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Reaction dynamics of proton drip-line nuclei at energies around the Coulomb barrier

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Reaction dynamics induced by proton drip-line nuclei at energies around the Coulomb barrier is one of the most popular topics in nuclear physics. In order to further investigate the reaction mechanisms of proton drip-line nuclei, we performed the complete-kinematics measurements of ^{8}B+^{120}Sn and ^{17}F+^{58}Ni at CRIB, University of Tokyo. Two detector arrays, i.e., the silicon telescope array of STARE and the ionization chamber array of MITA, were designed respectively for the measurements of ^{8}B and ^{17}F. Reaction products were completely identified with the help of these two arrays. For the ^{8}B+^{120}Sn system, the coincident measurement of the breakup fragments was achieved for the first time. The correlations between the breakup fragments reveal that the prompt breakup occurring on the outgoing trajectory dominates the breakup dynamics of ^{8}B. For ^{17}F+^{58}Ni, nearly the exhaustive information on reaction channels, such as quasi-elastic scattering, breakup and total fusion, was derived for the first time. An enhancement of the fusion cross section of ^{17}F+^{58}Ni was observed at the energy below the Coulomb barrier. Theoretical calculations indicate that this phenomenon is mainly due to the coupling to the continuum states. Moreover, different direct reaction dynamics were found in ^{8}B and ^{17}F systems, suggesting the influence of proton-halo structure on the reaction dynamics.

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