

Supplementary Material

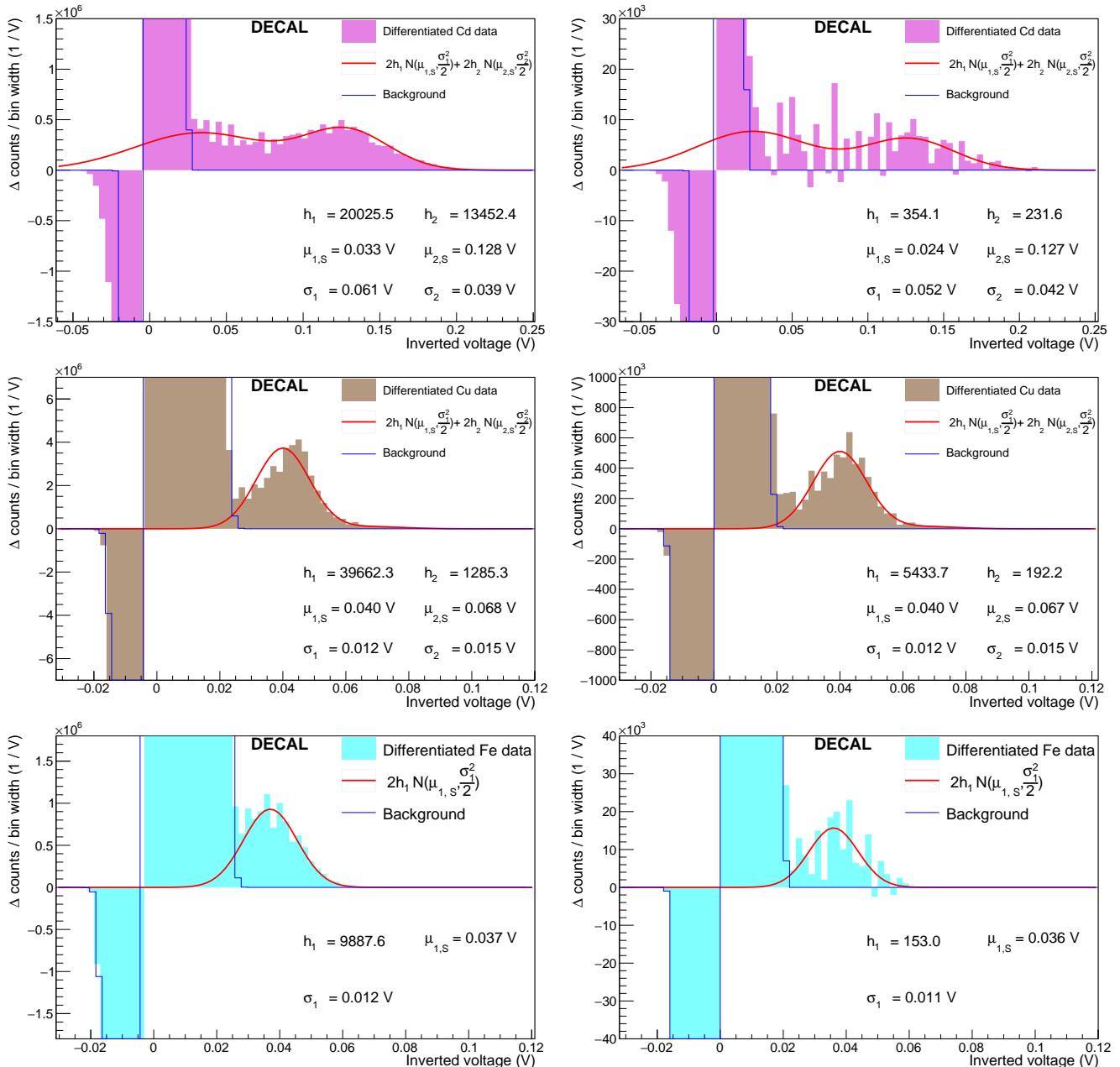


Figure S1. Differentiated DECAL threshold scans under X-ray fluorescence of target materials Cd (**top**), Cu (**middle**) and Fe (**bottom**). Left plots show data for the whole chip enabled, while the right data arise from only a single row being unmasked. The red line is the numerically differentiated fit function and the blue represents a background measurement with the X-ray machine turned off.

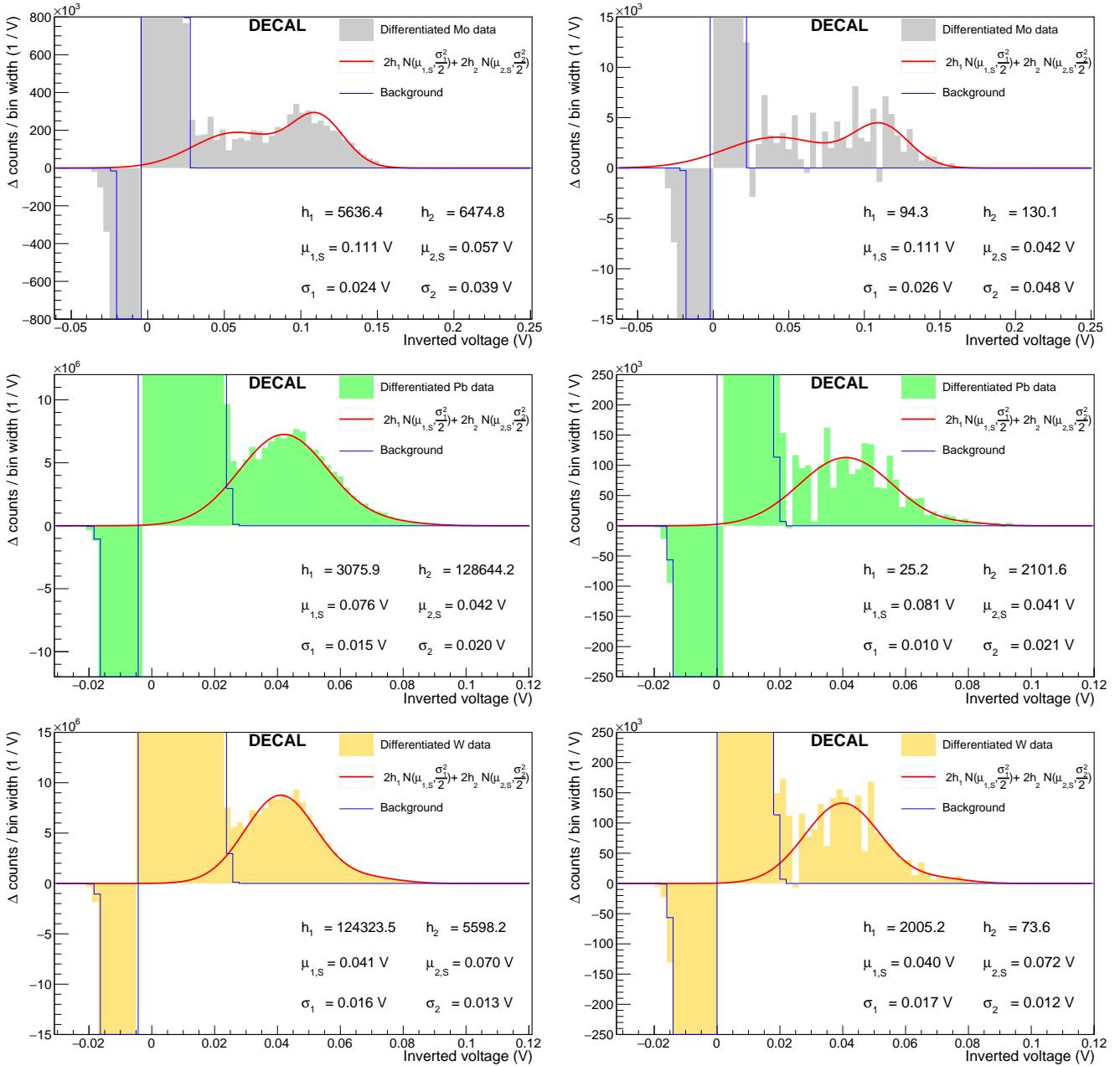


Figure S2. Differentiated DECAL threshold scans under X-ray fluorescence of target materials Mo (**top**), Pb (**middle**) and W (**bottom**). Left plots show data for the whole chip enabled, while the right data arise from only a single row being unmasked. The red line is the numerically differentiated fit function and the blue represents a background measurement with the X-ray machine turned off.

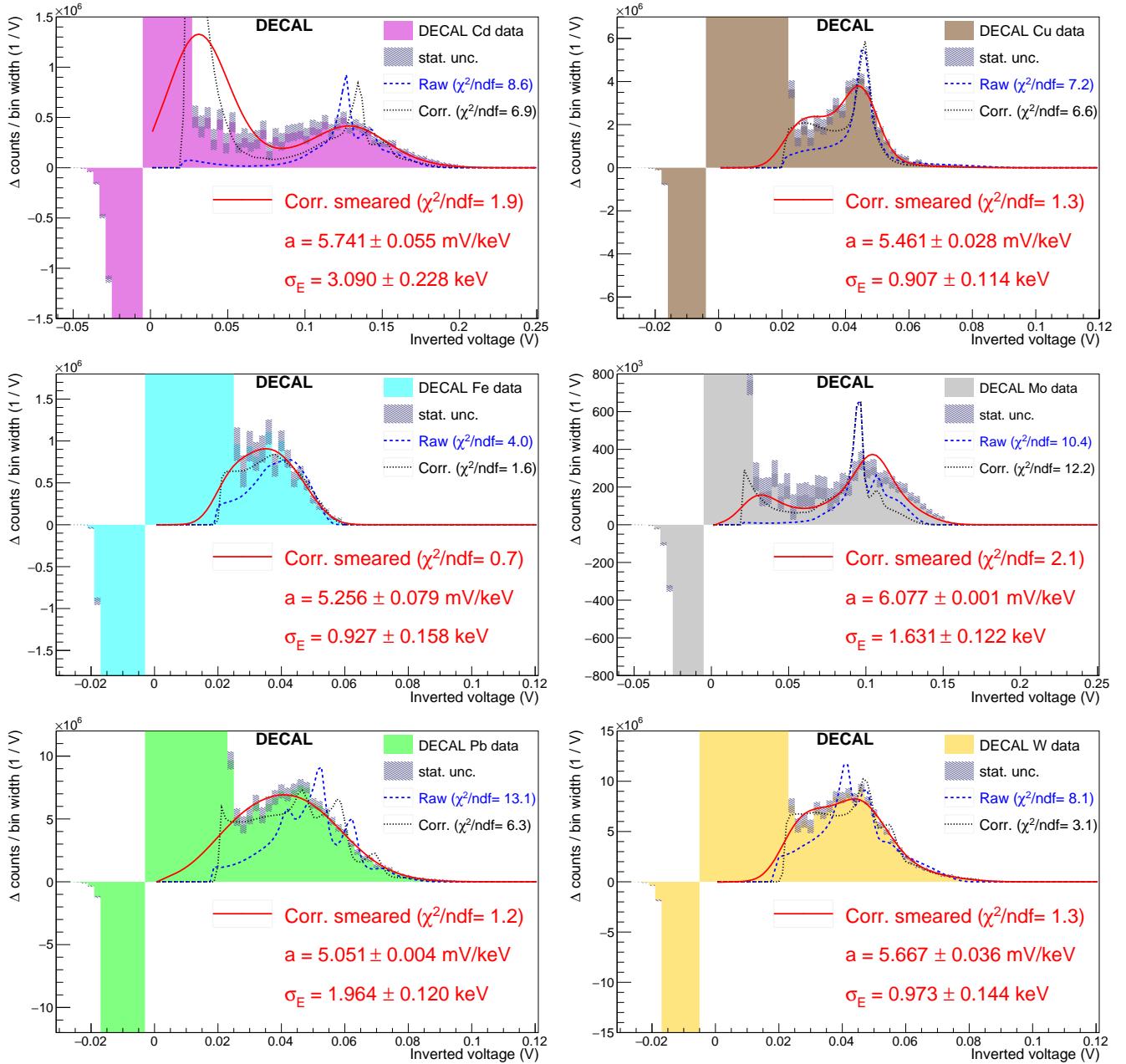


Figure S3. HEXITEC energy spectra fitted to differentiated DECAL threshold scan data under X-ray fluorescence. For all six X-ray target materials the uncorrected HEXITEC energy spectra (dashed blue) and the corrected ones (dashed black) are fitted. The spectra are scaled with a normalization constant C and multiplied in the voltage range by a factor a to translate from energy to voltage. The corrected red curve has an additional fit parameter σ_E , that is the width when smeared with a Gaussian convolution. The statistical uncertainties (dashed area) are propagated from the bin entries of the threshold scans from which the differentiation is performed. All fit parameters are listed in table S1.

Table S1. Fit parameters from three different fit functions to the differentiated DECAL data. For each X-ray fluorescence target the DECAL spectra with the fit functions are shown in fig. S3. The "raw" spectrum of the HEXITEC detector corresponds to the dashed blue line in the figure. The "corr" spectrum is corrected for the absorption probability of photons in 25 μm silicon. The "smeared" spectrum is additionally convoluted with a Gaussian function of width σ_E to estimate the DECAL energy resolution.

target material	HEXITEC spectrum	signal height a (mV/keV)	normalization C (10^7 counts)	energy resolution σ_E (keV)	χ^2/ndf
Cd	raw	5.471 ± 0.010	1.594 ± 0.060		8.6
	corr	5.839 ± 0.011	4.874 ± 0.180		6.9
	smeared	5.471 ± 0.055	5.720 ± 0.647	3.090 ± 0.228	1.9
Cu	raw	5.478 ± 0.012	3.939 ± 0.010		7.2
	corr	5.549 ± 0.011	4.938 ± 0.137		6.6
	smeared	5.461 ± 0.028	6.175 ± 0.184	0.907 ± 0.114	1.3
Fe	raw	5.181 ± 0.033	1.208 ± 0.064		4.0
	corr	5.499 ± 0.035	1.407 ± 0.074		1.6
	smeared	5.256 ± 0.079	1.673 ± 0.108	0.927 ± 0.158	0.7
Mo	raw	5.484 ± 0.015	0.837 ± 0.042		10.4
	corr	5.495 ± 0.016	1.090 ± 0.059		12.2
	smeared	6.077 ± 0.001	1.024 ± 0.058	1.631 ± 0.122	2.1
Pb	raw	4.862 ± 0.000	14.194 ± 0.248		13.1
	corr	5.446 ± 0.000	16.418 ± 0.274		6.3
	smeared	5.051 ± 0.004	9.950 ± 1.008	1.964 ± 0.120	1.2
W	raw	5.007 ± 0.012	17.586 ± 0.303		8.1
	corr	5.811 ± 0.013	16.795 ± 0.273		3.1
	smeared	5.667 ± 0.036	18.140 ± 0.361	0.973 ± 0.144	1.3