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EPOS.LHC-A: first results and impact on muon production in air showers

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With great amount of data coming from collider and fixed-target experiments on all sorts of hadron collisions, and with very precise ultra-high energy cosmic ray (UHECR) measurements, many missing pieces of crucial information on the nature of multiparticle production in quantum chromodynamics (QCD) are now unraveled. The simplified assumptions of old models fail to allow constructing a flexible description needed to satisfy the entire variety of data. The most evident example is the so-called "muon puzzle", the excess of N_μ in UHECR that remains a challenge to MC calculations even after almost two decades of studies.

EPOS is a state-of-the-art model that is being developed in a paradigm of a "global approach", aiming to provide a universal way of describing all types of hadronic interactions from e^+e^- to heavy ion collisions, with its EPOS.LHC-R version being adopted for cosmic ray studies.

Recently, a new string fragmentation model, ATROPOS, was interfaced with EPOS.LHC-R, resulting in a new EPOS.LHC-A version. ATROPOS is a unique approach that considers angular momentum conservation in the process of string fragmentation. This allows to develop a sophisticated treatment of heavy resonances production, along with changes in baryon production in hadron collisions. Moreover, the strict treatment of space-time evolution of string states is possible with ATROPOS, which allows a precise connection between string model parameters and the core-corona settings.

In this talk, we report the latest developments of ATROPOS model and the preliminary results of EPOS.LHC-A for hadron production and muon content in EAS.

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