

The JEM-EUSO program for UHECR studies from space

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Despite intense observational efforts and a series of important results in the last two decades, the study of ultra-high-energy cosmic rays (UHECRs) remains one of the most challenging in astronomy, both because their flux is extremely low (one particle per m^2 per billion year at the highest known energies) and because their macroscopic energies (tens of Joules) still remain insufficiently large to allow quasi-rectilinear propagation in the Galactic (and extragalactic) magnetic fields. As a consequence, no direct detection of their sources has been possible thus far, and their astrophysical origin as well as their acceleration mechanism remain a mystery. To take up the challenge, new UHECR observational means appear necessary. The JEM-EUSO Collaboration has undertaken to open the space road to UHECR studies. For more than a decade, it has been developing a realistic program to measure the UHECRs from space with unprecedented aperture. Several intermediate missions have already been completed (on the ground: EUSO-TA; under stratospheric balloons: EUSO-Balloon and EUSO-SPB1; in space: TUS, and on-board the ISS: MINI-EUSO), and others are in preparation for flight (EUSO-SPB2), under review (K-EUSO), or proposed for the next decade (POEMMA). We will report on the general status of the JEM-EUSO program, based on the demonstrated performance of its now mature technology.

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