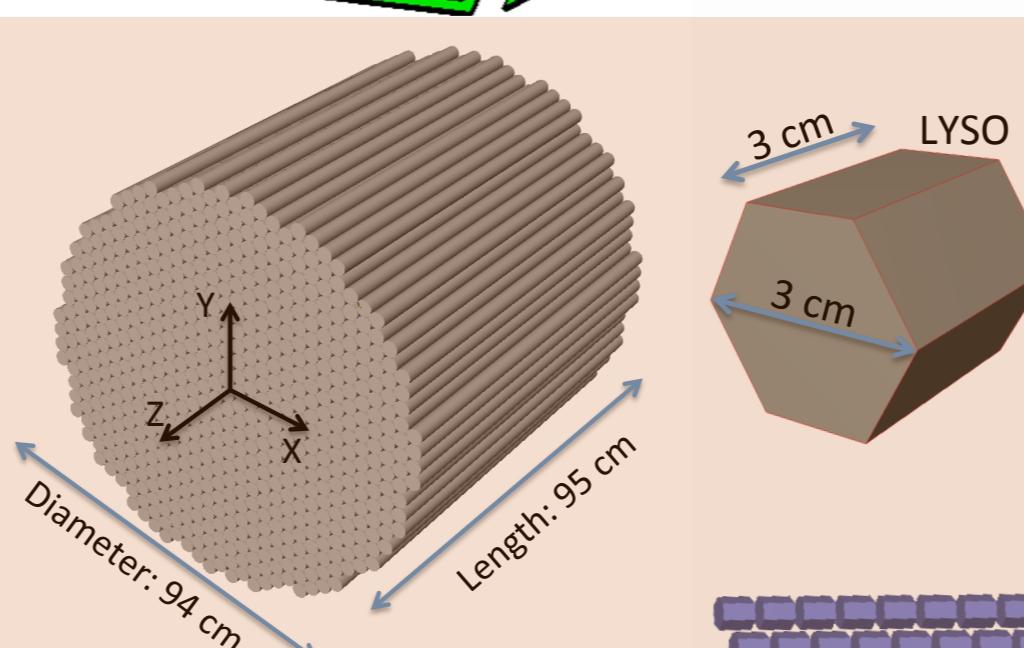
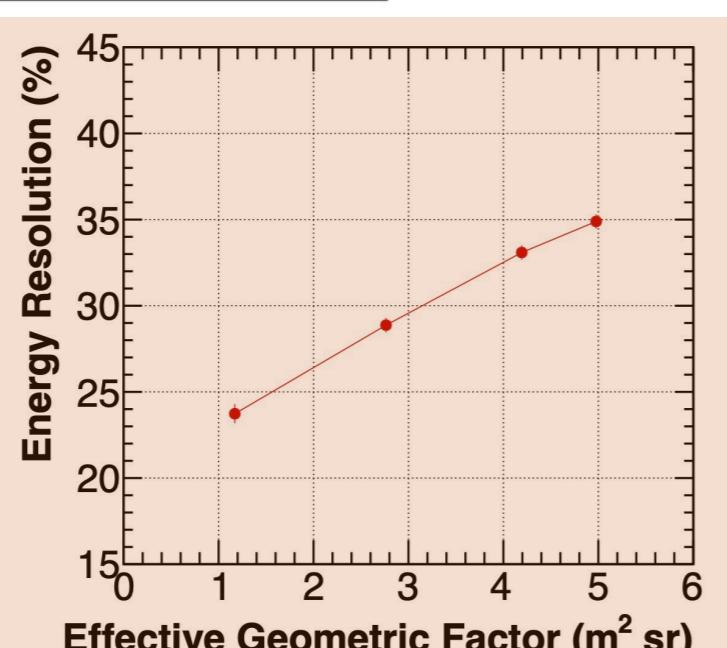
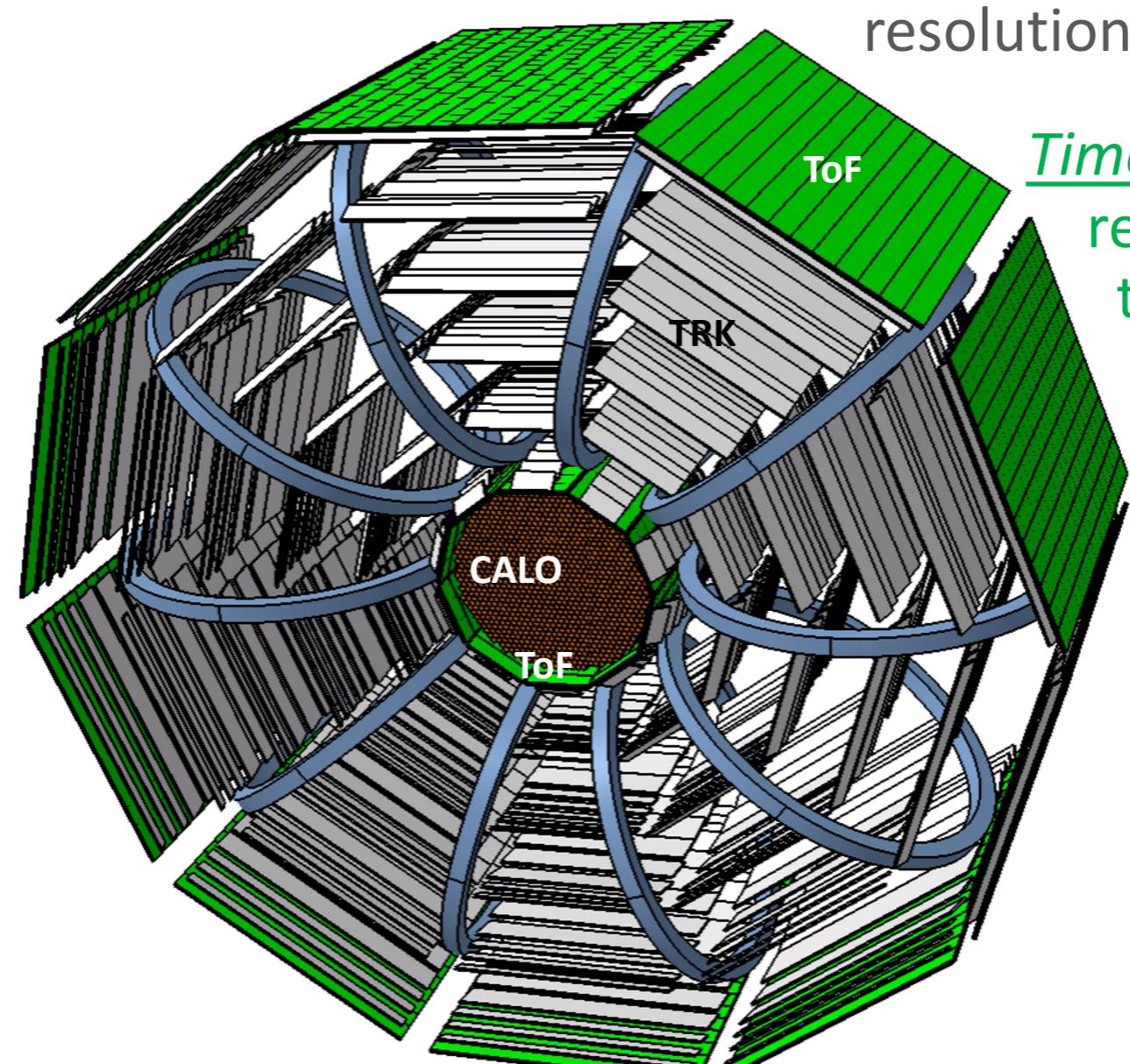
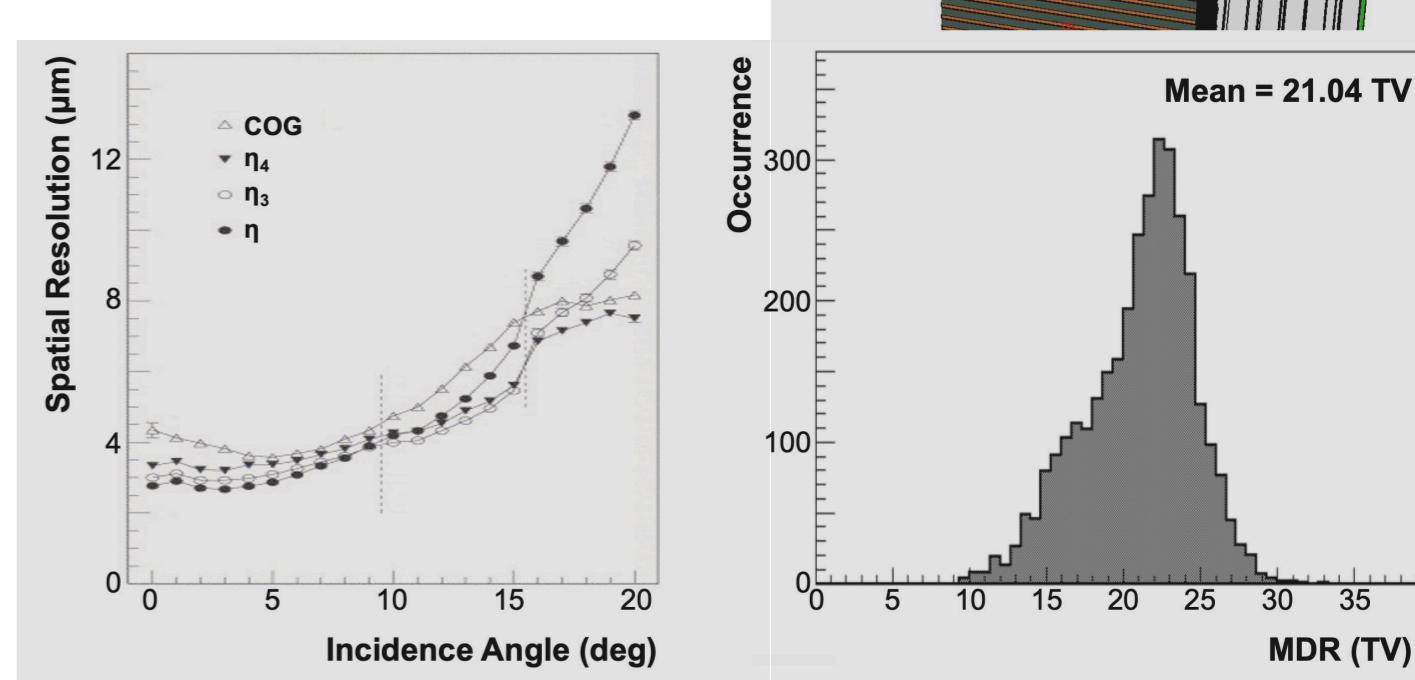
Magnet: High Temperature Superconducting Magnet, coils in toroidal arrangement, 0.8 T over ~ 1.5 m lever arm



Calorimeter: cylindrical calorimeter, lines of hexagonal base prisms for an "isotropic" segmentation, 61 X₀, 3.5 λ_T

Silicon tracker: high dynamic range silicon sensors, < 5 μm spatial resolution, charge measurement

Time of Flight: plastic scintillators, read-out by SiPMs, < 100 ps time resolution, charge measurement



Superconducting Magnet

Number of coils	10
Total current per coil	440 · 10 ³ A
Operating current	244 A
Inductance	120 H
Average magnetic flux density	0.8 T
Bending power	1.1 T·m
Cold mass	1200 kg

Possible Roadmap:

- Balloon pathfinder to demonstrate the high temperature superconducting magnet technology: ABU, ALADInO Balloon Unit
- Light (no calorimeter) version of the detector, focused on heavy anti-matter: LAMP, Light Aladino-like Magnetic sPectrometer