

## **The JEM-EUSO mission: Doing Astronomy by looking down to Earth**

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The idea of looking down onto the surface of the Earth to observe air-showers from space is not new. In fact, John Linsley already in 1979, had proposed to use a space telescope for the observation of UV emission from air-showers. Since then, a few missions were proposed to achieve this next generation technology for the exploration of the high energy universe. Space-based ultra-high energy observatories have important advantages compared with ground detectors: 1) the huge exposure area, 2) the well constrained distance to a shower, 3) the dust-free and cloud-less condition above half of the troposphere, and 4) the almost uniform exposure covering both hemispheres. The JEM-EUSO mission is the first observatory to do astronomy through charged particle channel by looking down to the Earth from the orbit. It will explore the origin of the extreme energy cosmic rays (EECRs) above 100 EeV and explore the limits of the fundamental physics, through the observations of their arrival directions and energies. A super-wide-Field (60 degrees) telescope with a diameter of about 2.5m looks down the night sky to detect near UV photons (330-400nm, both fluorescent and Cherenkov photons) emitted from the giant airshowers produced by EECRs. The arrival direction map with more than five hundred events will tell us the origin of the EECRs and allow us to identify the EECR sources with known astronomical objects. 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 2017 and transferred to ISS by H2 Transfer Vehicle (HTV) and attached to the Exposed Facility external experiment. It is the international mission, in which more than 250 researchers participate from thirteen countries.