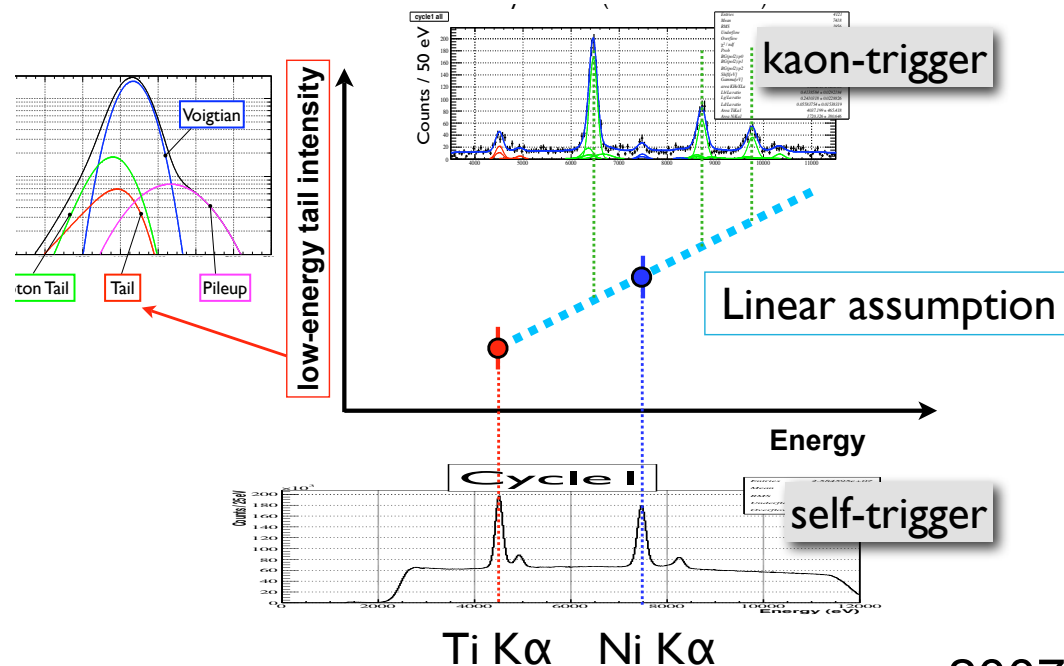


Fit parameters of calibration peaks with Compton tails

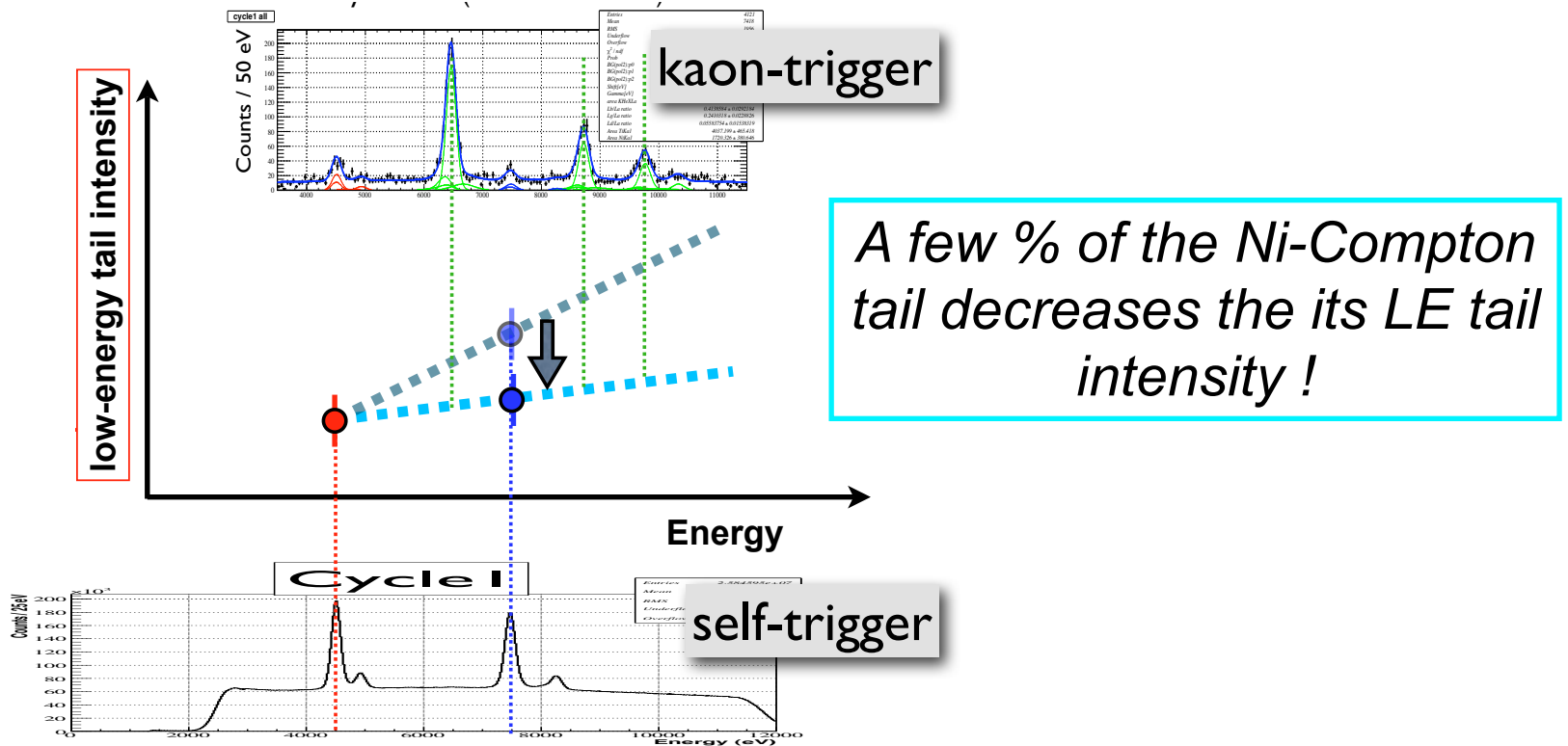
*this is a revised analysis of E570
especially for the low-energy tail intensity*

Energy dependence of *low-energy tail* intensity



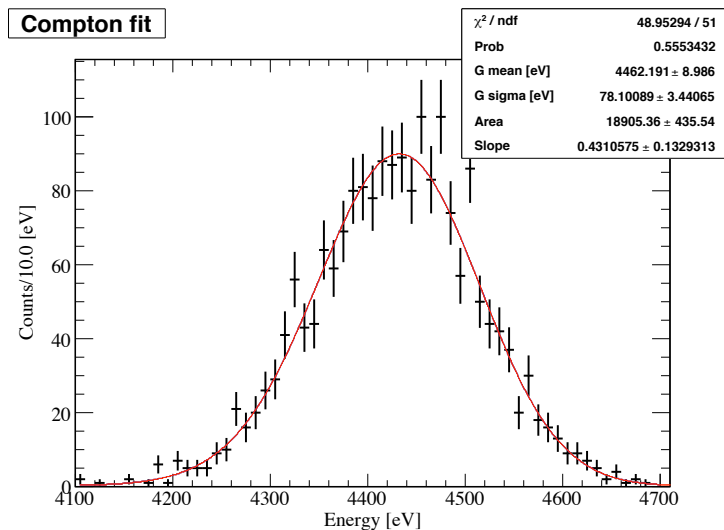
- 0. The systematic error is sensitive to the low-energy tail intensity
- 1. I pointed out the Compton tail of calibration peaks changes the energy dependence of the LE-tail
- 2. PSI data indicate the slope is negative !

Energy dependence of low-energy tail intensity

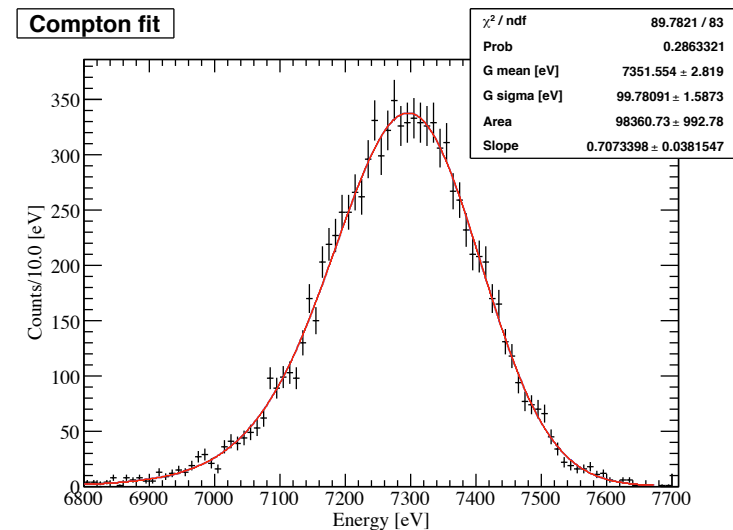


Re-analysis with Compton tail of calibration peaks

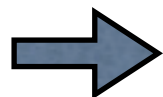
- E570 contamination pions profile
- Geant4 simulation (*see the other report*)



TiKa1 ~0.3% Compton



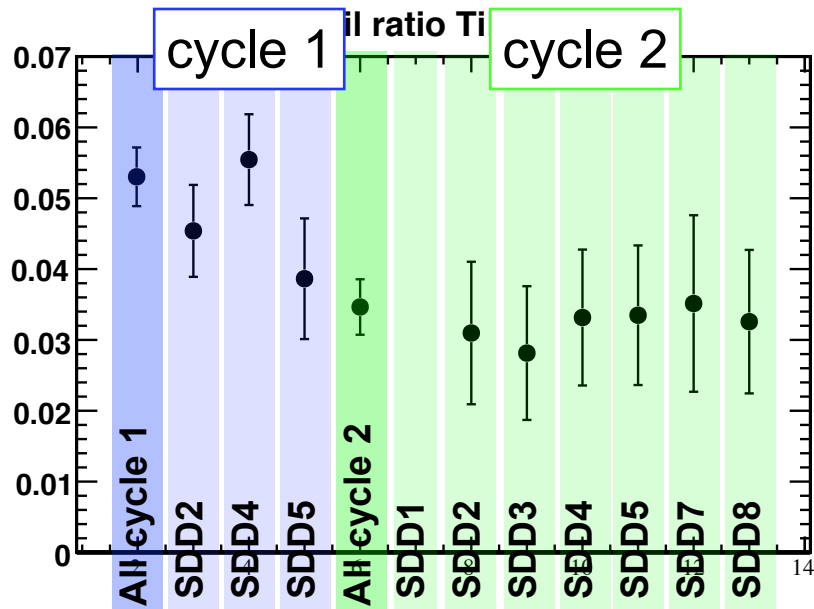
NiKa1 ~2.4% Compton



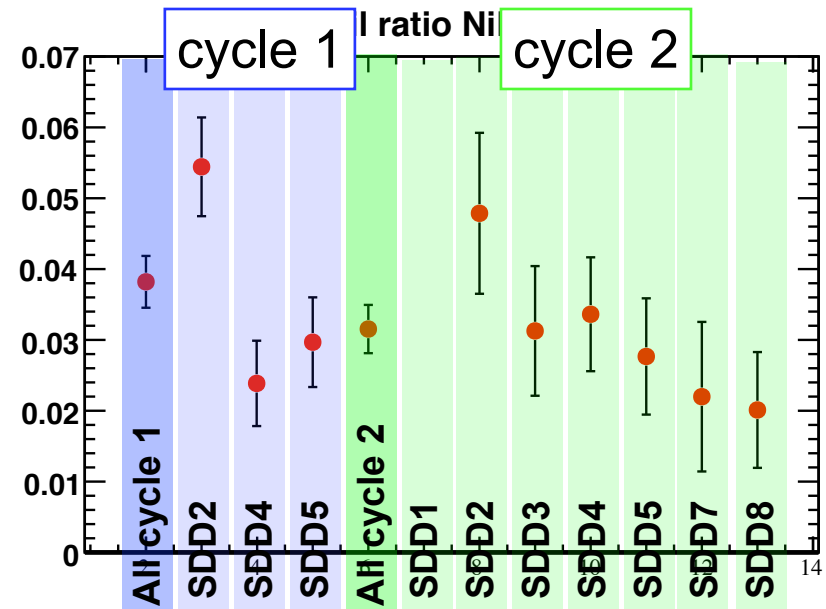
*Fit the calibration triggered spectra
with fixing the Compton tails*

Results

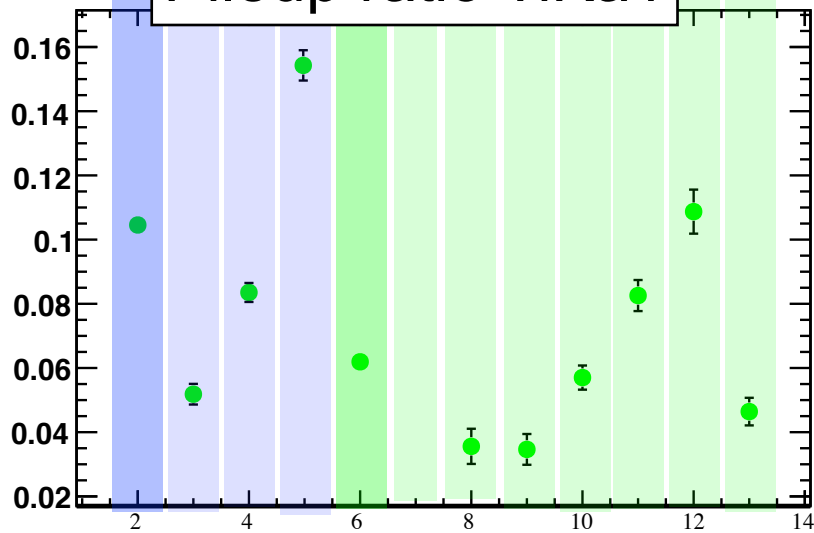
Tail ratio TiKa1



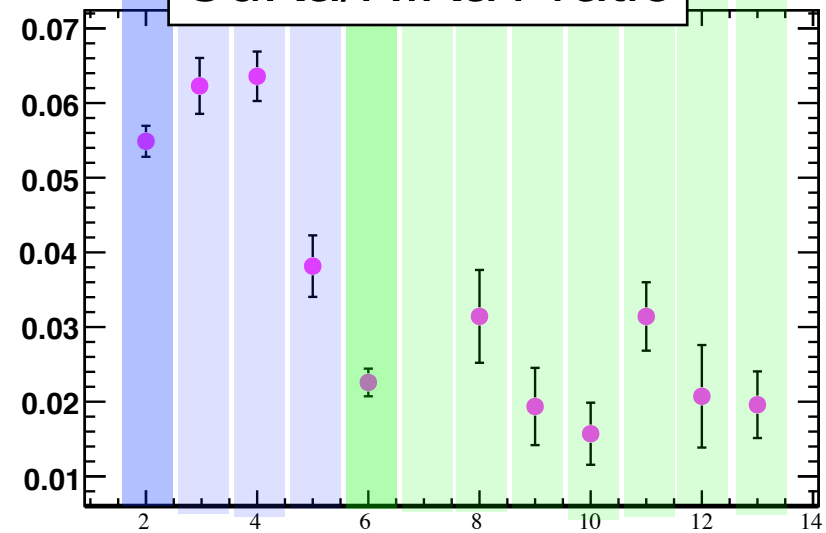
Tail ratio NiKa1



Pileup ratio TiKa1



CuKa/NiKa1 ratio



Fixed : tail-slope =3.0 and tail-Kb/Ka ratio =1.0

Summary

- ▶ The Compton tail decreased the LE-tail intensity.
- ▶ The energy dependence of the LE-tail is almost flat or has a slight-negative slope in total.
(Note : LE-tail slope and its Kb/Ka ratio were fixed)
- ▶ Pileup ratio has no change from the previous analysis.
- ▶ CuKa ratio was decreased by the Compton tail also.

Next

- ▷ Re-calibrate and fit the final spectra
- ▷ The shift might move to $\sim 1\text{eV}$ more-repulsive side ?

Spare

1st cycle SDD2 with compton

```
FCN=5767.73 FROM MINOS      STATUS=SUCCESSFUL 19650 CALLS      20753 TOTAL
      EDM=0.506214      STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      2.48274e+03  1.23747e+02  -8.22112e+01  2.46756e+02
 2  BGb      1.41087e+00  3.86474e-02  -7.73361e-02  2.56803e-02
 3  BGC      -1.05647e-04  2.95698e-06  -1.98195e-06  5.88459e-06
 4  Const Noise [eV]  5.34541e+01  1.05607e+00  -1.13540e+00  1.33297e+00
 5  Fano      1.28244e-01  5.33231e-03  -6.67259e-03  5.79137e-03
 6  Ti Kb/Ka1 ratio  2.46211e-01  3.69421e-03  -4.48498e-03  4.05545e-03
 7  Ni Kb/Ka1 ratio  2.77903e-01  4.81525e-03  -6.12692e-03  5.05691e-03
 8  TiKa1 Area  1.94338e+06  8.24045e+03  -7.96466e+03  1.13678e+04
 9  NiKa1 Area  1.66131e+06  8.18406e+03  -9.89731e+03  9.03634e+03
10  TiKa1 Mean [eV]  4.51057e+03  2.88045e-01  -3.96288e-01  2.78346e-01
11  NiKa1 Mean [eV]  7.47748e+03  3.71464e-01  -3.90163e-01  4.71752e-01
12  TiKb1 Mean [eV]  4.92982e+03  1.09980e+00  -1.33074e+00  1.21369e+00
13  NiKb1 Mean [eV]  8.25746e+03  1.37957e+00  -1.63983e+00  1.55124e+00
14  TiKb1 Sigma [eV]  7.33580e+01  1.15320e+00  -1.33822e+00  1.32640e+00
15  NiKb1 Sigma [eV]  8.22098e+01  1.46239e+00  -1.78056e+00  1.60552e+00
16  Pile area factor  5.18346e-02  3.21715e-03  -3.93027e-03  3.50782e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  4.53928e-02  6.48897e-03  -1.03031e-02  5.39962e-03
20  Tail area factor NiKa  5.44359e-02  6.96890e-03  -6.94383e-03  9.30717e-03
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  9.15567e-03  1.95811e-03  -2.06742e-03  2.47923e-03
24  Escape mean NiKa [eV]  5.81730e+03  2.08164e+01  -2.41748e+01  2.40140e+01
25  FeKa area factor  2.08741e-02  3.02491e-03  -3.04489e-03  4.01612e-03
26  FeKa mean [eV]  6.46752e+03  1.37233e+01  -1.57159e+01  1.58716e+01
27  CuKa area factor  6.22824e-02  3.74399e-03  -4.41362e-03  4.24010e-03
28  CuKa mean [eV]  8.04104e+03      fixed
```

1st cycle SDD2 with compton

29	Comp	TiKa1	shift	4.86500e+01	fixed
30	Comp	TiKa1	sigma	7.81009e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	4.31057e-01	fixed
33	Comp	TiKa2	shift	3.86400e+01	fixed
34	Comp	TiKa2	sigma	6.88225e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.01300e-01	fixed
37	Comp	TiKb1	shift	4.65500e+01	fixed
38	Comp	TiKb1	sigma	7.65435e+01	fixed
39	Comp	TiKb1	area	5.68564e-03	fixed
40	Comp	TiKb1	slope	6.88338e-01	fixed
41	Comp	NiKa1	shift	1.26600e+02	fixed
42	Comp	NiKa1	sigma	9.97809e+01	fixed
43	Comp	NiKa1	area	2.41967e-02	fixed
44	Comp	NiKa1	slope	7.07340e-01	fixed
45	Comp	NiKa2	shift	1.32540e+02	fixed
46	Comp	NiKa2	sigma	1.04119e+02	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	5.48561e-01	fixed
49	Comp	NiKb1	shift	1.62510e+02	fixed
50	Comp	NiKb1	sigma	1.11679e+02	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	6.13071e-01	fixed

Ti EVENT	
KA1+KA2	= 291508
Pileup	= 15110.2
Pile/(KA1+KA2)	= 0.0518346
Ni EVENT	
KA1+KA2	= 250857
Pileup	= 13003.1
Pile/(KA1+KA2)	= 0.0518346
TiKa1 Mean	= 4510.569 +- 0.337
TiKb1 Mean	= 4929.820 +- 1.272
NiKa1 Mean	= 7477.476 +- 0.431
NiKb1 Mean	= 8257.461 +- 1.596
Const Noise	= 53.454 +- 1.234
Fano	= 0.128 +- 0.006
TiKb1 Noise	= 73.358 +- 1.332
NiKb1 Noise	= 82.210 +- 1.693
Chisq/NDF	= 570.763/457

1st cycle SDD4 with compton

FCN=5813.9 FROM MINOS STATUS=SUCCESSFUL 19518 CALLS 20578 TOTAL
EDM=0.356834 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT NO.	PARAMETER NAME	VALUE	PARABOLIC ERROR	MINOS ERRORS	
				NEGATIVE	POSITIVE
1	BGa	4.24741e+03	1.37160e+02	-9.82735e+01	2.47223e+02
2	BGb	1.41504e+00	4.27655e-02	-7.73553e-02	3.06178e-02
3	BGc	-1.14119e-04	3.27069e-06	-2.35536e-06	5.88901e-06
4	Const Noise [eV]	5.15180e+01	1.01343e+00	-1.05928e+00	1.21214e+00
5	Fano	1.33796e-01	4.85136e-03	-5.77354e-03	5.09787e-03
6	Ti Kb/Ka1 ratio	2.41477e-01	3.40975e-03	-3.95122e-03	3.61751e-03
7	Ni Kb/Ka1 ratio	2.79374e-01	4.25309e-03	-5.20916e-03	4.27272e-03
8	TiKa1 Area	2.18788e+06	8.83369e+03	-8.43567e+03	1.14260e+04
9	NiKa1 Area	2.05794e+06	8.87241e+03	-1.01519e+04	9.51262e+03
10	TiKa1 Mean [eV]	4.50994e+03	2.76960e-01	-3.58696e-01	2.63372e-01
11	NiKa1 Mean [eV]	7.47628e+03	3.28850e-01	-3.36323e-01	3.94928e-01
12	TiKb1 Mean [eV]	4.92974e+03	1.01217e+00	-1.16463e+00	1.08300e+00
13	NiKb1 Mean [eV]	8.25761e+03	1.23272e+00	-1.39800e+00	1.33774e+00
14	TiKb1 Sigma [eV]	6.96299e+01	1.06065e+00	-1.17936e+00	1.17334e+00
15	NiKb1 Sigma [eV]	8.29299e+01	1.30753e+00	-1.54511e+00	1.35968e+00
16	Pile area factor	8.35286e-02	2.95856e-03	-3.43934e-03	3.12651e-03
17	Pile shift [eV]	2.00000e+02	fixed		
18	Pile sigma factor	2.00000e+00	fixed		
19	Tail area factor TiKa	5.54509e-02	6.40537e-03	-9.38554e-03	5.42948e-03
20	Tail area factor NiKa	2.37689e-02	6.02532e-03	-5.89121e-03	7.54234e-03
21	Tail slope factor	3.00000e+00	fixed		
22	Tail area factor Kb/Ka	1.00000e+00	fixed		
23	Escape area factor NiKa	2.39159e-03	1.71287e-03	-1.79331e-03	2.01333e-03
24	Escape mean NiKa [eV]	5.70036e+03	5.31968e+01	-7.65505e+01	7.25528e+01
25	FeKa area factor	8.19254e-03	2.64404e-03	-2.60835e-03	3.30173e-03
26	FeKa mean [eV]	6.53564e+03	5.65198e+01	-5.98826e+01	7.69937e+01
27	CuKa area factor	6.35871e-02	3.31101e-03	-3.70349e-03	3.63975e-03
28	CuKa mean [eV]	8.04104e+03	fixed		

1st cycle SDD4 with compton

29	Comp	TiKa1	shift	4.86500e+01	fixed
30	Comp	TiKa1	sigma	7.81009e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	4.31057e-01	fixed
33	Comp	TiKa2	shift	3.86400e+01	fixed
34	Comp	TiKa2	sigma	6.88225e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.01300e-01	fixed
37	Comp	TiKb1	shift	4.65500e+01	fixed
38	Comp	TiKb1	sigma	7.65435e+01	fixed
39	Comp	TiKb1	area	5.68564e-03	fixed
40	Comp	TiKb1	slope	6.88338e-01	fixed
41	Comp	NiKa1	shift	1.26600e+02	fixed
42	Comp	NiKa1	sigma	9.97809e+01	fixed
43	Comp	NiKa1	area	2.41967e-02	fixed
44	Comp	NiKa1	slope	7.07340e-01	fixed
45	Comp	NiKa2	shift	1.32540e+02	fixed
46	Comp	NiKa2	sigma	1.04119e+02	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	5.48561e-01	fixed
49	Comp	NiKb1	shift	1.62510e+02	fixed
50	Comp	NiKb1	sigma	1.11679e+02	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	6.13071e-01	fixed

Ti EVENT	
KA1+KA2	= 328182
Pileup	= 27412.6
Pile/(KA1+KA2)	= 0.0835286
Ni EVENT	
KA1+KA2	= 310749
Pileup	= 25956.4
Pile/(KA1+KA2)	= 0.0835286
TiKa1 Mean	= 4509.942 +- 0.311
TiKb1 Mean	= 4929.741 +- 1.124
NiKa1 Mean	= 7476.281 +- 0.366
NiKb1 Mean	= 8257.608 +- 1.368
Const Noise	= 51.518 +- 1.136
Fano	= 0.134 +- 0.005
TiKb1 Noise	= 69.630 +- 1.176
NiKb1 Noise	= 82.930 +- 1.452
Chisq/NDF	= 522.209/457

1st cycle SDD5 with compton

```
FCN=6010.23 FROM MINOS      STATUS=SUCCESSFUL 19604 CALLS      20709 TOTAL
      EDM=0.264582  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      7.25297e+03  1.79381e+02  -1.39332e+02  3.20023e+02
 2  BGb      1.13877e+00  5.49982e-02  -9.83090e-02  4.30175e-02
 3  BGC      -9.86293e-05  4.15063e-06  -3.27986e-06  7.36325e-06
 4  Const Noise [eV]  7.18193e+01  1.13735e+00  -1.15082e+00  1.35980e+00
 5  Fano      1.35087e-01  7.13206e-03  -8.47409e-03  7.24842e-03
 6  Ti Kb/Ka1 ratio  2.30450e-01  4.81017e-03  -5.73671e-03  4.74763e-03
 7  Ni Kb/Ka1 ratio  2.88873e-01  5.03610e-03  -5.84540e-03  5.16329e-03
 8  TiKa1 Area  2.32402e+06  1.13552e+04  -1.06873e+04  1.45908e+04
 9  NiKa1 Area  2.56110e+06  1.20359e+04  -1.35753e+04  1.25492e+04
10  TiKa1 Mean [eV]  4.51068e+03  4.01597e-01  -5.26661e-01  3.67820e-01
11  NiKa1 Mean [eV]  7.47750e+03  3.80400e-01  -3.77286e-01  4.54934e-01
12  TiKb1 Mean [eV]  4.93166e+03  1.55471e+00  -1.73515e+00  1.64751e+00
13  NiKb1 Mean [eV]  8.25624e+03  1.58264e+00  -1.74488e+00  1.69714e+00
14  TiKb1 Sigma [eV]  8.52640e+01  1.77192e+00  -2.01843e+00  1.83293e+00
15  NiKb1 Sigma [eV]  9.86241e+01  1.69957e+00  -1.92981e+00  1.77528e+00
16  Pile area factor  1.53864e-01  4.72185e-03  -5.21347e-03  5.03961e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  3.86363e-02  8.51639e-03  -1.28224e-02  7.07774e-03
20  Tail area factor NiKa  2.96786e-02  6.33023e-03  -5.96445e-03  7.95749e-03
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  4.26754e-03  1.74990e-03  -1.82048e-03  1.99424e-03
24  Escape mean NiKa [eV]  5.73930e+03  2.91566e+01  -3.23804e+01  3.29182e+01
25  FeKa area factor  1.00452e-02  2.64961e-03  -2.59848e-03  3.23767e-03
26  FeKa mean [eV]  6.55405e+03  4.46820e+01  -5.23556e+01  4.57520e+01
27  CuKa area factor  3.81588e-02  4.11956e-03  -4.44141e-03  4.51050e-03
28  CuKa mean [eV]  8.04104e+03      fixed
```

1st cycle SDD5 with compton

29	Comp	TiKa1	shift	4.86500e+01	fixed
30	Comp	TiKa1	sigma	7.81009e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	4.31057e-01	fixed
33	Comp	TiKa2	shift	3.86400e+01	fixed
34	Comp	TiKa2	sigma	6.88225e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.01300e-01	fixed
37	Comp	TiKb1	shift	4.65500e+01	fixed
38	Comp	TiKb1	sigma	7.65435e+01	fixed
39	Comp	TiKb1	area	5.68564e-03	fixed
40	Comp	TiKb1	slope	6.88338e-01	fixed
41	Comp	NiKa1	shift	1.26600e+02	fixed
42	Comp	NiKa1	sigma	9.97809e+01	fixed
43	Comp	NiKa1	area	2.41967e-02	fixed
44	Comp	NiKa1	slope	7.07340e-01	fixed
45	Comp	NiKa2	shift	1.32540e+02	fixed
46	Comp	NiKa2	sigma	1.04119e+02	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	5.48561e-01	fixed
49	Comp	NiKb1	shift	1.62510e+02	fixed
50	Comp	NiKb1	sigma	1.11679e+02	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	6.13071e-01	fixed

Ti EVENT	
KA1+KA2	= 348604
Pileup	= 53637.7
Pile/(KA1+KA2)	= 0.153864
Ni EVENT	
KA1+KA2	= 386725
Pileup	= 59503.3
Pile/(KA1+KA2)	= 0.153864
TiKa1 Mean	= 4510.684 +- 0.447
TiKb1 Mean	= 4931.661 +- 1.691
NiKa1 Mean	= 7477.497 +- 0.416
NiKb1 Mean	= 8256.244 +- 1.721
Const Noise	= 71.819 +- 1.255
Fano	= 0.135 +- 0.008
TiKb1 Noise	= 85.264 +- 1.926
NiKb1 Noise	= 98.624 +- 1.853
Chisq/NDF	= 618.861/457

1st cycle SDD 2,4 and 5 with compton

```
FCN=6926.92 FROM MINOS      STATUS=SUCCESSFUL 11958 CALLS      12926 TOTAL
      EDM=0.0560182 STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      1.43592e+04  2.42255e+02  -2.21688e+02  3.16681e+02
 2  BGb      3.82368e+00  7.30954e-02  -9.56259e-02  6.70371e-02
 3  BGC      -3.05755e-04  5.31885e-06  -4.88492e-06  6.94187e-06
 4  Const Noise [eV]  5.63869e+01  6.41334e-01  -6.41895e-01  6.71410e-01
 5  Fano      1.45939e-01  3.32433e-03  -3.48110e-03  3.32426e-03
 6  Ti Kb/Ka1 ratio  2.38159e-01  2.19052e-03  -2.34920e-03  2.12073e-03
 7  Ni Kb/Ka1 ratio  2.77548e-01  2.34736e-03  -2.42692e-03  2.34356e-03
 8  TiKa1 Area  6.39652e+06  1.60084e+04  -1.53525e+04  1.74301e+04
 9  NiKa1 Area  6.24248e+06  1.64227e+04  -1.70264e+04  1.63947e+04
10  TiKa1 Mean [eV]  4.51022e+03  1.84490e-01  -2.05636e-01  1.74636e-01
11  NiKa1 Mean [eV]  7.47693e+03  2.08478e-01  -2.05289e-01  2.20255e-01
12  TiKb1 Mean [eV]  4.93157e+03  6.86818e-01  -7.06235e-01  6.90113e-01
13  NiKb1 Mean [eV]  8.25693e+03  7.91074e-01  -7.87358e-01  8.20591e-01
14  TiKb1 Sigma [eV]  7.49012e+01  7.35515e-01  -7.62880e-01  7.33866e-01
15  NiKb1 Sigma [eV]  8.72957e+01  8.28973e-01  -8.60054e-01  8.24690e-01
16  Pile area factor  1.04548e-01  1.94196e-03  -1.95826e-03  1.98791e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  5.30218e-02  4.14072e-03  -4.89879e-03  3.81365e-03
20  Tail area factor NiKa  3.81985e-02  3.65668e-03  -3.52359e-03  4.00887e-03
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  5.10271e-03  1.03806e-03  -1.03607e-03  1.07794e-03
24  Escape mean NiKa [eV]  5.75812e+03  1.96472e+01  -1.99086e+01  2.03449e+01
25  FeKa area factor  1.20835e-02  1.59873e-03  -1.55882e-03  1.71857e-03
26  FeKa mean [eV]  6.48490e+03  1.76464e+01  -1.77574e+01  1.82046e+01
27  CuKa area factor  5.48750e-02  2.07513e-03  -2.04600e-03  2.17285e-03
28  CuKa mean [eV]  8.04104e+03      fixed
```

1st cycle SDD 2,4 and 5 with compton

29	Comp	TiKa1	shift	4.86500e+01	fixed
30	Comp	TiKa1	sigma	7.81009e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	4.31057e-01	fixed
33	Comp	TiKa2	shift	3.86400e+01	fixed
34	Comp	TiKa2	sigma	6.88225e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.01300e-01	fixed
37	Comp	TiKb1	shift	4.65500e+01	fixed
38	Comp	TiKb1	sigma	7.65435e+01	fixed
39	Comp	TiKb1	area	5.68564e-03	fixed
40	Comp	TiKb1	slope	6.88338e-01	fixed
41	Comp	NiKa1	shift	1.26600e+02	fixed
42	Comp	NiKa1	sigma	9.97809e+01	fixed
43	Comp	NiKa1	area	2.41967e-02	fixed
44	Comp	NiKa1	slope	7.07340e-01	fixed
45	Comp	NiKa2	shift	1.32540e+02	fixed
46	Comp	NiKa2	sigma	1.04119e+02	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	5.48561e-01	fixed
49	Comp	NiKb1	shift	1.62510e+02	fixed
50	Comp	NiKb1	sigma	1.11679e+02	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	6.13071e-01	fixed

Ti EVENT	
KA1+KA2	= 959477
Pileup	= 100312
Pile/(KA1+KA2)	= 0.104548
Ni EVENT	
KA1+KA2	= 942615
Pileup	= 98548.7
Pile/(KA1+KA2)	= 0.104548
TiKa1 Mean	= 4510.224 +- 0.190
TiKb1 Mean	= 4931.567 +- 0.698
NiKa1 Mean	= 7476.932 +- 0.213
NiKb1 Mean	= 8256.927 +- 0.804
Const Noise	= 56.387 +- 0.657
Fano	= 0.146 +- 0.003
TiKb1 Noise	= 74.901 +- 0.748
NiKb1 Noise	= 87.296 +- 0.842
Chisq/NDF	= 740.013/487

2nd cycle SDD1 with compton

Not yet converged

2nd cycle SDD1 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Not yet converged

2nd cycle SDD2 with compton

```

FCN=5264.45 FROM MINOS      STATUS=SUCCESSFUL 10701 CALLS      12389 TOTAL
                        EDM=3.84016e-05  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      1.03054e+03  7.14078e+01 -8.85852e+01  8.87417e+01
 2  BGb      4.69738e-01  2.21333e-02 -2.76331e-02  2.75920e-02
 3  BGC      -3.57237e-05  1.68700e-06 -2.09796e-06  2.10029e-06
 4  Const Noise [eV]  6.15331e+01  1.57375e+00 -1.62291e+00  1.58464e+00
 5  Fano      1.09103e-01  9.16214e-03 -9.29742e-03  9.32472e-03
 6  Ti Kb/Ka1 ratio  2.40021e-01  5.85730e-03 -5.81458e-03  5.91658e-03
 7  Ni Kb/Ka1 ratio  2.82420e-01  8.00139e-03 -7.97774e-03  8.16717e-03
 8  TiKa1 Area  7.76734e+05  5.22665e+03 -5.33635e+03  5.34795e+03
 9  NiKa1 Area  6.22957e+05  5.07881e+03 -5.08242e+03  5.07864e+03
10  TiKa1 Mean [eV]  4.51075e+03  4.75896e-01 -4.85074e-01  4.85872e-01
11  NiKa1 Mean [eV]  7.47731e+03  6.20693e-01 -6.22639e-01  6.25773e-01
12  TiKb1 Mean [eV]  4.92998e+03  1.80672e+00 -1.80943e+00  1.80931e+00
13  NiKb1 Mean [eV]  8.25701e+03  2.35464e+00 -2.37077e+00  2.34511e+00
14  TiKb1 Sigma [eV]  7.54950e+01  1.81621e+00 -1.79507e+00  1.83811e+00
15  NiKb1 Sigma [eV]  8.56292e+01  2.43226e+00 -2.39325e+00  2.49446e+00
16  Pile area factor  3.55871e-02  5.48086e-03 -5.49916e-03  5.46657e-03
17  Pile shift [eV]  2.00000e+02  fixed
18  Pile sigma factor  2.00000e+00  fixed
19  Tail area factor TiKa  3.09762e-02  1.00592e-02 -1.07742e-02  1.09021e-02
20  Tail area factor NiKa  4.78725e-02  1.13604e-02 -1.14169e-02  1.15888e-02
21  Tail slope factor  3.00000e+00  fixed
22  Tail area factor Kb/Ka  1.00000e+00  fixed
23  Escape area factor NiKa  9.07596e-03  3.21023e-03 -3.21474e-03  3.22873e-03
24  Escape mean NiKa [eV]  5.72315e+03  4.49215e+01 -3.94650e+01  6.09288e+01
25  FeKa area factor  2.20758e-02  4.93261e-03 -4.99194e-03  5.01208e-03
26  FeKa mean [eV]  6.43709e+03  2.08535e+01 -2.14946e+01  2.07280e+01
27  CuKa area factor  3.14283e-02  6.21770e-03 -6.25631e-03  6.18094e-03
28  CuKa mean [eV]  8.04104e+03  fixed

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2nd cycle SDD2 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 116510
Pileup	= 4146.25
Pile/(KA1+KA2)	= 0.0355871
Ni EVENT	
KA1+KA2	= 94066.5
Pileup	= 3347.55
Pile/(KA1+KA2)	= 0.0355871
TiKa1 Mean	= 4510.748 +- 0.485
TiKb1 Mean	= 4929.979 +- 1.809
NiKa1 Mean	= 7477.310 +- 0.624
NiKb1 Mean	= 8257.005 +- 2.358
Const Noise	= 61.533 +- 1.604
Fano	= 0.109 +- 0.009
TiKb1 Noise	= 75.495 +- 1.817
NiKb1 Noise	= 85.629 +- 2.444
Chisq/NDF	= 555.684/457

2nd cycle SDD3 with compton

```

FCN=5254.18 FROM MINOS      STATUS=SUCCESSFUL 12287 CALLS      13699 TOTAL
                        EDM=0.000167732  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa        5.35477e+02  6.99845e+01 -8.59139e+01  8.63368e+01
 2  BGb        6.06567e-01  2.17492e-02 -2.69626e-02  2.68116e-02
 3  BGc       -4.54201e-05  1.66066e-06 -2.04123e-06  2.05383e-06
 4  Const Noise [eV]  5.41748e+01  1.59508e+00 -1.64673e+00  1.60117e+00
 5  Fano        1.43263e-01  7.99206e-03 -8.10469e-03  8.12734e-03
 6  Ti Kb/Ka1 ratio  2.44988e-01  5.60534e-03 -5.54681e-03  5.68280e-03
 7  Ni Kb/Ka1 ratio  2.81321e-01  6.61736e-03 -6.59400e-03  6.74994e-03
 8  TiKa1 Area   7.97090e+05  5.04902e+03 -5.15684e+03  5.15145e+03
 9  NiKa1 Area   7.63894e+05  5.18586e+03 -5.19193e+03  5.19309e+03
10  TiKa1 Mean [eV]  4.51055e+03  4.45731e-01 -4.52128e-01  4.56284e-01
11  NiKa1 Mean [eV]  7.47715e+03  5.27927e-01 -5.28909e-01  5.33049e-01
12  TiKb1 Mean [eV]  4.92653e+03  1.63327e+00 -1.64209e+00  1.62893e+00
13  NiKb1 Mean [eV]  8.25507e+03  1.97932e+00 -1.99774e+00  1.96437e+00
14  TiKb1 Sigma [eV]  7.36002e+01  1.73324e+00 -1.70754e+00  1.76069e+00
15  NiKb1 Sigma [eV]  8.57684e+01  2.01792e+00 -1.98516e+00  2.06810e+00
16  Pile area factor  3.46404e-02  4.79359e-03 -4.82505e-03  4.76808e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  2.81441e-02  9.43914e-03 -1.00591e-02  1.01844e-02
20  Tail area factor NiKa  3.12697e-02  9.15094e-03 -9.21196e-03  9.34401e-03
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  8.71697e-03  2.58604e-03 -2.59064e-03  2.60467e-03
24  Escape mean NiKa [eV]  5.74393e+03  2.86152e+01 -2.74648e+01  3.14591e+01
25  FeKa area factor  9.99212e-03  3.97492e-03 -4.02390e-03  4.03643e-03
26  FeKa mean [eV]  6.51331e+03  5.16646e+01 -3.16117e+02  4.90163e+01
27  CuKa area factor  1.93584e-02  5.17260e-03 -5.22386e-03  5.11923e-03
28  CuKa mean [eV]  8.04104e+03      fixed

```

2nd cycle SDD3 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 119564
Pileup	= 4141.73
Pile/(KA1+KA2)	= 0.0346404
Ni EVENT	
KA1+KA2	= 115348
Pileup	= 3995.71
Pile/(KA1+KA2)	= 0.0346404
TiKa1 Mean	= 4510.547 +- 0.454
TiKb1 Mean	= 4926.527 +- 1.636
NiKa1 Mean	= 7477.153 +- 0.531
NiKb1 Mean	= 8255.073 +- 1.981
Const Noise	= 54.175 +- 1.624
Fano	= 0.143 +- 0.008
TiKb1 Noise	= 73.600 +- 1.734
NiKb1 Noise	= 85.768 +- 2.027
Chisq/NDF	= 543.162/457

2nd cycle SDD4 with compton

```

FCN=5313.22 FROM MINOS      STATUS=SUCCESSFUL 18732 CALLS      19983 TOTAL
                EDM=0.289125  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER          PARABOLIC          MINOS ERRORS
NO.  NAME              VALUE              ERROR          NEGATIVE          POSITIVE
 1  BGa                1.58546e+03  7.32680e+01  -5.64946e+01  1.33742e+02
 2  BGb                4.95613e-01  2.29789e-02  -4.22553e-02  1.76253e-02
 3  BGC                -3.98900e-05  1.77172e-06  -1.35824e-06  3.24841e-06
 4  Const Noise [eV]   4.35762e+01  1.52031e+00  -1.60873e+00  1.76892e+00
 5  Fano               1.28395e-01  5.99388e-03  -7.01243e-03  6.31059e-03
 6  Ti Kb/Ka1 ratio   2.37487e-01  5.28241e-03  -5.89563e-03  5.70159e-03
 7  Ni Kb/Ka1 ratio   2.84625e-01  5.64405e-03  -6.82274e-03  5.64936e-03
 8  TiKa1 Area        7.68332e+05  4.79946e+03  -4.68156e+03  5.98094e+03
 9  NiKa1 Area        8.83090e+05  5.21569e+03  -5.87795e+03  5.56514e+03
10  TiKa1 Mean [eV]   4.51071e+03  4.01743e-01  -5.00212e-01  3.91728e-01
11  NiKa1 Mean [eV]   7.47765e+03  4.26856e-01  -4.41270e-01  4.97864e-01
12  TiKb1 Mean [eV]   4.93085e+03  1.53427e+00  -1.73067e+00  1.63994e+00
13  NiKb1 Mean [eV]   8.25782e+03  1.54050e+00  -1.74138e+00  1.64088e+00
14  TiKb1 Sigma [eV]  6.47950e+01  1.54455e+00  -1.66732e+00  1.72281e+00
15  NiKb1 Sigma [eV]  7.86102e+01  1.59742e+00  -1.84042e+00  1.67254e+00
16  Pile area factor  5.70118e-02  3.76252e-03  -4.35051e-03  3.91492e-03
17  Pile shift [eV]   2.00000e+02  fixed
18  Pile sigma factor  2.00000e+00  fixed
19  Tail area factor TiKa  3.31599e-02  9.59255e-03  -1.33807e-02  8.59260e-03
20  Tail area factor NiKa  3.36225e-02  8.03769e-03  -7.99752e-03  9.75373e-03
21  Tail slope factor  3.00000e+00  fixed
22  Tail area factor Kb/Ka  1.00000e+00  fixed
23  Escape area factor NiKa  5.81207e-03  2.26804e-03  -2.35897e-03  2.62406e-03
24  Escape mean NiKa [eV]  5.58992e+03  2.68903e+01  -3.00534e+01  3.12579e+01
25  FeKa area factor   1.21217e-02  3.52289e-03  -3.47493e-03  4.32407e-03
26  FeKa mean [eV]    6.41636e+03  2.91472e+01  -3.20555e+01  3.26492e+01
27  CuKa area factor   1.57099e-02  4.15770e-03  -4.69279e-03  4.42521e-03
28  CuKa mean [eV]    8.04104e+03  fixed

```

2nd cycle SDD4 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 115250
Pileup	= 6570.6
Pile/(KA1+KA2)	= 0.0570118
Ni EVENT	
KA1+KA2	= 133347
Pileup	= 7602.33
Pile/(KA1+KA2)	= 0.0570118
TiKa1 Mean	= 4510.710 +- 0.446
TiKb1 Mean	= 4930.853 +- 1.685
NiKa1 Mean	= 7477.654 +- 0.470
NiKb1 Mean	= 8257.823 +- 1.691
Const Noise	= 43.576 +- 1.689
Fano	= 0.128 +- 0.007
TiKb1 Noise	= 64.795 +- 1.695
NiKb1 Noise	= 78.610 +- 1.756
Chisq/NDF	= 509.055/457

2nd cycle SDD5 with compton

```

FCN=5398.11 FROM MINOS      STATUS=SUCCESSFUL  13025 CALLS      14029 TOTAL
                    EDM=0.0183316  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER          PARABOLIC          MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      2.58351e+03  9.16688e+01  -9.93992e+01  1.25357e+02
 2  BGB      4.28850e-01  2.83511e-02  -3.89297e-02  3.08685e-02
 3  BGC      -3.78182e-05  2.15676e-06  -2.34637e-06  2.95005e-06
 4  Const Noise [eV]  5.76517e+01  1.50502e+00  -1.52128e+00  1.55933e+00
 5  Fano      1.44649e-01  7.78545e-03  -8.10310e-03  7.80049e-03
 6  Ti Kb/Ka1 ratio  2.38432e-01  5.55430e-03  -5.65728e-03  5.55212e-03
 7  Ni Kb/Ka1 ratio  2.85028e-01  5.91052e-03  -6.13145e-03  5.86612e-03
 8  TiKa1 Area  1.00522e+06  6.21499e+03  -6.10128e+03  6.68834e+03
 9  NiKa1 Area  1.06575e+06  6.42826e+03  -6.50668e+03  6.41898e+03
10  TiKa1 Mean [eV]  4.51096e+03  4.55856e-01  -4.91589e-01  4.45882e-01
11  NiKa1 Mean [eV]  7.47869e+03  4.78901e-01  -4.76186e-01  4.92824e-01
12  TiKb1 Mean [eV]  4.92915e+03  1.69978e+00  -1.72545e+00  1.70168e+00
13  NiKb1 Mean [eV]  8.26166e+03  1.74503e+00  -1.77216e+00  1.74348e+00
14  TiKb1 Sigma [eV]  7.53348e+01  1.84482e+00  -1.85087e+00  1.86470e+00
15  NiKb1 Sigma [eV]  8.77129e+01  1.83486e+00  -1.86937e+00  1.83842e+00
16  Pile area factor  8.25701e-02  4.83968e-03  -4.92320e-03  4.82502e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  3.34851e-02  9.85493e-03  -1.14818e-02  9.83663e-03
20  Tail area factor NiKa  2.76648e-02  8.20693e-03  -8.04467e-03  8.64776e-03
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  3.69016e-03  2.31854e-03  -2.29482e-03  2.38682e-03
24  Escape mean NiKa [eV]  5.76579e+03  4.53570e+01  -4.98960e+01  4.81406e+01
25  FeKa area factor  7.53464e-03  3.53336e-03  -3.47617e-03  3.72268e-03
26  FeKa mean [eV]  6.58812e+03  7.82567e+01  -9.76422e+01  9.61308e+01
27  CuKa area factor  3.14166e-02  4.58371e-03  -4.60764e-03  4.61656e-03
28  CuKa mean [eV]  8.04104e+03      fixed

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2nd cycle SDD5 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 150784
Pileup	= 12450.2
Pile/(KA1+KA2)	= 0.0825701
Ni EVENT	
KA1+KA2	= 160929
Pileup	= 13287.9
Pile/(KA1+KA2)	= 0.0825701
TiKa1 Mean	= 4510.955 +- 0.469
TiKb1 Mean	= 4929.150 +- 1.714
NiKa1 Mean	= 7478.693 +- 0.485
NiKb1 Mean	= 8261.658 +- 1.758
Const Noise	= 57.652 +- 1.540
Fano	= 0.145 +- 0.008
TiKb1 Noise	= 75.335 +- 1.858
NiKb1 Noise	= 87.713 +- 1.854
Chisq/NDF	= 494.831/457

2nd cycle SDD7 with compton

```

FCN=5406.03 FROM MINOS      STATUS=SUCCESSFUL 14579 CALLS      15680 TOTAL
                        EDM=0.0347311 STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      2.77001e+03  1.00140e+02 -1.05342e+02  1.46100e+02
 2  BGb      4.49914e-01  3.07769e-02 -4.51141e-02  3.25431e-02
 3  BGC      -3.93761e-05  2.33262e-06 -2.46680e-06  3.40297e-06
 4  Const Noise [eV]  6.60753e+01  1.77744e+00 -1.79668e+00  1.87861e+00
 5  Fano      1.40799e-01  1.05788e-02 -1.12048e-02  1.06104e-02
 6  Ti Kb/Ka1 ratio  2.37406e-01  7.23417e-03 -7.49617e-03  7.21222e-03
 7  Ni Kb/Ka1 ratio  2.85774e-01  8.51007e-03 -8.84201e-03  8.54343e-03
 8  TiKa1 Area  9.00276e+05  6.77184e+03 -6.58765e+03  7.50580e+03
 9  NiKa1 Area  9.00271e+05  6.87879e+03 -7.03348e+03  6.85583e+03
10  TiKa1 Mean [eV]  4.51069e+03  5.82768e-01 -6.45711e-01  5.66207e-01
11  NiKa1 Mean [eV]  7.47789e+03  6.15412e-01 -6.02920e-01  6.51404e-01
12  TiKb1 Mean [eV]  4.93472e+03  2.35349e+00 -2.42515e+00  2.35196e+00
13  NiKb1 Mean [eV]  8.25580e+03  2.71048e+00 -2.79472e+00  2.70035e+00
14  TiKb1 Sigma [eV]  8.46909e+01  2.55159e+00 -2.59024e+00  2.58269e+00
15  NiKb1 Sigma [eV]  9.75118e+01  2.91660e+00 -2.96917e+00  2.96659e+00
16  Pile area factor  1.08713e-01  6.86045e-03 -7.07618e-03  6.81656e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  3.51407e-02  1.24582e-02 -1.52434e-02  1.22256e-02
20  Tail area factor NiKa  2.19860e-02  1.05559e-02 -1.01666e-02  1.14421e-02
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  6.76916e-03  3.00067e-03 -2.99397e-03  3.09494e-03
24  Escape mean NiKa [eV]  5.67227e+03  3.80835e+01 -4.07592e+01  3.99076e+01
25  FeKa area factor  9.68896e-03  4.54731e-03 -4.46578e-03  4.88443e-03
26  FeKa mean [eV]  6.44620e+03  7.82273e+01 -6.86052e+01  9.19805e+01
27  CuKa area factor  2.07238e-02  6.86464e-03 -7.02074e-03  6.87176e-03
28  CuKa mean [eV]  8.04104e+03      fixed

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2nd cycle SDD7 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 135041
Pileup	= 14680.7
Pile/(KA1+KA2)	= 0.108713
Ni EVENT	
KA1+KA2	= 135941
Pileup	= 14778.5
Pile/(KA1+KA2)	= 0.108713
TiKa1 Mean	= 4510.693 +- 0.606
TiKb1 Mean	= 4934.720 +- 2.389
NiKa1 Mean	= 7477.893 +- 0.627
NiKb1 Mean	= 8255.799 +- 2.748
Const Noise	= 66.075 +- 1.838
Fano	= 0.141 +- 0.011
TiKb1 Noise	= 84.691 +- 2.586
NiKb1 Noise	= 97.512 +- 2.968
Chisq/NDF	= 479.478/457

2nd cycle SDD8 with compton

```

FCN=5284.07 FROM MINOS      STATUS=SUCCESSFUL 17219 CALLS      18526 TOTAL
                        EDM=0.178425  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER              PARABOLIC              MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      6.59436e+02  7.20340e+01 -6.14632e+01  1.23835e+02
 2  BGb      6.43729e-01  2.25160e-02 -3.89964e-02  1.91640e-02
 3  BGC      -4.78501e-05  1.72932e-06 -1.46918e-06  2.98673e-06
 4  Const Noise [eV]  5.07932e+01  1.56503e+00 -1.59969e+00  1.78012e+00
 5  Fano      1.34439e-01  7.06418e-03 -8.05543e-03  7.19417e-03
 6  Ti Kb/Ka1 ratio  2.51045e-01  5.86048e-03 -6.34629e-03  6.13100e-03
 7  Ni Kb/Ka1 ratio  2.70889e-01  5.98855e-03 -6.90100e-03  5.92290e-03
 8  TiKa1 Area  7.43142e+05  4.90199e+03 -4.68691e+03  5.92987e+03
 9  NiKa1 Area  8.73075e+05  5.30874e+03 -5.79107e+03  5.48094e+03
10  TiKa1 Mean [eV]  4.51059e+03  4.50908e-01 -5.40134e-01  4.34846e-01
11  NiKa1 Mean [eV]  7.47753e+03  4.60791e-01 -4.62316e-01  5.20992e-01
12  TiKb1 Mean [eV]  4.93037e+03  1.71881e+00 -1.87845e+00  1.78246e+00
13  NiKb1 Mean [eV]  8.25613e+03  1.76411e+00 -1.92197e+00  1.83276e+00
14  TiKb1 Sigma [eV]  7.32929e+01  1.80955e+00 -1.89792e+00  1.95210e+00
15  NiKb1 Sigma [eV]  8.32617e+01  1.89832e+00 -2.10727e+00  1.94164e+00
16  Pile area factor  4.64146e-02  4.29751e-03 -4.76389e-03  4.37789e-03
17  Pile shift [eV]  2.00000e+02      fixed
18  Pile sigma factor  2.00000e+00      fixed
19  Tail area factor TiKa  3.25776e-02  1.01261e-02 -1.36028e-02  9.19624e-03
20  Tail area factor NiKa  2.01122e-02  8.17270e-03 -7.92182e-03  9.58839e-03
21  Tail slope factor  3.00000e+00      fixed
22  Tail area factor Kb/Ka  1.00000e+00      fixed
23  Escape area factor NiKa  8.58500e-03  2.30546e-03 -2.31019e-03  2.61530e-03
24  Escape mean NiKa [eV]  5.73958e+03  2.59413e+01 -2.68042e+01  2.91857e+01
25  FeKa area factor  1.11972e-02  3.56100e-03 -3.47045e-03  4.19426e-03
26  FeKa mean [eV]  6.44313e+03  3.07026e+01 -3.07187e+01  3.62688e+01
27  CuKa area factor  1.95955e-02  4.46108e-03 -4.82962e-03  4.65262e-03
28  CuKa mean [eV]  8.04104e+03      fixed

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2nd cycle SDD8 with compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 111471
Pileup	= 5173.9
Pile/(KA1+KA2)	= 0.0464146
Ni EVENT	
KA1+KA2	= 131834
Pileup	= 6119.04
Pile/(KA1+KA2)	= 0.0464146
TiKa1 Mean	= 4510.591 +- 0.487
TiKb1 Mean	= 4930.366 +- 1.830
NiKa1 Mean	= 7477.525 +- 0.492
NiKb1 Mean	= 8256.132 +- 1.877
Const Noise	= 50.793 +- 1.690
Fano	= 0.134 +- 0.008
TiKb1 Noise	= 73.293 +- 1.925
NiKb1 Noise	= 83.262 +- 2.024
Chisq/NDF	= 531.600/457

2nd cycle SDD1,2,3,4,5,7 and 8 with Compton

```

FCN=6681.35 FROM MINOS      STATUS=SUCCESSFUL  24428 CALLS      25538 TOTAL
                EDM=1.59435  STRATEGY= 1      ERROR MATRIX ACCURATE
EXT PARAMETER          PARABOLIC          MINOS ERRORS
NO.  NAME      VALUE      ERROR      NEGATIVE      POSITIVE
 1  BGa      9.86771e+03  2.08168e+02  -9.61040e+01  5.38668e+02
 2  BGB      3.64603e+00  6.30393e-02  -1.63243e-01  2.92460e-02
 3  BGC     -2.85510e-04  4.60483e-06  -2.19388e-06  1.18553e-05
 4  Const Noise [eV]  5.43809e+01  5.94744e-01  -7.44266e-01  9.25952e-01
 5  Fano      1.30055e-01  2.94487e-03  -4.55989e-03  3.71861e-03
 6  Ti Kb/Ka1 ratio  2.42429e-01  2.13763e-03  -3.44906e-03  2.52900e-03
 7  Ni Kb/Ka1 ratio  2.78153e-01  2.20296e-03  -3.02710e-03  3.12636e-03
 8  TiKa1 Area  5.67163e+06  1.39141e+04  -1.54610e+04  2.36488e+04
 9  NiKa1 Area  5.81022e+06  1.45338e+04  -2.21389e+04  1.84874e+04
10  TiKa1 Mean [eV]  4.51079e+03  1.74203e-01  -3.16936e-01  1.75282e-01
11  NiKa1 Mean [eV]  7.47757e+03  1.91998e-01  -2.28701e-01  3.09569e-01
12  TiKb1 Mean [eV]  4.93053e+03  6.47880e-01  -9.30703e-01  8.78454e-01
13  NiKb1 Mean [eV]  8.25733e+03  7.15897e-01  -9.85140e-01  1.01450e+00
14  TiKb1 Sigma [eV]  7.26854e+01  6.76083e-01  -1.01650e+00  8.70479e-01
15  NiKb1 Sigma [eV]  8.42854e+01  7.34943e-01  -1.02379e+00  1.02946e+00
16  Pile area factor  6.19225e-02  1.69620e-03  -2.28277e-03  2.44841e-03
17  Pile shift [eV]  2.00000e+02  fixed
18  Pile sigma factor  2.00000e+00  fixed
19  Tail area factor TiKa  3.46471e-02  3.91668e-03  -8.19189e-03  3.08151e-03
20  Tail area factor NiKa  3.15347e-02  3.40678e-03  -3.49920e-03  6.13721e-03
21  Tail slope factor  3.00000e+00  fixed
22  Tail area factor Kb/Ka  1.00000e+00  fixed
23  Escape area factor NiKa  5.67903e-03  9.74421e-04  -1.23528e-03  1.49117e-03
24  Escape mean NiKa [eV]  5.73036e+03  1.80396e+01  -2.37430e+01  2.68799e+01
25  FeKa area factor  1.06214e-02  1.50519e-03  -1.67689e-03  2.55988e-03
26  FeKa mean [eV]  6.43183e+03  1.80024e+01  -2.44815e+01  2.52171e+01
27  CuKa area factor  2.25778e-02  1.85044e-03  -2.49768e-03  2.67338e-03
28  CuKa mean [eV]  8.04104e+03  fixed

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2nd cycle SDD1,2,3,4,5,7 and 8 with Compton

29	Comp	TiKa1	shift	3.40400e+01	fixed
30	Comp	TiKa1	sigma	6.78073e+01	fixed
31	Comp	TiKa1	area	3.19352e-03	fixed
32	Comp	TiKa1	slope	7.38536e-01	fixed
33	Comp	TiKa2	shift	3.36800e+01	fixed
34	Comp	TiKa2	sigma	6.87857e+01	fixed
35	Comp	TiKa2	area	3.43036e-03	fixed
36	Comp	TiKa2	slope	7.47375e-01	fixed
37	Comp	TiKb1	shift	5.09600e+01	fixed
38	Comp	TiKb1	sigma	6.90366e+01	fixed
39	Comp	TiKb1	area	5.64655e-03	fixed
40	Comp	TiKb1	slope	7.48765e-01	fixed
41	Comp	NiKa1	shift	1.26300e+02	fixed
42	Comp	NiKa1	sigma	9.69050e+01	fixed
43	Comp	NiKa1	area	2.35656e-02	fixed
44	Comp	NiKa1	slope	7.04538e-01	fixed
45	Comp	NiKa2	shift	1.24210e+02	fixed
46	Comp	NiKa2	sigma	9.67320e+01	fixed
47	Comp	NiKa2	area	2.39419e-02	fixed
48	Comp	NiKa2	slope	7.09247e-01	fixed
49	Comp	NiKb1	shift	1.56120e+02	fixed
50	Comp	NiKb1	sigma	9.98516e+01	fixed
51	Comp	NiKb1	area	2.88379e-02	fixed
52	Comp	NiKb1	slope	7.37399e-01	fixed

Ti EVENT	
KA1+KA2	= 850744
Pileup	= 52680.2
Pile/(KA1+KA2)	= 0.0619225
Ni EVENT	
KA1+KA2	= 877343
Pileup	= 54327.2
Pile/(KA1+KA2)	= 0.0619225
TiKa1 Mean	= 4510.791 +- 0.246
TiKb1 Mean	= 4930.528 +- 0.905
NiKa1 Mean	= 7477.571 +- 0.269
NiKb1 Mean	= 8257.327 +- 1.000
Const Noise	= 54.381 +- 0.835
Fano	= 0.130 +- 0.004
TiKb1 Noise	= 72.685 +- 0.943
NiKb1 Noise	= 84.285 +- 1.027
Chisq/NDF	= 597.316/487