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Decay Spectroscopy in the Region of ^{78}Ni

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The simultaneous development of advanced astrophysical models [1] and new facilities capable of producing rapid neutron capture (r-process) nuclei with sufficient yields to measure their masses and decay half-lives [2] has spurred a renaissance of the field. Now-available realistic r-process calculations in neutron binary mergers [3] show that the properties of nuclei in the vicinity of doubly magic ^{78}Ni, ^{132}Sn and ^{208}Pb are the largest contributors to the final abundance pattern [4]. These nuclei are simultaneously the hardest to model using global nuclear models [5] and to produce in nuclear physics facilities [2].

Detailed decay-spectroscopy measurements of r-process nuclei close to magic numbers can offer a wealth of nuclear structure information to improve nuclear models. However, large neutron branching ratios have traditionally impeded complete observations. The Versatile Array for Neutron Detectors (VANDLE) was developed at UTK for neutron spectroscopy using the time-of-flight technique. Here we will discuss the delayed neutron emission from neutron rich ^{83,84}Ga isotopes measured with VANDLE and a new microscopic model of their decay capable to reproduce their decay properties.

[1] A. Arcones and G. Martnez-Pinedo, Phys. Rev. C 83, 045809 (2011).
[2] S. Nishimura et al., Phys. Rev. Lett. 106, 052502 (2011).
[3] B. P. Abbott et al. Phys. Rev. Lett. 119, 141101 (2017).
[4] M. Mumpower et al., Prog. Part. Nucl. Phys. 86, 86 (2016).
[5] P. Möller, B. Pfeiffer, and K.-L. Kratz, Phys. Rev. C 67, 055802 (2003).