ALADInO: an Antimatter Large Acceptance Detector In Orbit

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

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Science:

Detector:

ALADInO

- Spectrometer acceptance: >10 m² sr
- Calorimeter acceptance: 9 m² sr
- Spectrometer MDR: >20 T
- Combined acceptance: 3 m² sr
- Calorimeter depth: 61 X₀ - 3.5 λ₀
- Calorimeter energy resolution: 2% (e²)
- e/p separation: >10⁴
- 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

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 prims for an "isotropic" segmentation, 61 X₀, 3.5 λ₀

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

Mission:

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

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