

Virtual Superheavy Elements Seminar

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“Decay Spectroscopy of Trans-fermium Nuclei with the Argonne Gas-Filled Analyzer ”

Following the commissioning, experimental program with AGFA was focused on in-beam spectroscopy of trans-fermium nuclei using the Gammasphere gamma-ray detector array. In 2020, the first AGFA campaign to study decay properties of trans-fermium nuclei was carried out. The campaign consisted of 3 experiments. 1) Decays of K-isomers in ^{254}No were studied to resolve discrepancies among existing decay level schemes. About one million of ^{254}No nuclei were implanted in a double-sided Si strip detector at the AGFA focal plane matching previous experiments. gamma rays emitted following the decay of K-isomers were detected using a compact array of Ge clover detectors. Due to a large detection efficiency, gamma-gamma coincidence data were collected for the first time and can be used to constrain the decay level scheme. 2) Search for K-isomers in ^{253}Lr was undertaken as a follow up to the discovery with AGFA of a $\sim 1\text{s}$ K-isomer in the lighter $N=150$ isotone, ^{251}Md . Surprisingly, no evidence for an isomer with a similar half life was found in ^{253}Lr . However, a handful of low energy decay events with decay times around ~ 1 microseconds were observed suggesting existence of a rapidly decaying isomer in ^{253}Lr . 3) Search for so far unknown ^{251}Lr isotope was carried out. A new alpha-decay activity was observed and was assigned to ^{251}Lr based on temporal and spatial correlations with known daughter and grand-daughter ^{247}Md and ^{243}Es alpha decays.

The above preliminary results and their interpretation will be discussed in detail during the talk. These results are a testament for high sensitivity and selectivity of AGFA equipped with a high granularity DSSD and a compact array of Ge clover detectors at the focal plane.

Plans for upcoming experimental program with AGFA will be also presented.

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3	4	5	6	7	26	27	Ni	Cu	Zn	49	50	51	Te	Iodine	86		
21 Sc scandium 44.956	22 Ti titanium 47.867	23 V vanadium 50.942	24 Cr chromium 51.996	25 Mn manganese 54.938	26 Fe iron 55.845(2)	27 Co cobalt 58.933	Ni nickel 58.693	Cu copper 63.546(3)	Zn zinc 65.38(2)	49 In indium 114.82	50 Sn tin 118.71	51 Sb antimony 121.76	Te tellurium 127.60(3)	Iodine 126.90	86 Rn radon 131.29		
39 Y yttrium 88.906	40 Zr zirconium 91.224(2)	41 Nb niobium 92.905	42 Mo molybdenum 95.95	43 Tc technetium 101.07(2)	44 Ru ruthenium 101.07(2)	45 Rh rhodium 102.91	46 Pd palladium 106.42	47 Ag silver 107.87	48 Cd cadmium 112.41	80 Hg mercury 200.59	81 Tl thallium 204.38 [204.38, 204.39]	82 Pb lead 207.2	83 Bi bismuth 208.98	84 Po polonium	85 At astatine	118 Og oganesson 118	
57-71 lanthanoids	72 Hf hafnium 178.49(2)	73 Ta tantalum 180.95	74 W tungsten 183.84	75 Re rhenium 186.21	76 Os osmium 190.23(3)	77 Ir iridium 192.22	78 Pt platinum 195.08	79 Au gold 196.97	80 Hg mercury 200.59	111 Rg roentgenium	112 Cn copernicium	113 Nh nihonium	114 Fl flerovium	115 Mc moscovium	116 Lv livermorium	117 Ts tennessine	118 Og oganesson
89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	113 Nh nihonium	114 Fl flerovium	115 Mc moscovium	116 Lv livermorium	117 Ts tennessine	118 Og oganesson		
57 La lanthanum	58 Ce cerium	59 Pr praseodymium	60 Nd neodymium 144.24	61 Pm promethium	62 Sm samarium 150.36(2)	63 Eu europium 151.96	64 Gd gadolinium 157.25(3)	65 Tb terbium 158.93	66 Dy dysprosium 162.50	67 Ho holmium 164.93	68 Er erbium 167.26	69 Tm thulium 168.93	70 Yb ytterbium 173.05	71 Lu lutetium 174.97			
93 Pu plutonium	94 Am americium	95 Cm curium	96 Bk berkelium	97 Cf californium	98 Es einsteinium	99 Fm fermium	100 Md mendelevium	101 No nobelium	102 Lr lawrencium								

