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Thu-Af-Or21-02: A Superconducting Space Magnet for Antimatter Spectrometer

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Future spaceborne spectrometers for astroparticle detection need high bending power therefore, the use of superconducting magnets is the sole applicable solution. Space magnets require high reliability that, in turn, requires high stability. Avoiding liquid helium cryogenics is also an attractive feature. The use of high temperature superconductors (HTS) or magnesium diboride (MgB₂) combines both the requirements. The paper describes an MgB₂ magnet operating at about 10 K that will be one of the main components of a space antimatter spectrometer. The magnet is a large toroid that will host a silicon tracker inside the toroidal 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 1500 kg.

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