

## Nuclei in the Cosmos (NIC XVII)



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# JUNA investigation of star evolution in deep underground laboratory

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The Jinping Underground experiment for Nuclear Astrophysics (JUNA) has leveraged the ultralow background of the CJPL to conduct experiments aimed at directly studying crucial reactions occurring at relevant stellar energies during the evolution of stars. In 2020, JUNA successfully commissioned an mA level high current accelerator based on an ECR source, as well as BGO and  $^3\text{He}$  detectors. These advancements enabled JUNA to perform direct measurements of several key reactions, including  $^{25}\text{Mg}(p, \gamma)^{26}\text{Al}$ ,  $^{19}\text{F}(p, \alpha\gamma)^{16}\text{O}$ ,  $^{19}\text{F}(p, \gamma)^{20}\text{Ne}$ ,  $^{13}\text{C}(\alpha, n)^{16}\text{O}$ ,  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$ , and  $^{18}\text{O}(\alpha, \gamma)^{20}\text{Ne}$  with improved precision and across a wider energy range, closer to the Gamow window. These experiments provide valuable insights into the astrophysics implications (neutron source, F and Ca over production etc.) with their precise reaction rates.

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