THE FIRST MEASUREMENT OF CROSS SECTION FOR THE ^{7}Be(n,α)^{4}He REACTION NEAR THE THRESHOLD ENERGY

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The primordial abundances of the light elements produced in the process of Big Bang nucleosynthesis (BBN) provide important insights into what happen in the early universe. Accurate estimation of the primordial abundances is crucial to test the cosmological theories by comparing the predicted values with the observations.

A comparison between the theoretical predictions of the primordial abundances and the observations is in good agreement with those for the helium and deuterium. However, there remains a serious problem: The ^{7}Li abundance does not agree with any theoretical BBN calculations. This discrepancy is known as the cosmological lithium problem, and has been of great interest in recent years.

It was pointed out that if a unknown resonant nuclear reaction channel destructing ^{7}Be exists, the ^{7}Li abundance can be greatly reduced in the BBN calculation, and the lithium problem might be solved. One of the candidate channels to destruct ^{7}Be is the ^{7}Be(n,α)^{4}He reaction, but the cross section for this reaction at the cosmological energy has been never measured.

Very recently, we have measured the cross section for the ^{4}He(α,n)^{7}Be reaction, which is the time reverse reaction of the ^{7}Be(n,α)^{4}He reaction, and determined the cross section for the ^{7}Be(n,α)^{4}He reaction at low energies down to E_{cm} = 0.26 MeV for the first time. We will report the experimental details and derived thermonuclear reaction rate of the reaction of interest in the present talk.