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The JEM-EUSO Mission to Explore the Extreme Universe

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The JEM-EUSO mission explores the origin of the extreme energy comic-rays (EECRs) above 10^20 eV and challenges to the limit of the basic physics, through the observations, of their arrival directions and energies. It is designed to observe more than 1,000 events of EECRs above 7x10^19 eV in its five-year operation with an exposure larger than 1 million km^2 /sr/year. The super-wide-field (60 degrees) telescope with a diameter of about 2.5m looks down the atmosphere of the night-side of the earth to detect near UV photons (330-400nm, both fluorescent and Cherenkov photons) emitted from the giant air-shower produced by an EECR. The arrival direction map with 1,000 events naturally tells us the origin of the EECRs and allows us to identify the EECR sources to known astronomical objects. The comparison among the energy spectra of the spatially resolved individual sources will clarify the acceleration/emission mechanism, and also finally confirm the Greisen-Zatse'pin-Kuzmin process for the validation of Lorentz invariance up to ~10^11. Neutral components (neutrinos and gamma rays) can also be detected as well, if their fluxes are high enough. The JEM-EUSO mission is planned to be launched by a H2B rocket about 2015 and transferred to ISS by H2 Transfer Vehicle (HTV). It will be attached to the external experiment platform of "KIBO" which completed July 2009 by STS-127 mission of the space shuttle.

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