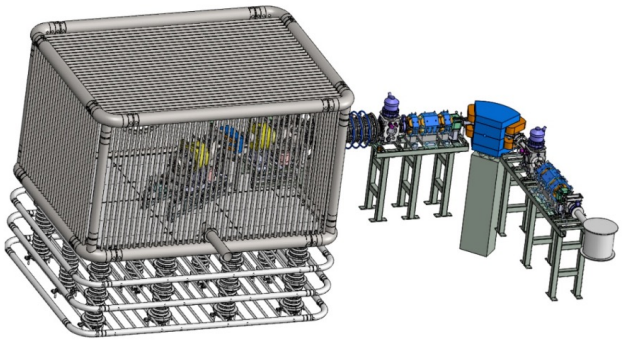
Underground nuclear astrophysics experiment in Jinping China: JUNA

W. P. Liu[a], for JUNA collaboration

[a] *CIAE, China Institute of Atomic Energy, P. O. Box 275(1), Beijing 102413, China*

Jinping Underground experiment for Nuclear Astrophysics (JUNA) [1] will take the advantage of the ultra-low background of China Jinping Laboratory (CJPL) (rock depth 2400 m) and high current accelerator based on an ECR source and a highly sensitive detector to directly study a number of crucial reactions occurring at their relevant stellar energies during the evolution of hydrostatic stars. In its first phase, JUNA aims at the direct measurements of ^{25}Mg(p,γ)^{26}Al, ^{19}F(p,α)^{16}O [2], ^{13}C(α,n)^{16}O and ^{12}C(α,γ)^{16}O reactions near Gamow energy.
The experimental setup, which includes an accelerator system (400 kV with ECR source) with high stability and high intensity (10 emA for proton (commissioned), 2.5 emA for ^{4}He^{2+}(under development)), a detector system, and a shielding material with low background, will be established during the above research. The high efficiency detector system is composed of gamma (HPGe and BGO, all commissioned), neutron (^{3}He and liquid scintillator, commissioned) and charged particle arrays. The high-power target is under development. See figure below.



The main parts of accelerator system and detector arrays are ready and will be tested on ground and installed underground in 2019. Some test experiment on base level, such as ^{19}F(p,α)^{16}O, as well as detector background measurement in CJPL, were performed in ground and underground bases. One of four experiments will be started in 2019 and the first batch of four experimental results will be released in 2021. In this talk, the current progress of JUNA will be given.

References

[1] W. P. Liu *et al.*, Science China **59**(2016)642011.

[2] J. J. He *et al.*, Science China **59**(2016)652011.