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Precision cross-sections for advancing cosmic-ray physics

The latest generation of cosmic-ray direct detection experiments is providing a wealth of high-precision data, stimulating a very rich and active debate in the community on the related strong discovery and constraining potentials on many topics, namely dark matter nature, and the sources, acceleration, and transport of Galactic cosmic rays. However, interpretation of these data is strongly limited by the uncertainties on nuclear and hadronic cross-sections. This contribution is one of the outcomes of the Cross-Section for Cosmic Rays at CERN workshop series, that built synergies between experimentalists and theoreticians from the astroparticle, particle physics, and nuclear physics communities. A few successful and illustrative examples of CERN experiments' efforts to provide missing measurements on cross-sections are presented. In the context of growing cross-section needs from ongoing, but also planned, cosmic-ray experiments, a road map for the future is highlighted, including overlapping or complementary cross-section needs from applied topics (e.g., space radiation protection and hadrontherapy).

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