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The measurements of the abundances of ultra-Iron nuclei with DAMPE

The origin, acceleration, and propagation mechanisms of cosmic rays are fundamental scientific issues in the field of international cosmic ray research. The composition and energy spectrum of cosmic rays contain rich information about physical processes. Therefore, accurately measuring the composition and energy spectrum of cosmic rays is a key approach to studying and validating cosmic ray physical models. Among these, the measurement of ultra-heavy element abundances is particularly important. It not only helps to understand the relative contributions of the s-process and r-process in the nucleosynthesis of ultra-heavy elements but also validates the OB star synergistic effect and volatile physical models regarding cosmic ray origin and acceleration mechanisms. This has significant implications for deepening human understanding of cosmic ray physics. The Dark Matter Particle Explorer (DAMPE) is a space-based particle telescope with a wide energy range and high energy resolution. It can observe gamma rays and electrons, as well as effectively identify various nuclides. Its broad dynamic range enables it to measure the ultra-heavy element zirconium nuclei. Through the measurement of ultra-heavy element abundance ratios, DAMPE provides crucial observational data for studying the origin and propagation of cosmic rays, further enriching our understanding of the physical mechanisms behind cosmic rays.

Collaboration(s)

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