

Automated co-adding and energy calibration of large array microcalorimeter data with zero sample knowledge¹ M. D. Yoho^{*}, S.E. Garner^{*}, K. E. Koehler^{*}, D. T. Vo^{*}, M. P. Croce^{*}

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Motivation

- Large (>256) pixelated transition edge sensor arrays allow conventional HPGe (high-purity germanium) detectors.
- must be combined.
- signatures (e.g. MOX, advanced reactor fuels)
- from co-adding.



Resolution preserved for many different nuclear materials

Item	Description		Energy [keV]	Average FWHM [e ^v	V]	Co-addeo FWHM [e]	l V]	Number of Pixels	
PIDIE-6	0.4g RGPu		129.3	65		64		149	
¹⁵³ Gd	Commercial		97.4	56		58		134	
PIDIE-1	0.4g WGPu		129.3	65		64		144	
^{166m} Ho/ ⁵⁷ Co	Commercial		80.6	65		64		145	
CBNM61	10.5g RGI	10.5g RGPu		76		73		84	
A1-324-1	1 kg 10%En. U		143.8	64		63		82	
Automated Energy calibration off ~200 eV									
				Known	C	alibrated	A	bsolute	
Item	Description	Isc	otope	Energy		Centroid	C	Centroid	
				[keV]		[keV]	E	rror [eV]	
PIDIE-1	.4g WGPu	²⁴¹ Am		59.54		59.56		20	
		²⁴⁰ Pu		104.23		104.3		70	
		²⁴¹ Pu		208		208.1		100	
CBNM61	10.5g RGPu	²⁴¹ Am		59.54		59.54		0	
		24	⁴⁰ Pu	104.23		104.08		150	
		24	¹¹ Pu	208		207.84		160	
A1-324-1	1 kg 10%En. U	²³⁵ U		185.71		185.97		260	

Excellent separation of ²³⁸U and ²³⁵U signatures



References

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- 2. M. P. Croce et. al., Hyperspectral x-ray imaging, LTD 2018, LA-UR-19-26750.
- 3. K.E. Koehler et. al., Experimental validation of calorimetric electron capture spectral theory with ¹⁹³Pt, journal of low-temperature physics, submitted 2019.



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