# Progress for the measurement of $^{14}$N(p,$\gamma$)$^{15}$O reaction in Jinping Underground laboratory for Nuclear Astrophysics (JUNA)

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The CN cycle is the dominant energy source for stars more massive than our sun, and also plays an important role to determine the age of globular clusters[1]. The capture reaction $^{14}$N(p,$\gamma$)$^{15}$O is the slowest CN reaction and thus of high astrophysical interest[2,3]. The extremely low value of the cross section, ranging from pico-barn, has always prevented its measurement in a laboratory at the Earth′s surface, where the signal to background ratio is too small because of cosmic ray interactions.

China JinPing underground Laboratory (CJPL) is shield by 2400 m of mainly marble overburden, with radioactively quiet rock, which extremely suppresses the cosmic ray background. A high current accelerator based on ECR source, JUNA 400 kV, will be install into CJPL-II A1 hall in the end of 2019 for the study of key nuclear reactions in astrophysics. Base on the ultra-low background of CJPL and high current accelerator, the cross section of $^{14}$N(p,$\gamma$)$^{15}$O reaction can be directly measured near the solar Gamow window. High pure $^{14}$N target is a key factor for the measurement of the $^{14}$N(p,$\gamma$)$^{15}$O cross section at lower energy, due to the high count rate from the $^{15}$N(p,$\alpha$)$^{12}$C. The targets for our measurements were prepared by implanting $^{14}N_2^+$ ions into 0.2-mm-thickness tantalum backings (99.99% metals-basis purity) using 320 kV high-voltage platform at Institute of Modern Physics (IMP), Lanzhou, China. The target stoichiometry was determined via Rutherford backscattering spectrometry (RBS) using 3.0 MV tandetron accelerator at Sichuan University, Chengdu, China. The test experiments for the measurement of $^{14}$N(p,$\gamma$)$^{15}$O reaction was carried out on the ground using JUNA 400 kV at CIAE and the results will be presented.

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