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Decay Spectroscopy of Neutron-rich ^{129}Cd with GRIFFIN Spectrometer (student talk)

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Nuclei around doubly magic ^{132}Sn are of particular interest in terms of nuclear structure as well as nuclear astrophysics. The properties of these nuclei provide important input parameters for the astrophysical r-process (rapid neutron-capture process) since they play a role as waiting-point nuclei and their shell structure and half-lives affect the shape of the second r-abundance peak at A$\sim$130. From the perspective of nuclear structure, the evolution of single-particle levels near shell closures is ideal for testing the current nuclear models far from stability.

There has been two decay spectroscopies on ^{129}Cd, however, the level schemes of ^{129}In obtained from each measurement have large discrepancy [1,2]. Also, most of the spin assignments of the excited states of ^{129}In remain unclear. Therefore, to solve this discrepancy of level schemes and determine the properties of the energy states with high precision are the main purpose of this study.

This experiment was performed at TRIUMF, Canada. New data of the decay of ^{129}Cd was collected with the high-purity germanium detector array GRIFFIN (Gamma-Ray Infrastructure For Fundamental Investigations of Nuclei), along with the auxiliary β-particle detector SCEPTAR, for about 13 hours with the beam intensity of $\sim$250 pps. This high statistics of the data and the high sensitivity of the detectors enabled us to perform detailed and precise spectroscopy, including β-γ-γ coincidence analysis and angular correlation analysis, which are essential for building the level scheme and assignment of the spins of each level. The new results from ongoing analysis, including 6 new excited states and 22 new transitions will be reported.

[1] J. Taprogge et al., Phys. Rev. C 91, 054324 (2015).

[2] O. Arndt et al., Acta Physica Polonica B 40, 3 (2009).

[3] R. Dunlop et al., Phys. Rev. C 93, 062801(R) (2016).

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