Breakup reactions of ^{14}Be

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Unbound states of the very neutron-rich nuclei ^{14}Be and ^{13}Be are investigated via the breakup reactions of ^{14}Be on a proton target. The neutron drip-line nucleus ^{14}Be is known to have two neutron halo structure. No bound excited states of ^{14}Be have been observed below its neutron decay threshold (S_{2n}=1.26 MeV [1]). The study of its unbound states is thus essential to clarify its nuclear structure. As for the unbound nucleus ^{13}Be, low-lying states are not clarified because experimental studies are not consistent with each other. Thus, experimental study for ^{13}Be is strongly desired. The knowledge of low-lying states of ^{13}Be is also important to understand the structure of the three-body binding system ^{14}Be. To study these neutron-rich nuclei, we performed the invariant-mass spectroscopy via the proton-induced breakup reaction of ^{14}Be at 69 MeV/nucleon in inverse kinematics. In the breakup of ^{14}Be by a proton target, inelastic scattering and one-neutron removal reaction mainly occur. These reactions are useful to investigate the unbound states of ^{14}Be and ^{13}Be, respectively. The experiment was carried out at RIKEN Nishina Center using the RIPS beam line. The data analysis and experimental results will be presented.

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