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Title:	Measurement of $\bar{\nu}_\mu$ charged-current single π^- production on hydrocarbon in the few-GeV region using MINERvA
Authors:	Fiza, N. (/jspui/browse?type=author&value=Fiza%2C+N.)
Keywords:	MINERvA detector at Fermilab Antineutrino energy GENIE Nontrack vertex energy
Issue Date:	2019
Publisher:	American Physical Society
Citation:	Physical Review D, 100(5).
Abstract:	The antineutrino scattering channel $\bar{\nu}_\mu \text{CH} \rightarrow \mu + \pi^- X$ (nucleon(s)) is analyzed in the incident energy range 1.5 to 10 GeV using the MINERvA detector at Fermilab. Differential cross sections are reported as functions of μ^+ momentum and production angle, π^- kinetic energy and production angle, and antineutrino energy and squared four-momentum transfer. Distribution shapes are generally reproduced by simulations based on the GENIE, NuWro, and GiBUU event generators, however GENIE (GiBUU) overestimates (underestimates) the cross section normalizations by 8% (10%). Comparisons of data with the GENIE-based reference simulation probe conventional treatments of cross sections and pion intranuclear rescattering. The distribution of nontrack vertex energy is used to decompose the signal sample into reaction categories, and cross sections are determined for the exclusive reactions $\mu + \pi^- n$ and $\mu + \pi^- p$. A similar treatment applied to the published MINERvA sample $\bar{\nu}_\mu \text{CH} \rightarrow \mu + \pi^0 X$ [nucleon(s)] has determined the $\mu + \pi^0 n$ cross section, and the latter is used with $\sigma(\pi^- n)$ and $\sigma(\pi^- p)$ to carry out an isospin decomposition of $\bar{\nu}_\mu$ -induced CC (π^-). The ratio of magnitudes and relative phase for isospin amplitudes A_3 and A_1 thereby obtained are: $R_{\bar{\nu}} = 0.99 \pm 0.19$ and $\phi_{\bar{\nu}} = 93^\circ \pm 7^\circ$. Our results are in agreement with bubble chamber measurements made four decades ago.
Description:	Only IISERM authors are available in the record.
URI:	https://journals.aps.org/prd/abstract/10.1103/PhysRevD.100.052008 (https://journals.aps.org/prd/abstract/10.1103/PhysRevD.100.052008) http://hdl.handle.net/123456789/1820 (http://hdl.handle.net/123456789/1820)
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