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Fragmentation Cross Sections for the Understanding of Cosmic-Ray Transport in the Galaxy: Results and Prospects from NA61/SHINE

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Accurate measurements of cosmic-ray fragmentation cross sections are essential for maximizing the physics potential of precise measurements of secondary and primary cosmic-ray fluxes from current balloon and space-borne experiments. NA61/SHINE, operating at the CERN SPS H2 beamline, is uniquely suited for studying these interactions at high energies above 10 GeV/nucleon.

In this contribution we will present the fragmentation cross sections of carbon to 10B, 11B and 11C at 13 GeV/nucleon, crucial for interpreting the cosmic-ray boron-to-carbon (B/C) ratio. These findings are based on data from a pilot run conducted in 2018. Additionally, we report on preliminary results from 2024 measurements covering projectile nuclei ranging from lithium to silicon. With over 40 million recorded events, this dataset will enable the reconstruction of the full reaction network required to study light secondary cosmic rays. Finally, we discuss prospects for extending these measurements to heavier projectiles, including iron.

Collaboration(s)

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