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Description and performance results of the trigger logic of TUS and Mini-EUSO to search for Ultra-High Energy Cosmic Rays from space

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The Tracking Ultraviolet Setup (TUS) and Multiwavelength Imaging New Instrument for the Extreme Universe Space Observatory (Mini-EUSO) are the first two space missions of the JEM-EUSO (Joint Experiment Missions for the Extreme Universe Space Observatory) program devoted to demonstrate the detection principle of Ultra-High Energy Cosmic Rays (UHECRs) from space. TUS operated in 2016 and 2017 as a part of the Lomonosov satellite orbiting at 500 km from ground while Mini-EUSO is operational since 2019 on the International Space Station. Both telescopes are based on an optical system (Fresnel mirrors for TUS and Fresnel lenses for Mini-EUSO) which focus near-UV light (290 –430 nm) on an array of Photomultiplier Tubes. Both instruments adopt a multi-level trigger scheme with time resolutions ranging from microseconds to tens of milliseconds to search for UHECRs and slower phenomena occurring in the atmosphere such as transient luminous events, meteors and macroscopic dark matter.

During this contribution a review of the two different trigger and data acquisition systems will be presented showing their performance results in space with emphasis to the search for UHECRs and macroscopic dark matter.

Collaboration

for the JEM-EUSO collaboration

Primary author: BERTAINA, Mario Edoardo (University of Torino and Istituto Nazionale di Fisica Nucleare)

Presenter: BERTAINA, Mario Edoardo (University of Torino and Istituto Nazionale di Fisica Nucleare)

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