

AtmoHEAD 2014:
 Atmospheric Monitoring for High Energy AstroParticle Detectors



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The Atmospheric Monitoring System of the JEM-EUSO Space Mission

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An Atmospheric Monitoring System (AMS) is a mandatory and key device of a space-based mission which aims to detect Ultra-High Energy Cosmic Rays (UHECR) and Extremely-High Energy Cosmic Rays (EHECR) from Space. JEM-EUSO has a dedicated atmospheric monitoring system that plays a fundamental role in our understanding of the atmospheric conditions in the Field of View (FoV) of the telescope. Our AMS consists of a very challenging space infrared camera and a LIDAR device, that are being fully designed with space qualification to fulfil the scientific requirements of this space mission. This AMS will provide information of the cloud cover in the FoV of JEM-EUSO, as well as measurements of the cloud top altitudes with an accuracy of 500 m and the optical depth profile of the atmosphere transmittance in the direction of each air shower with an accuracy of 0.15 degree and a resolution of 500 m. This will ensure that the energy of the primary UHECR and the depth of maximum development of the EAS (Extensive Air Shower) are measured with an accuracy better than 30% primary energy and 120 g/cm² depth of maximum development for EAS occurring either in clear sky or with the EAS depth of maximum development above optically thick cloud layers. Moreover a stereoscopic retrieval technique and a very novel that seems to be the most promising radiometric retrieval technique considering the LIDAR shots as calibration points are under development to infer the Cloud Top Height (CTH) of all kind of clouds, thick and thin clouds in the FoV of the JEM-EUSO space telescope.

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