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Decay Spectroscopy of Neutron-Rich Cd Around the $N = 82$ Shell Closure

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The neutron-rich Cadmium isotopes around $A = 130$ are of special interest to both nuclear structure and astrophysics. Situated near the well-known magic numbers at $Z = 50$ and $N = 82$, these nuclei are prime candidates to study the evolving shell structure observed in exotic nuclei. Additionally, the extra binding energy observed around the nearby doubly-magic ^{132}Sn has direct correlations in astrophysical models, leading to the second r-process abundance peak at $A \approx 130$ and the corresponding waiting-point nuclei around $N = 82$. The β -decay of the $N = 82$ isotope ^{130}Cd into ^{130}In was first studied a decade ago [1], but the information for states of the lighter indium isotope (^{128}In) is still limited. These motivating factors has led us to perform detailed γ -ray spectroscopy following the β -decay of $^{128-132}\text{Cd}$ using the GRIFFIN [2] facility at TRIUMF, which is capable of performing spectroscopy down to rates of ~ 0.1 pps}.

The ongoing analysis of the $^{128,131,132}\text{Cd}$ will be presented. Already in ^{128}Cd , 23 new transitions and 15 new states have been observed in addition to the 4 previously observed excited states [3]. Its half-life has also been remeasured via the time distribution of the strongest γ -rays in the decay scheme with a higher precision [4]. For ^{131}Cd , results will be compared with the recent EURICA data. These data highlight the unique capabilities of GRIFFIN for decay spectroscopy on the most exotic, short-lived isotopes, and the necessity to re-investigate also “well-known” decay schemes for missing transitions.

References:

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Primary authors: DILLMANN, Iris (TRIUMF); BERNIER, Nikita (TRIUMF/UBC); KRÜCKEN, Reiner (TRIUMF/UBC)

Co-authors: GARNSWORTHY, Adam (TRIUMF); RADICH, Allison (University of Guelph); JUNGCLAUS, Andrea (Instituto de Estructura de la Materia, CSIC); TEIGELHOEFER, Andrea (TRIUMF); Mr MACLEAN, Andrew (University of Guelph); Dr OLAIZOLA, Bruno (TRIUMF); SVENSSON, Carl (University of Guelph); Ms BURBADGE, Christina (University of Guelph); ANDREOIU, Corina (Simon Fraser University); PETRACHE, Costel (CNRS/IN2P3); SOUTHALL, Dan (University of Waterloo); KISLIUK, Dylan (University of Guelph); PADILLA-RODAL, Elisabeth (Instituto de Ciencias Nucleares UNAM); MACCONNACHIE, Elizabeth (TRIUMF/Queen’s University); MCGEE, Erin (University of Guelph); GARCIA, Fatima (Simon Fraser University); BALL, Gordon (TRIUMF); HACKMAN, Greg (TRIUMF); BIDAMAN, Harris (University of Guelph); Dr HENDERSON, Jack (TRIUMF); MEASURES, James (University of Surrey); Dr SMALLCOMBE, James (TRIUMF); PARK, Jason (TRIUMF/UBC); SMITH, Jenna (TRIUMF); PORE, Jennifer (Simon Fraser University); Dr LASSEN, Jens (TRIUMF); Mr TURKO, Joseph (University of Guelph); Mr EVITTS, Lee (TRIUMF / University of Surrey); TICU, Marius (Simon Fraser University); Dr BOWRY, Michael (Michigan State University); Mrs DUNLOP, Michelle (University of Guelph); MOUKADDAM, Mohamad (TRIUMF); Dr RUOTSALAINEN, Panu (University of Jyväskylä); GARRETT, Paul (University of Guelph); BOUBEL, Paula (University of Guelph); Dr CABALLERO FOLCH, Roger (TRIUMF); LI,

Ruohong (TRIUMF); Mr DUNLOP, Ryan (University of Guelph); HALLAM, Sam (TRIUMF/Surrey); TABOR, Sam (Florida State University); ILYUSHKIN, Sergey (Colorado School of Mines); Ms ZIDAR, Tammy Louise (University of Guelph); BILDSTEIN, Vincenz (University of Guelph)

Presenter: BERNIER, Nikita (TRIUMF/UBC)

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