

# Photonuclear cross sections and UHECR transport: towards more transparency [10'+5']

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Studies of the origin and composition of ultra-high-energy cosmic rays involve simulating their interactions, predominantly with surrounding photon fields and involving photonuclear cross sections in the MeV-GeV range. Although such interactions within the source and during extra-galactic propagation are analogous, these scenarios are addressed separately and the codes employed for each of them are different. Evaluating the impact of cross sections in this way can be quite complex and the cross section datasets used for each scenario are often inconsistent. This contribution presents an approach that allows a consistent treatment of in-source and extra-galactic propagation, and is better suited to explore the impact of cross section uncertainties. The approach is based on analytic functions describing the probabilistic behavior of Continuous Time Markov Chains, which are well suited for nuclear cascades produced in UHECR interactions even when the target photon fields are variable in time. Examples illustrating the connection between the photonuclear cross sections and the evolution of UHECR composition are discussed.

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