

Charged-current quasielastic-like neutrino scattering from ^{12}C in the coherent density fluctuation model with two-nucleon emission

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Abstract.

The quasielastic cross-sections of charged-current neutrino and antineutrino scattering on ^{12}C are calculated using the coherent density fluctuation model with a relativistic effective mass $m_N^* = 0.8m_N$ (CDFM $_{M^*}$) [1–4]. The model explicitly considers the modification of the relativistic effective mass of the nucleon within the relativistic mean field (RMF) model of nuclear matter. In addition, our calculations include neutrino-induced two-particle emission processes, which are evaluated within the RMF model of nuclear matter. Utilizing the CDFM $_{M^*}$, we provide predictions for the neutrino and antineutrino cross sections of ^{12}C , which have been observed in accelerator experiments, such as MiniBooNE, T2K, and MINERvA. The findings demonstrate a high degree of consistency with experimental data across all (anti)neutrino energy ranges.

References

- [1] M.V. Ivanov and A.N. Antonov, *Phys. Rev. C* **109** (2024) 064621.
- [2] M.V. Ivanov and A.N. Antonov, *EPJ Web Conf.* **324** (2025) 00034.
- [3] M.V. Ivanov and A.N. Antonov, *Universe* **11** (2025) 119: 1–11.
- [4] M.V. Ivanov and A.N. Antonov, *Phys. Rev. C* **113** (2026) 044612.