Contribution ID: **8** Type: **not specified**

Probing Ancient Cosmic Ray Flux with Paleo-Detectors and the Launch of the PRIμS Project.

Wednesday 21 May 2025 11:15 (45 minutes)

Paleo-detectors offer a unique opportunity to probe the long-term history of cosmic ray flux, potentially revealing evidence of historical nearby high-energy astrophysical events. In this contribution, we present our recently published work demonstrating that evaporites formed during the Messinian Salinity Crisis (~6 Myr ago) could provide an ideal natural target to study secondary cosmic ray interactions. By modeling the density of nuclear recoil tracks preserved in these minerals and taking into account the deposition and shielding rate in the geological event, we show that percent-level variations in the primary cosmic ray flux could be detected, extending the reach of paleodetectors beyond dark matter and neutrino searches to cosmic ray paleo-astrophysics. We also introduce PRIμS, an INFN-funded experimental effort that is the natural extension of our phenomenological work. Using high-throughput optical microscopy and plasma etching techniques, PRIμS aims to analyze a variety of samples, with a focus on halite and other evaporites, with the goal of validating theoretical models and refining background estimates for future paleo-detector applications.

Do you plan to give the talk in person?

Yes

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