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Missing mass spectroscopy on the proton-unbound ^{12}O nucleus and the breakdown of the $Z = 8$ shell closure D. SUZUKI, H. IWASAKI, Department of Physics, University of Tokyo, D. BEAUMEL, IPN Orsay, E537@SPEG COLLABORATION — We will report on the first observation of an excited state in the proton-unbound nucleus ^{12}O with $Z = 8$. Recent studies have shown that the shell closure at $N = 8$ disappears far from stability. A further interest then arises in mirror nuclei, addressing an open question about a persistence or a disappearance of the proton magicity at $Z = 8$. Level properties of the low-lying states of $^{12}_{8}O_4$ should provide an invaluable information since studies on the low-lying intruder states in the mirror partner $^{12}_{4}Be_8$ have highlighted the breakdown of the neutron shell closure. However, no definite observation has been made for excited states of ^{12}O, which lies beyond the proton-drip line. In this study, we applied the missing mass method to the ^{14}O(p,t)^{12}O reaction at 50 MeV/u. The experiment was performed at the GANIL-SPEG facility. The secondary ^{14}O beam was produced in the SISSI device, and impinged on a 1-mm-thick solid hydrogen target. Recoiling particles were detected by an array of the MUST2 telescopes, each of which was composed of a double-sided silicon strip detector and a CsI calorimeter. A large active area of 100×100 mm^2 with a high granularity achieved efficient measurements as well as a good momentum resolution. Based on the experimental result, we will discuss the breakdown of the $Z = 8$ shell closure in ^{12}O.

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