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A Superconducting Space Magnet for the ALADInO Spectrometer

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Future spaceborne spectrometers for astroparticle detection need high bending power therefore, the use of superconducting magnets is the only applicable solution. The main requirements for superconducting magnets for space applications are: (i) low mass budget, i.e. high stored energy to mass ratio; (ii) low power consumption, i.e. efficient cryogenics; (iii) very high stability. Besides, the presence of liquid helium tanks is regarded as a drawback. The use of high temperature superconductors (HTS) or magnesium diboride (MgB₂) combines all the requirements. The magnet envisaged for the Antimatter Large Acceptance Detector IN Orbit (ALADInO) is a large HTS toroid operating at about 40 K. It will host a silicon tracker inside its internal volume and a 3D isotropic calorimeter in the center. The inner and outer diameters are 1 m and 4.3 m, respectively. The magnet mass is about 1200 kg.

Collaboration

ALADInO collaboration

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