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Top quark production at ultra-high energies

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The top quark, the heaviest quark and, indeed, the heaviest elementary particle known today, constitutes a novel probe of the long-lived medium in quark-gluon phase which, as expected, can be produced even in light nuclei collisions at ultra-high energies. Some distinctive features are considered for particle production in the top sector in ultra-high energy domain. The single top production and antitop-top pair production is studied within the effective field theory approach used for calculations of global quantities. Predictions for all observables are computed at NLO in QCD. These quantitative results can be important for both the future collider experiments at center-of-mass energy frontier and the improvement of the phenomenological models for development of the cosmic ray cascades in ultra-high energy domain. Thus the study allows the better understanding of heavy particle production and emphasizes the exciting interrelation between the high-energy physics on accelerators and ultra-high energy cosmic ray measurements.

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