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A ranking of production cross-sections for light cosmic rays : LI, BE, B, C, AND N

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The precision of the new generation of cosmic-ray (CR) experiments, such as AMS-02, PAMELA, CALET, and ISS-CREAM, is now reaching the percent level in a wide energy range from GeV/n (per nucleon) to multi-TeV/n. A precise understanding of cosmic-rays production and propagation as well as stringent constraints on dark matter are guaranty results from a precise interpretation of the measured fluxes. Meanwhile, a major obstacle in doing so is the current uncertainty in the isotopic production cross sections which is often as high as 20-50% or even larger in some channels. This embarrassing situation is gaining momentum in the astrophysics community which call for a dedicated experimental effort. I will first illustrate the impact of the current cross-section models on the interpretation of the data. Measuring the all set of cross-sections needed is of course a huge work that requires an incremental approach. In a recent work my collaborators and I aim at providing the community with the ranking of the cross sections contributing to the production of the most astrophysically important isotopes of Li, Be, B, C, and N. I will present this ranking and give an evaluation of the beam time necessary to reach a 3% precision in the production cross-sections pertinent to the AMS-02 experiment. This first roadmap may become a starting point in the planning of new measurement campaigns that could be carried out in several nuclear and/or particle physics facilities around the world.

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