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Progress of underground nuclear astrophysics JUNA experiments

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The Jinping Underground experiment for Nuclear Astrophysics (JUNA) takes advantage of the ultra-low background of the CJPL to conduct experiments for directly studying crucial reactions at stellar energies in the evolution of stars. In 2020, JUNA commissioned an mA level high current accelerator based on an ECR source, as well as high efficiency BGO and ^{3}He detectors. These combination enabled JUNA to perform direct measurements of key nuclear reactions in 10^{-13} b sensitivity with the beam exposure of few hundreds of Coulomb, including $^{25}\mathrm{Mg}(p,\gamma)^{26}\mathrm{Al}$, $^{19}\mathrm{F}(p,\alpha\gamma)^{16}\mathrm{O}$, $^{19}\mathrm{F}(p,\gamma)^{20}\mathrm{Ne}$, $^{13}\mathrm{C}(\alpha,n)^{16}\mathrm{O}$, $^{12}\mathrm{C}(\alpha,\gamma)^{16}\mathrm{O}$, and $^{18}\mathrm{O}(\alpha,\gamma)^{20}\mathrm{Ne}$ with improved precision and closer to the Gamow window. These precise reaction rates provide valuable insights into the high precision astrophysics simulation. The highlights of JUNA experiments will be presented.

<img src="https://i.slow.pics/CImyviDM.webp" alt="JUNA layout with research highlights superposed." title="JUNA layout with research highlights superposed." style="width:100

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