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Cosmogenic isotope production by stopping muons in Double Chooz

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Using the Double Chooz reactor neutrino detector, we have measured the products of μ^- capture on ^{12}C, ^{13}C, ^{14}N and ^{16}O. Over a period of 490 days, we collected 2.3×10^6 stopping cosmic μ^-, of which 1.8×10^5 captured on these nuclei in the inner detector scintillator or acrylic vessels. The resulting isotopes were tagged using prompt neutron emission (when applicable), the subsequent beta decays, and, in some cases, β-delayed neutrons. Production of these βn isotopes, primarily ^{9}Li, which are $\bar{\nu}_e$ backgrounds, was found at a significance of 5.0σ. The probability of ^{9}Li per capture on ^{nat}C is $(2.4 \pm 0.9(\mathrm{stat}) \pm 0.1(\mathrm{syst})) \times 10^{-4}$.

Oral or Poster Presentation

Oral

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