

E570 report      22/May/2006      H. Tatsuno

## -Continuance of the report 19/May/2006-

### [1] $K\beta/K\alpha$ ratio

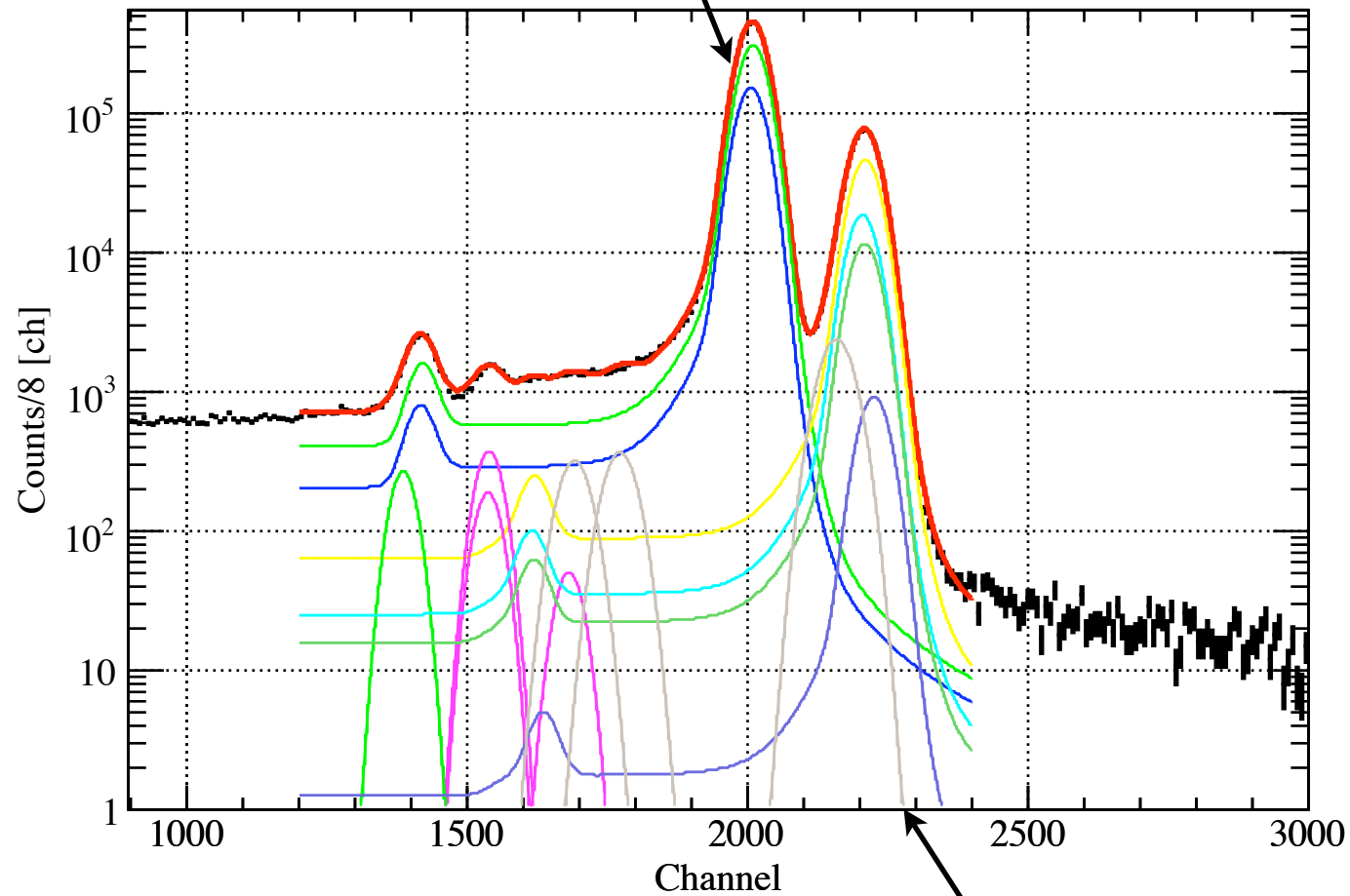
I reported in the previous meeting the  $K\beta/K\alpha$  ratio was not too high for ion source data. But this was my mistake (I'm sorry). As Outa-san said the ratio couldn't be explained by the increase of events from the width of main and satellite peaks. In the report, I calculated  $K\beta/K\alpha$  NOT  $K\beta/K\alpha I$ . So the ratio was still about 50% larger than the value of X-ray Data Booklet.

### [2] pile-up fit was converged

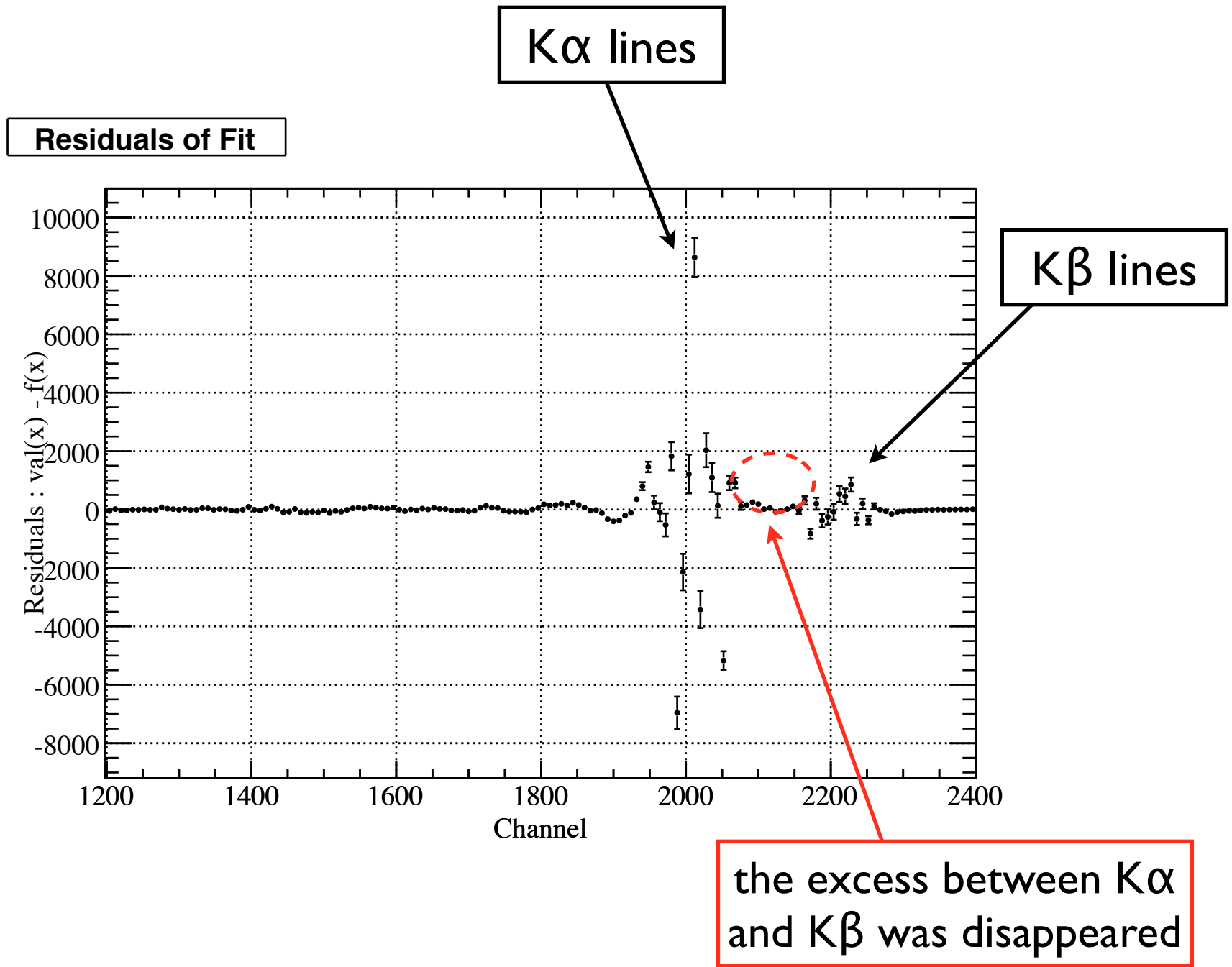
The fit using Voigtian + pile-up + radiative Auger effect (KMM) was converged. The KMM term of the RAE and the pile-up term made up for the excess between  $K\alpha$  and  $K\beta$  without changing their natural widths. But the ratio of  $KMM/K\beta$  was a little smaller than a reference, and the ratios of pile-up have 0.5 % difference between  $K\alpha$  and  $K\beta$ .

Voigtian + response function  
(w/ pile-up)

Fe55 Calibration Data Fit



RAE KMM assumed as a Gaussian



Fe55 Mn X-rays clib. Voigtian natural widths are fixed, w/ pile-up

FCN=1394.76 FROM MINOS STATUS=SUCCESSFUL 10384 CALLS 12031 TOTAL  
EDM=0.000669788 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT NO.	PARAMETER NAME	VALUE	PARABOLIC ERROR	MINOS ERRORS	
				NEGATIVE	POSITIVE
1	V mean Ka1	2.00988e+03	7.30343e-02	-5.86964e-02	5.51906e-02
2	V mean Kb1	2.21029e+03	6.97849e-02	-6.16106e-02	5.96443e-02
3	V sigma Ka1	2.44946e+01	3.39297e-02	-2.88222e-02	2.79382e-02
4	Fano	1.20000e-01	fixed		
5	V height Ka1	2.76618e+05	2.01617e+03	-1.58336e+03	1.45668e+03
6	Ka1 Kb1 ratio	9.01519e-01	1.50865e-03	-1.44789e-03	1.46200e-03
7	Escape ratio	3.76643e-03	8.65937e-05	-8.12756e-05	8.80362e-05
8	TS height	1.55169e+02	7.73154e+00	-7.73730e+00	7.63406e+00
9	i_{T} factor	6.95613e-01	4.54592e-03	-4.49146e-03	4.86361e-03
10	S height	4.02303e+02	3.54693e+00	-3.53268e+00	3.56016e+00
11	D height	2.36060e+04	8.98732e+02	-8.55933e+02	8.90058e+02
12	D slope	4.33677e+01	6.89872e-01	-6.62118e-01	6.79029e-01
13	TiKa1 height	3.68890e+02	1.63009e+01	-1.61529e+01	1.63381e+01
14	ESCMnComp height	2.61548e+02	3.44582e+01	-3.69073e+01	3.24477e+01
15	RAE height MnKLL1	3.13660e+02	1.92240e+01	-1.90569e+01	1.93236e+01
16	RAE height MnKLL2	3.58563e+02	1.97688e+01	-1.96996e+01	1.97968e+01
17	P height MnKa1	2.61928e+05	5.72441e+04	-3.89357e+04	4.65904e+04
18	P slope	1.62782e+01	6.14346e-01	-4.47501e-01	4.65115e-01
19	V gamma MnKa1	4.76667e-01	fixed		
20	V gamma MnKa2	6.56667e-01	fixed		
21	V gamma MnKb1	8.06667e-01	fixed		
22	RAE height MnKMM1	2.33122e+03	5.85631e+01	-5.57493e+01	5.49814e+01

natural widths were fixed



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ndf = 132  
chi^2 = 1394.76  
chi^2/ndf = 10.5664  
e2c = 2.95255 +- 0.00122544[eV/ch]  
intercept = -35.5398 +- 2.46872[eV]

chisquare/ndf was improved

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Main and Satellite :

event Mn Ka = 2.96943e+07 +- 5449.25  
event Mn Kb = 5.1766e+06 +- 2275.22  
ratio Mn Ka2/Ka1 = 0.499772 +- 0.000194617  
ratio Mn Kb/Ka1 = 0.261584 +- 0.000129136  
ratio Mn Kb/Ka = 0.17433 +- 8.30317e-05

K $\beta$ /K $\alpha$  ratio, about 50%  
larger than a reference

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Radiative Auger Transition :

RAE Mn KLL = 47740.4 +- 218.496  
RAE Mn KMM = 175042 +- 418.38  
K alpha line total = 2.97421e+07 +- 5453.63  
K beta line total = 5.35165e+06 +- 2313.36  
ratio Mn Kb/Ka (total) = 0.179935 +- 8.44893e-05  
RAE KLL / Ka total = 0.00160515 +- 7.35225e-06  
RAE KMM / Kb total = 0.0327081 +- 7.94461e-05

RAE ratios  
please see *Xray Spectrometry*  
**26** (1997) 223

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Pile-up :

ratio Mn pileKa1/(Ka1+pile) = 0.0649405 +- 5.71641e-05  
ratio Mn pileKa2/(Ka2+pile) = 0.0650351 +- 8.09191e-05  
ratio Mn pileKb1/(Kb1+pile) = 0.0602202 +- 0.00013912  
ratio Mn pileKb1P1/(Kb1P1+pile) = 0.0603388 +- 0.000220245  
ratio Mn pileKb1P2/(Kb1P2+pile) = 0.0602466 +- 0.000278318  
ratio Mn pileKb5/(Kb5+pile) = 0.0598739 +- 0.000980103

the pile-up ratio of  
K $\alpha$  was about 0.5%  
larger than that of  
K $\beta$