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Seasonal Variation of the Underground Muon Flux in Daya Bay Using the Full Data Set

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High-energy cosmic rays enter Earth's atmosphere where they interact with atmospheric particles to generate charged mesons that subsequently decay into muons. As the atmospheric temperature rises, the density decreases, increasing the mean free path of pions and kaons and thus their likelihood of decaying into cosmic ray muons. The positive correlation that results as a consequence of this effect has been observed in multiple experiments. The Daya Bay Reactor Neutrino experiment consists of three experimental halls, each with a different level of rock overburden, making it an ideal setup to also observe this behavior. In this study, we analyze the full Daya Bay dataset to extract correlation coefficients for each hall by examining the relationship between the muon rate and the effective atmospheric temperature. We investigate multiple analysis techniques and evaluate both their advantages and limitations. In this talk, we will present our latest results and compare them to the theoretical model prediction as well as to the published results of other experiments.

Collaboration(s)

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