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Impact of neutrino-nucleon interactions in the IceCube ultrahigh-energy neutrino data

In 2013 the IceCube Collaboration reported the detection of the two most energetic neutrino events ever seen. The amount of data accumulated since then is nowadays accepted to be due to an extragalactic neutrino flux of ultrahigh-energy, and have opened a new window to explore the whole universe. The combination of the information relative to electromagnetic radiation, neutrinos, cosmic rays, and gravitational waves gives rise to the so-called multi-messenger astronomy. However, given the energy scales involved in the interaction process, HESE neutrino events are also a reasonable place to looking for signatures of the non-linear (saturation) effects whose origin is believed to be due to partonic recombination inside the target nucleus. Indeed, the neutrino-nucleon interaction cross-section uncertainties configure an important systematic error in the whole detection process. In this opportunity, I will briefly describe the IceCube events and the processes of neutrino-nucleon interaction for both cases of linear and non-linear dynamics. Finally, an estimative of the impact of non-linear effects on the determination of the parameters associated with the HESE flux determination is presented.