

Superscaling Analysis and Neutrino-Induced Charged-Current Pion Production at MiniBooNE Kinematics

**M.V. Ivanov^{1,2}, J.M. Udias¹, A.N. Antonov², J.A. Caballero³,
M.B. Barbaro⁴, E. Moya de Guerra¹**

¹Grupo de Física Nuclear, Departamento de Física Atómica, Molecular y Nuclear, Facultad de Ciencias Físicas, Universidad Complutense de Madrid, CEI Moncloa, Madrid E-28040, Spain

²Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences, Sofia 1784, Bulgaria

³Departamento de Física Atómica, Molecular y Nuclear, Universidad de Sevilla, 41080 Sevilla, Spain

⁴Dipartimento di Fisica, Università di Torino and INFN, Sezione di Torino, Via P. Giuria 1, 10125 Torino, Italy

Superscaling approximation (SuSA) predictions to neutrino-induced charged-current charged pion production in the Δ -resonance region are explored under MiniBooNE experimental conditions. The results obtained within SuSA for the flux-averaged double-differential cross sections of the pion production for the $\nu_\mu + \text{CH}_2$ reaction as a function of the muon kinetic energy and of the scattering angle, the cross sections averaged over the angle, the total cross section for the pion production, as well as $\text{CC}1\pi^+$ to CCQE cross section ratio are compared with the corresponding MiniBooNE experimental data. The SuSA charged-current π^+ predictions are in good agreement with data on neutrino flux average cross-sections, but a somewhat different dependence on the neutrino energy is predicted than the one resulting from the experimental analysis.