E570 meeting report 19/May/2006 H. Tatsuno

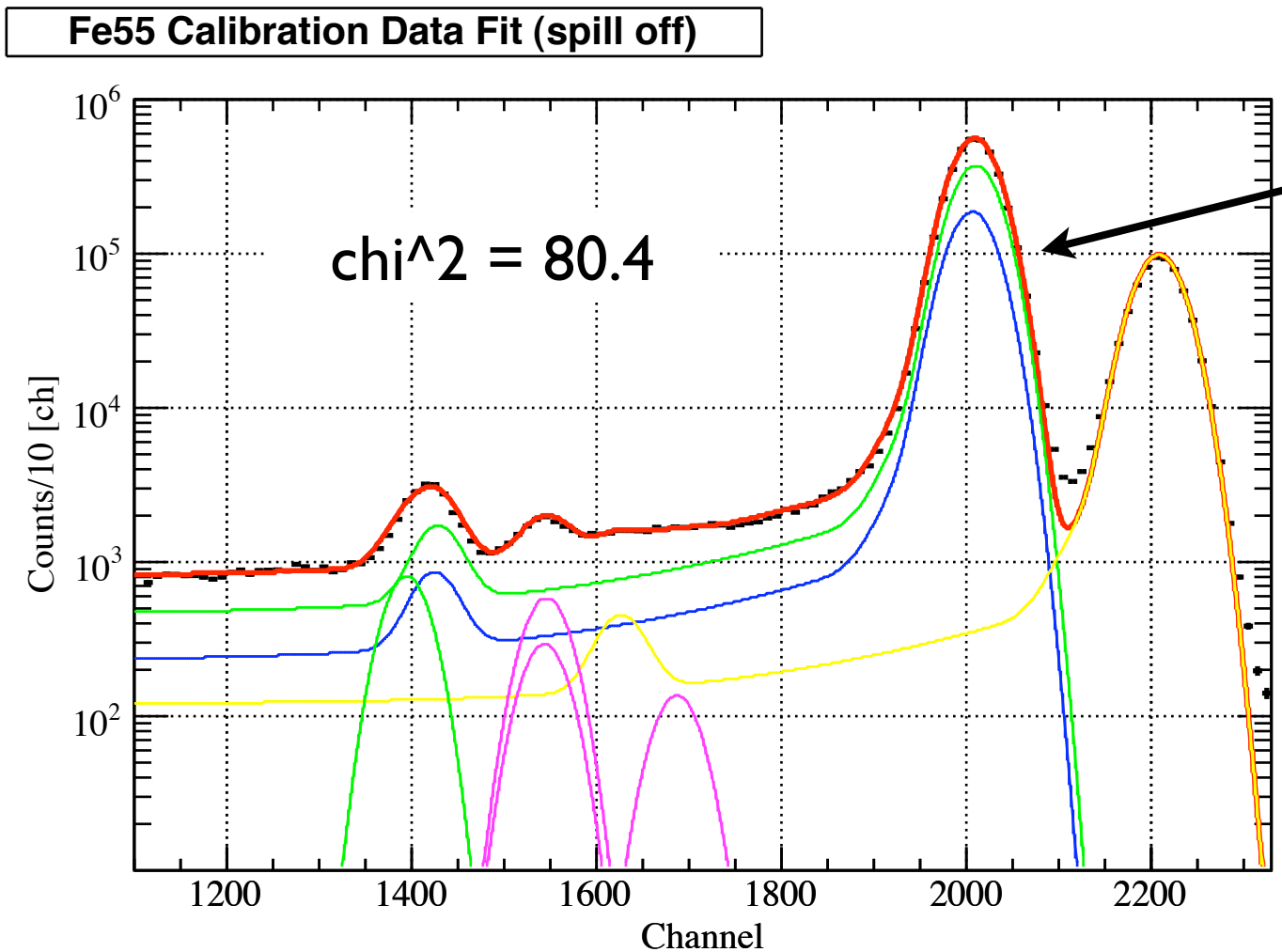
Is it possible to consider the excess between Kα and Kβ of Mn X-rays from ion source as pile-up ?

The response function was changed from Gaussian to Voigtian. The natural widths of Lorenzians are ordinary a few eV. For Mn Ka1 **1.43** eV, Ka2 **1.97** eV and Kb1,3 **2.42** eV.

The ion source data is the test experimental data taken in E549 (all production runs). The fitted histograms are cut by the spill off condition.

Previous meeting ...

There were huge excesses between Kα and Kβ.
First, the response function was changed from Gaussian to Voigtian

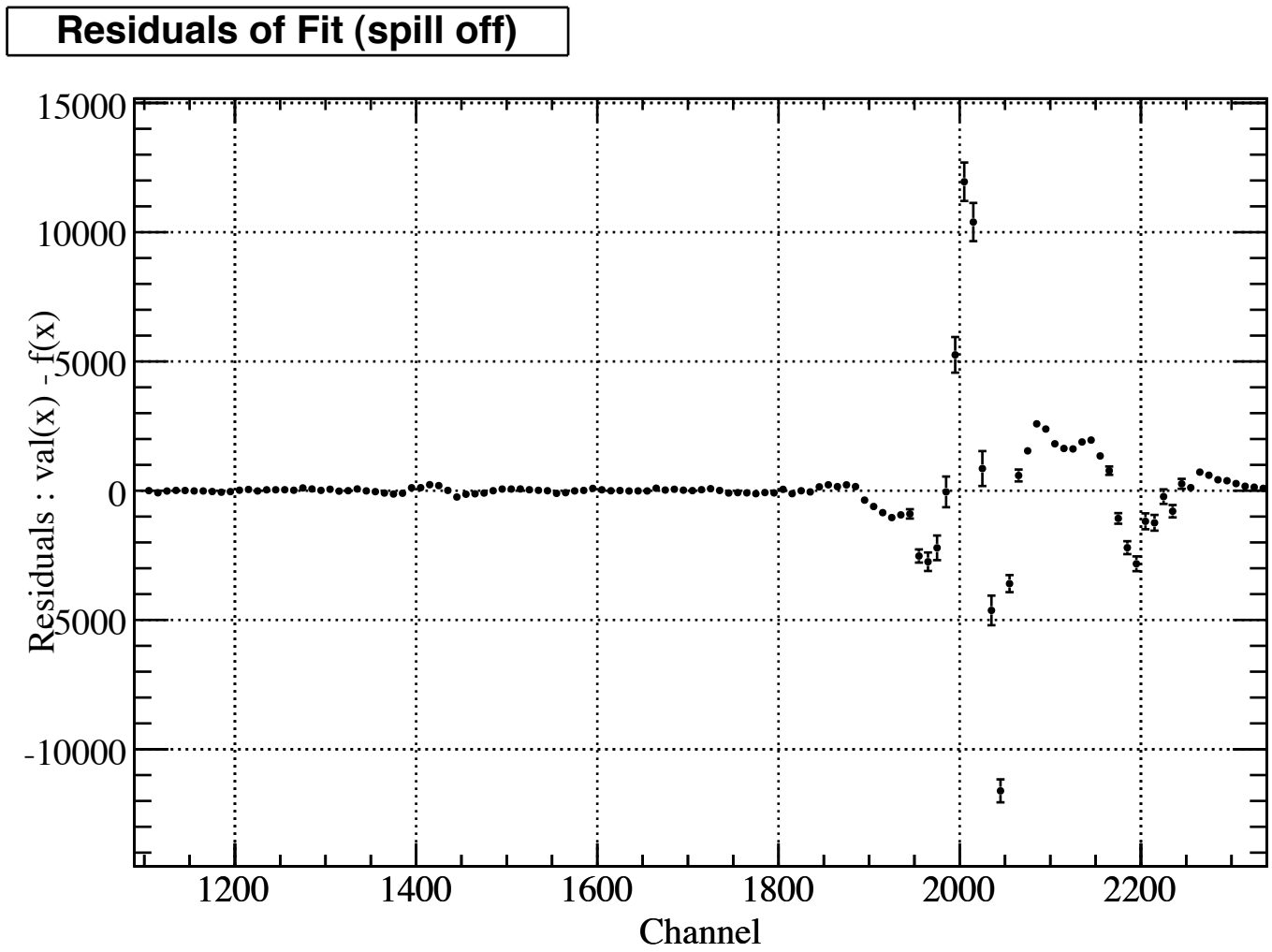


Gaussian +
lower side tail +
escape peaks

next

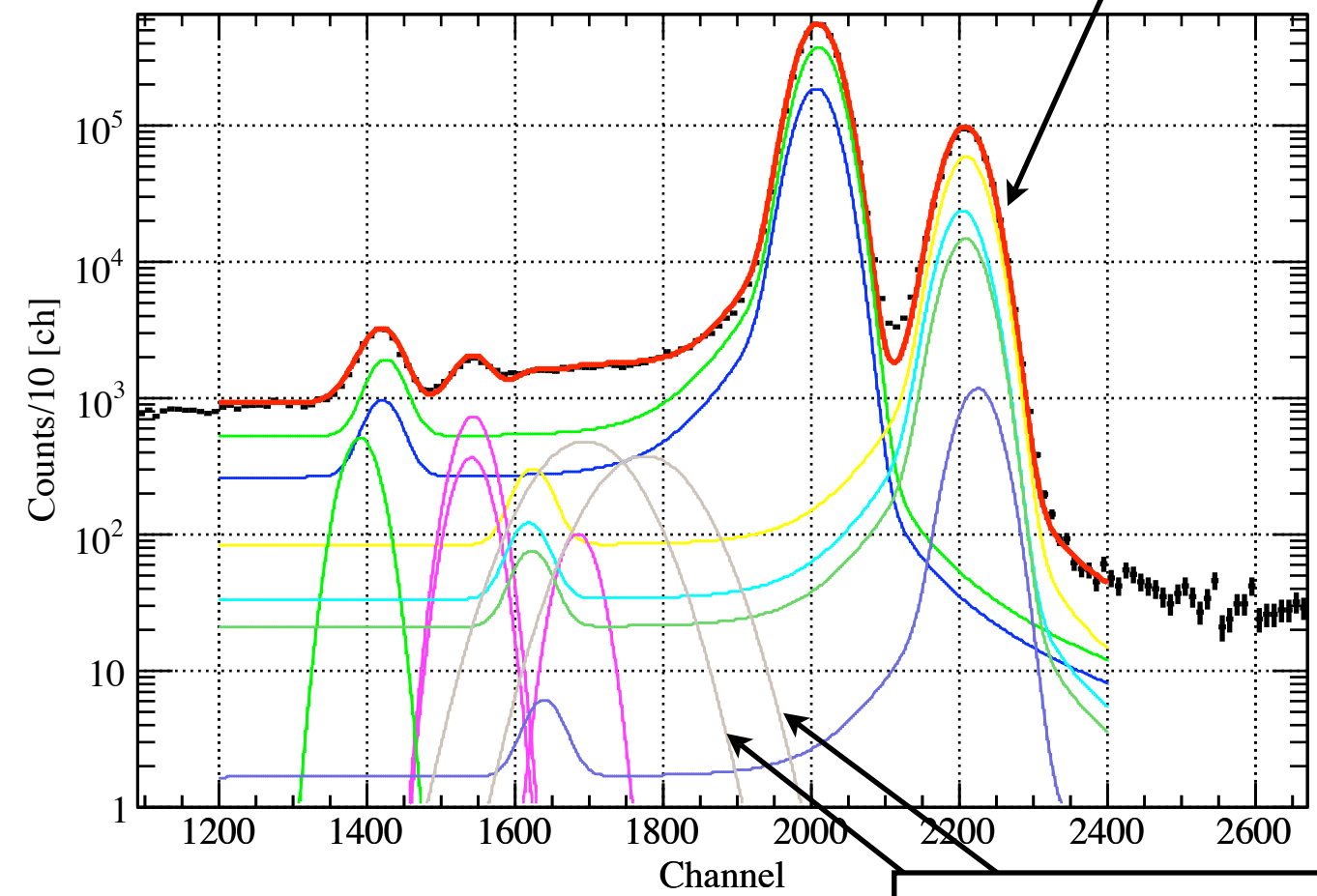
Voigtian +
lower side tail +
escape peaks

residuals


Residuals of Fit (spill off)
15000
10000
5000
0
-5000
-10000
Residuals : val(x) - f(x)
1200
1400
1600
1800
2000
2200
Channel

Voigtian fit with radiative Auger effect

the upper side tails were constructed by Lorenzians which have natural widths; Ka1 **1.43** eV, Ka2 **1.97** eV, Kb1,3 **2.42** eV



Kβ satellites; Kβ' and Kβ5

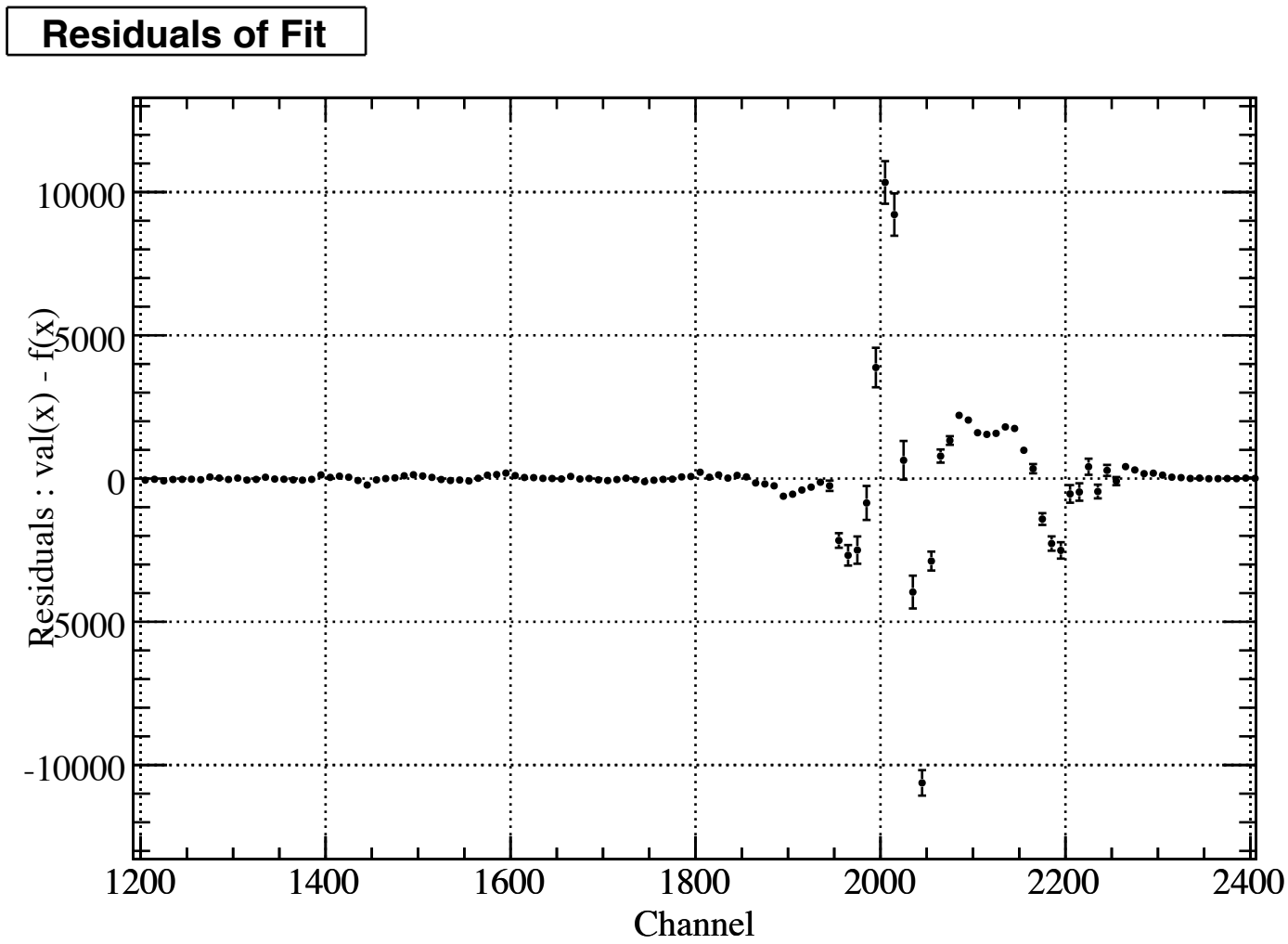
chi^2 was improved 80.4 → 60.5

ratio Kβ/Kα ~ 0.18 (X-ray Data Booklet 0.17)

RAE KLL/Kα ~ 0.34 %

RAE assumed as 2 broad Gaussians

residuals


Residuals of Fit
10000
5000
0
-5000
-10000
Residuals : val(x) - f(x)
1200
1400
1600
1800
2000
2200
2400
Channel

Voigtian + pile-up fit
→ cannot converge to a meaningful result...

Summary

For Mn X-rays from ion source, it was difficult to fit the excess between Kα and Kβ , even if a pile-up structure (a convolution of exp and error function) was added .

The intensity ratio of Kβ and Kα was calculated from the integral of diagram lines and their satellites. For Mn X-rays from ion source, the ratio was 0.18 without the attenuation correction, and the value of X-ray Data Booklet is 0.17, the difference is only **5 %**. If satellites and the lower-side tail are considered, the intensity ratio is not too high.