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Thermal Radiation and Entanglement in Antineutrino Scattering from Nuclei GEORGE ISKANDER, MOJIQUE TYLER, OLIVER BAKER[1], Yale University — We extend studies of apparent thermalization in proton-proton collisions to weak interaction processes by analyzing antineutrino-nucleus scattering results from the MINERνA collaboration. We find that for charged-current muon antineutrino scattering on hydrocarbon at average antineutrino energy of 3.6 GeV, the momentum distribution of the resulting pion can be described by both an exponential and a power law component. The presence of an exponential component implies a thermal distribution. We explore the possibility that this thermalization is due to entanglement between distinct regions of the target system. We also show that in coherent muon antineutrino scattering on carbon, there is no entanglement and the thermal component is absent, as expected. These results are consistent with the behavior that is observed in the transverse momentum distribution of charged hadrons produced in proton-proton collisions at CERN's Large Hadron Collider. Results from both scattering processes and their comparison will be presented.

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