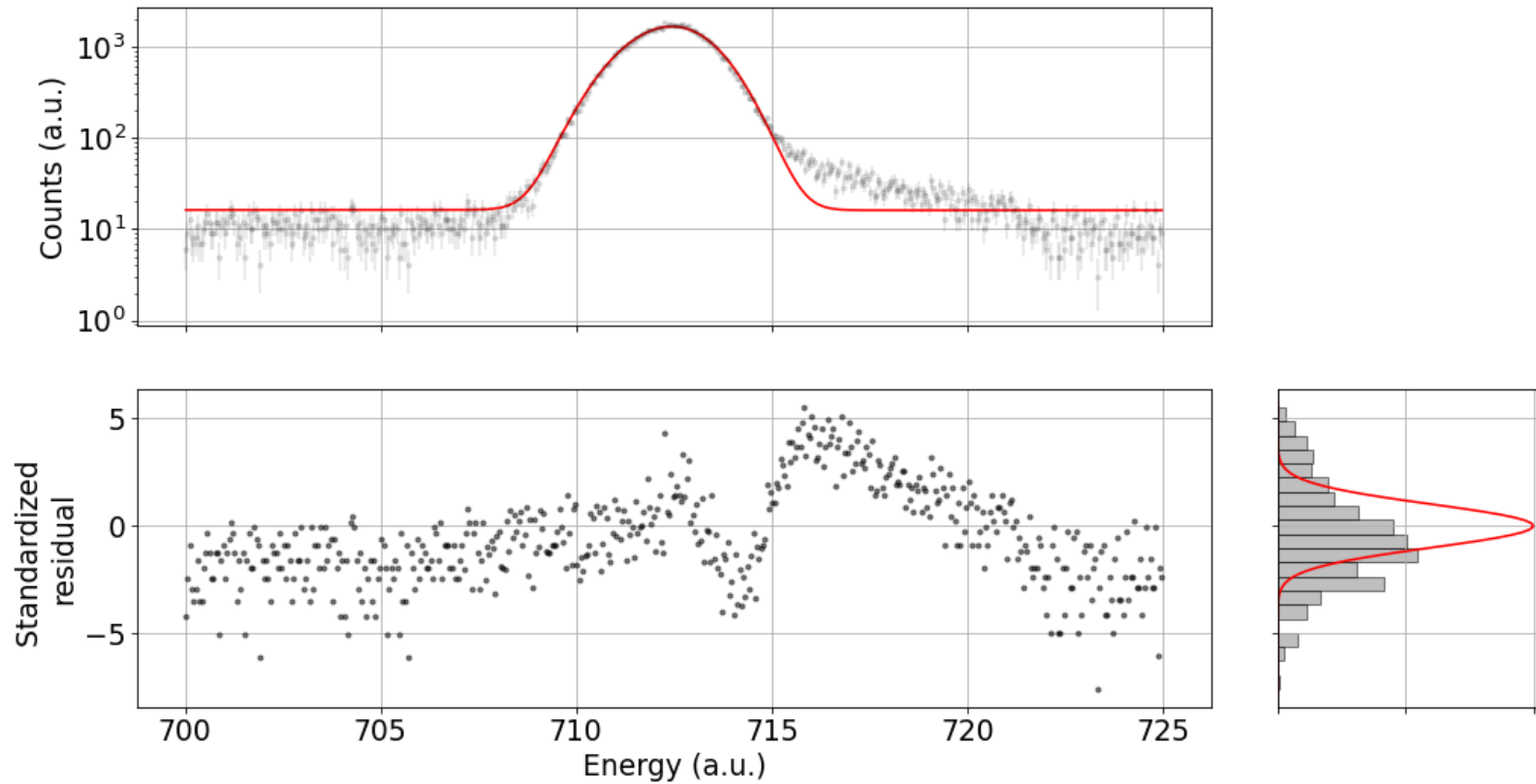


Update muX meeting 08/11

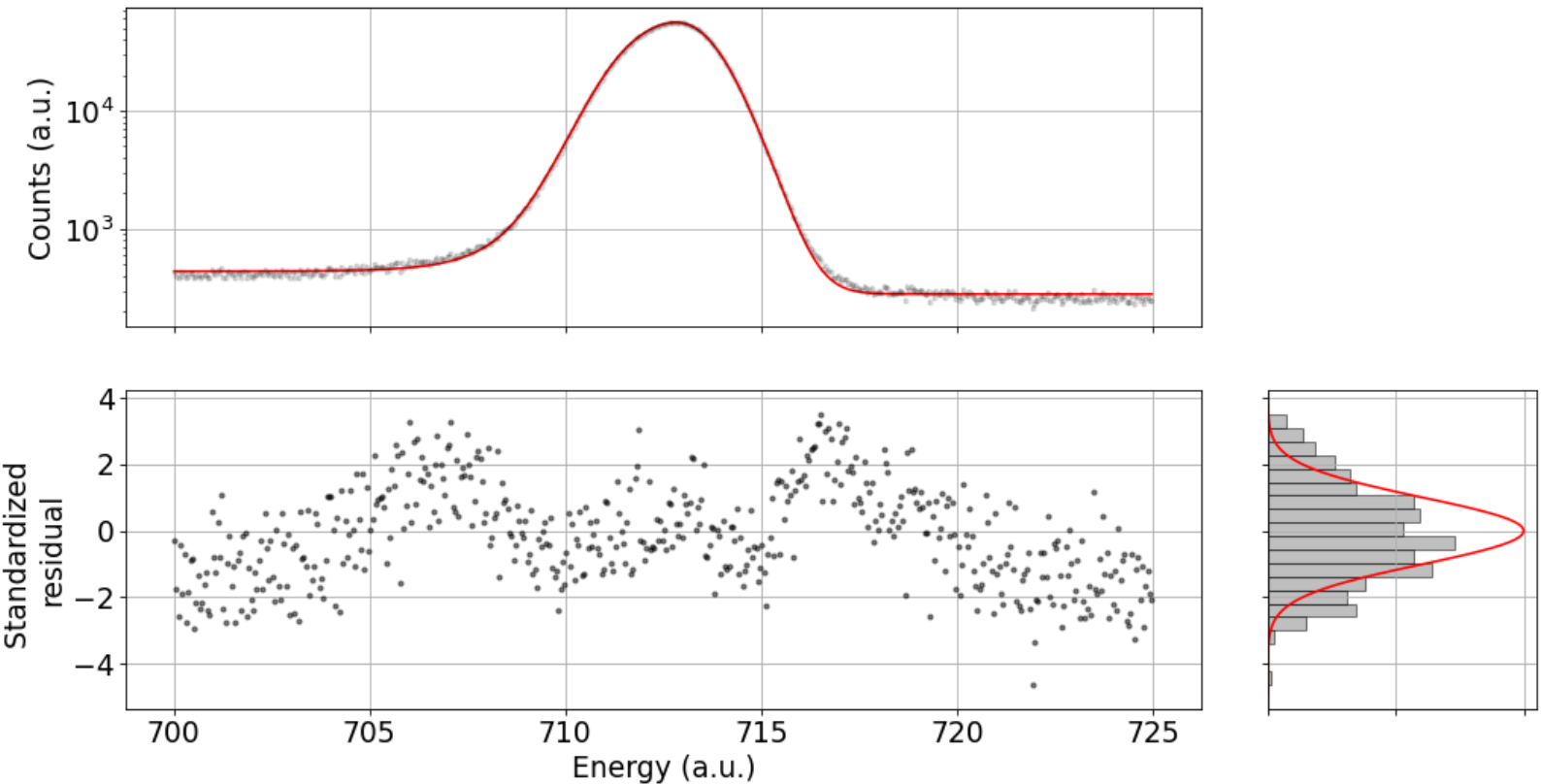
Michael Heines

High-E tail in Ge08

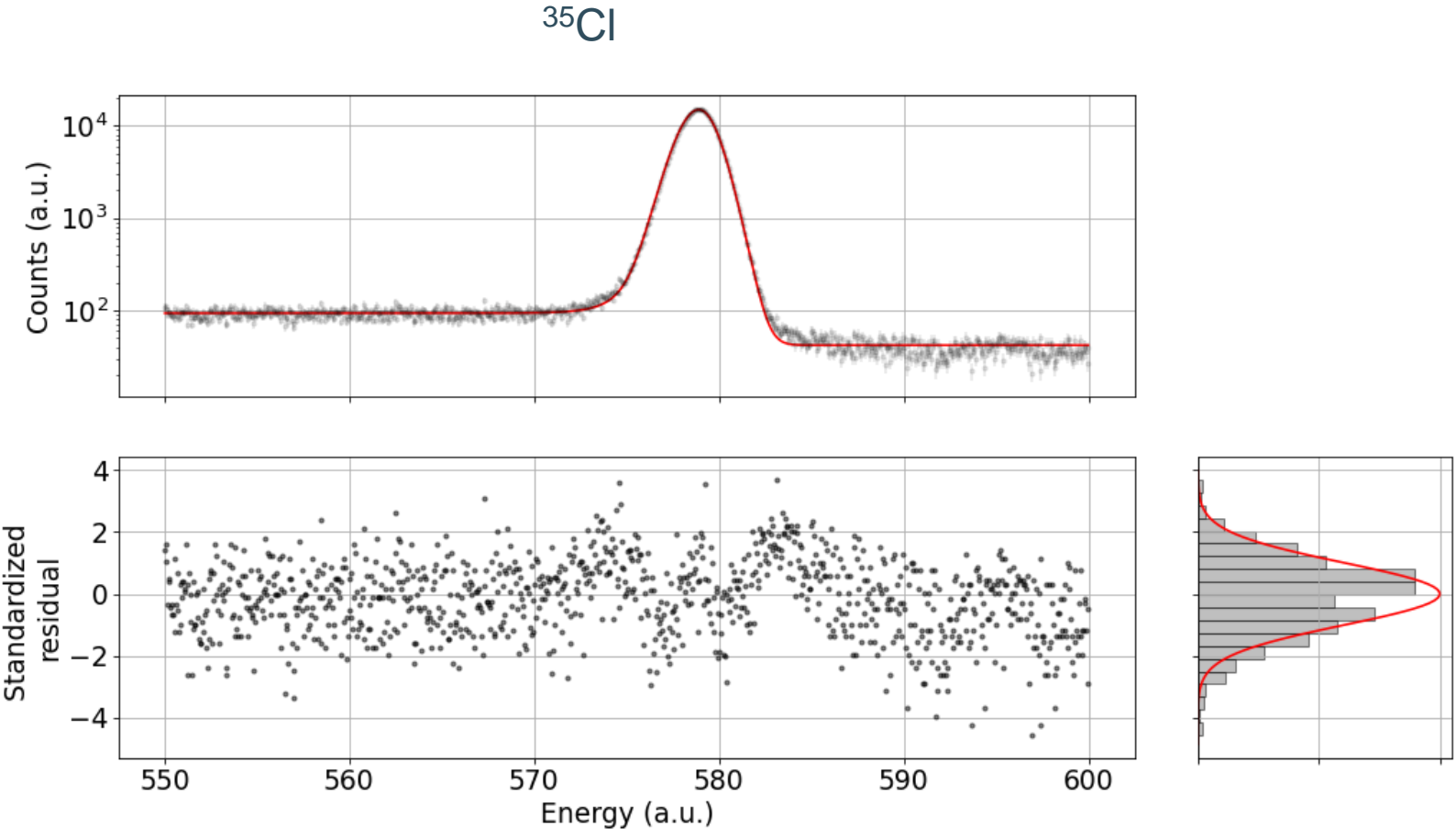


Fitted lines

^{39}K , highest χ^2



Fitted lines



Results

After averaging over detectors

Isotope	Line	Energy (keV)	Fit χ^2_ν All	Fit χ^2_ν No Ge08	Averaging χ^2_ν
³⁵ Cl	2p1s	578.8975(178)[66]{11}	1.32	1.11	4.59
	3p1s	692.1174(72)[66]{11}	0.55	0.53	1.64
	4p1s	731.6849(98)[66]{11}	0.54	0.53	1.36
³⁷ Cl	2p1s	578.7550(111)[66]{11}	1.15	1.13	3.28
	3p1s	692.0204(154)[66]{11}	1.11	1.10	0.59
	4p1s	731.5701(263)[66]{11}	0.95	0.97	0.78
³⁹ K	2p1s	712.7078(76)[66]{11}	2.07	1.40	5.95
	3p1s	854.3164(82)[66]{11}	1.23	1.20	4.30
	4p1s	903.7793(54)[66]{11}	1.12	1.09	1.01
⁴¹ K	2p1s	712.3690(66)[66]{11}	1.50	1.28	4.27
	3p1s	854.0069(93)[66]{11}	0.81	1.76	2.43
	4p1s	903.4692(131)[66]{11}	0.67	0.64	2.11

Results

After averaging over detectors

Isotopes	Line	Shift (eV)	Averaging χ^2_ν
$^{35}\text{Cl} - ^{37}\text{Cl}$	2p1s	143.7(112)	0.40
	3p1s	99.7(165)	0.57
	4p1s	113.9(277)	0.79
$^{39}\text{K} - ^{41}\text{K}$	2p1s	334.4(46)	0.80
	3p1s	310.7(74)	1.01
	4p1s	307.8(107)	0.76

Not sure I understand the change in isotope shift, but it agrees with Paul's calculations

Effect of impurities

$$\begin{aligned} IS' &= [f_1 E_{Isotope1} + (1 - f_1) E_{Isotope2}] - [f_2 E_{Isotope2} + (1 - f_2) E_{Isotope1}] \\ &= (f_1 + f_2 - 1)(E_{Isotope1} - E_{Isotope2}) \\ &= (f_1 + f_2 - 1)IS \\ \implies IS &= \frac{IS'}{f_1 + f_2 - 1} \end{aligned} \tag{9}$$

$$\begin{aligned} E' &= fE + (1 - f)(E + dE) \\ &= E(f + 1 - f) + (1 - f)dE \\ \implies E &= E' + (f - 1)dE \end{aligned}$$

Effect of impurities

Isotope	Purity (%)	Approximate shift (eV)
^{35}Cl	99.32	1
^{37}Cl	99.28	1
^{39}K	99.967	0.1
^{41}K	98.80	4

Not all purity measurements give errors → Assumed error of 0.05% on all (same as those where it's given)

Results after correction - IS

Isotopes	Line	Shift (eV)	σ_{exp} (eV)	σ_f (eV)	σ_{tot} (eV)
$^{35}\text{Cl} - ^{37}\text{Cl}$	2p1s	145.7	11.4	0.1	11.5
	3p1s	101.1	16.8	0.1	16.9
	4p1s	115.5	28.1	0.1	28.2
$^{39}\text{K} - ^{41}\text{K}$	2p1s	335.2	4.7	0.3	5.0
	3p1s	311.4	7.5	0.3	7.8
	4p1s	308.5	10.8	0.3	11.1

Results after correction – Absolute energy

Isotope	Line	Energy (keV)	σ_{exp} (eV)	σ_{bias} (eV)	σ_{lit} (eV)	σ_f (eV)	σ_{tot} (eV)
³⁵ Cl	2p1s	578.8985	17.8	6.6	1.1	0.2	25.6
	3p1s	692.1181	7.2	6.6	1.1	0.2	15.1
	4p1s	731.6857	9.8	6.6	1.1	0.3	17.8
³⁷ Cl	2p1s	578.7540	11.1	6.6	1.1	0.2	19.0
	3p1s	692.0197	15.4	6.6	1.1	0.2	23.3
	4p1s	731.5693	26.3	6.6	1.1	0.3	33.3
³⁹ K	2p1s	712.7079	7.6	6.6	1.1	0.2	15.5
	3p1s	854.3165	8.2	6.6	1.1	0.2	16.1
	4p1s	903.7794	5.4	6.6	1.1	0.2	13.3
⁴¹ K	2p1s	712.3683	6.6	6.6	1.1	0.2	14.5
	3p1s	854.0063	9.3	6.6	1.1	0.2	17.2
	4p1s	903.4686	13.1	6.6	1.1	0.2	21.0

Other things

- Yesterday the pull request on mudirac was finally accepted → R and t change now possible there
- Writing analysis document describing the different steps → Will send out to PIs hopefully early next week

