The Deflection Magnet Design for PKU Energetic Particle Instrument

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The Energetic Particle Instrument (EPI), proposed by Peking University for a L1 mission, is designed to provide the three-dimensional distribution of suprathermal electrons and ions with good time, energy, and angular resolutions in the interplanetary space, respectively, at energies from 20 keV to 1 MeV and from 20 keV to 11 MeV. The EPI consists of four dual-double-ended foil/magnet semiconductor telescopes, which cleanly separate electrons in the energy range from 20 to 400 keV and ions from 20 keV to 6 MeV.

The magnet of semiconductor telescopes consists of four type 677H rare earth permanent magnets and a soft iron frame. Due to the high saturation polarization and high magnetic anisotropy of the Nd\textsubscript{2}Fe\textsubscript{14}B strongly magnetic matrix phase, this system can make the magnetic field strong enough to make the electrons deflected.

A frame made of iron-cobalt alloy VACOFLEX 50 will be able to combine two pairs of magnets and cause the magnetic field to decay rapidly in the far field. In this way, the two air gaps in the system can simultaneously provide a deflecting magnetic field for a pair of anti-parallel sensor systems.