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The Calorimetric Electron Telescope (CALET) on ISS for High Energy Astroparticle Physics

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The CALET space experiment, currently under development by Japan in collaboration with Italy and the United States,will measure the flux of Cosmic Ray electrons (and positrons) to 20 TeV, gamma rays to 10 TeV and nuclei with Z=1 to 40 up to 1,000 TeV during a five year mission. These measurements are essential to investigate possible nearby astrophysical
sources of high energy electrons, study the details of galactic particle propagation and search for dark matter signatures.
The instrument consists of a module to identify the particle charge, a thin imaging calorimeter (3 radiation lengths) with tungsten plates interleaving scintillating fiber planes, and a thick calorimeter (27 radiation lengths) composed of lead-tungstate logs. CALET has the depth, imaging capabilities and energy resolution necessary for excellent separation
between hadrons, electrons and gamma rays. The instrument is currently being prepared for launch in JFY 2014 (by March,2015) to the International Space Station (ISS) for installation on the Japanese Experiment Module –Exposure Facility (JEM-EF).

Summary

The CALET (CALrimetric Electron Telescope) is an Astrophysics mission for the International Space Station (ISS) that will search for signatures of Dark Mater and provide the highest energy direct measurements of the cosmic ray electron spectrum in order to observe discrete sources of high energy particle acceleration in our local region of the Galaxy. CALET will address many of the outstanding questions including ; (1) the nature of the sources of high energy particles and photons, through the high energy spectrum, (2) the details of particle transportation in the Galaxy, and (3) signatures of dark matter, in either the high energy electrons or gamma ray spectrum. It will also be capable of monitoring gamma ray transients and solar modulation. The unique feature of CALET is its thick, fully active calorimeter that allows well into the TeV energy region with excellent energy resolution, coupled with a fine imaging upper calorimeter to accurately identify the starting point of electromagnetic showers. It is in the TeV region that we anticipate being able to observe, for first time, an unambiguous signature of energetic particles (electrons) accelerated in specific sources in our local region of the Galaxy and then propagating to Earth.

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