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First measurement of the yield of ^{8}He isotopes produced in liquid scintillator by cosmic-ray muons at Daya Bay

Tuesday, 18 June 2024 17:30 (2 hours)

This poster presents the first measurement of cosmogenic ^{8}He isotope production in liquid scintillator at Daya Bay, using an innovative method for identifying cascade decays of ^{8}He and its child isotope, ^{8}Li. We also measure the production yield of ^{9}Li isotopes using two independent methods. The results, in units of $10^{-8}\mu^{-1}\mathrm{g}^{-1}\mathrm{cm}^{2}$, are 0.307±0.042, 0.341±0.040, and 0.546±0.076 for ^{8}He, and 6.73±0.73, 6.75±0.70, and 13.74±0.82 for ^{9}Li at average muon energies of 63.9 GeV, 64.7 GeV, and 143.0 GeV, respectively. These results supersede previous attempts to determine the ratio of ^{8}He to ^{9}Li production, which yielded a wide range of limits from 0 to 30%. They also provide future liquid scintillator-based experiments with improved ability to predict cosmogenic backgrounds.

Poster prize

Yes

Given name

Chengzhuo

Surname

Yuan

First affiliation

Institute of High Energy Physics, Beijing, China

Second affiliation

University of Chinese Academy of Sciences, Beijing, China

Institutional email

yuanchengzhuo@ihep.ac.cn

Gender

Male

Collaboration (if any)

Daya Bay Collaboration

Primary author: YUAN, Chengzhuo (Institute of high energy physics, China)

Presenter: YUAN, Chengzhuo (Institute of high energy physics, China)

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