Dealing with partly missing energy information

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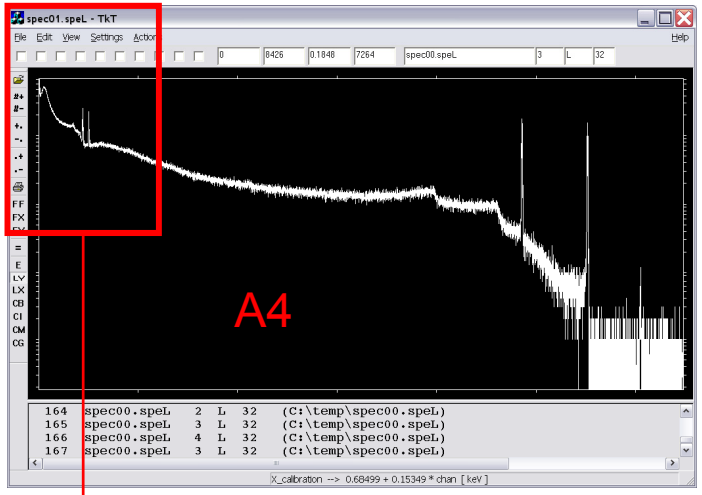
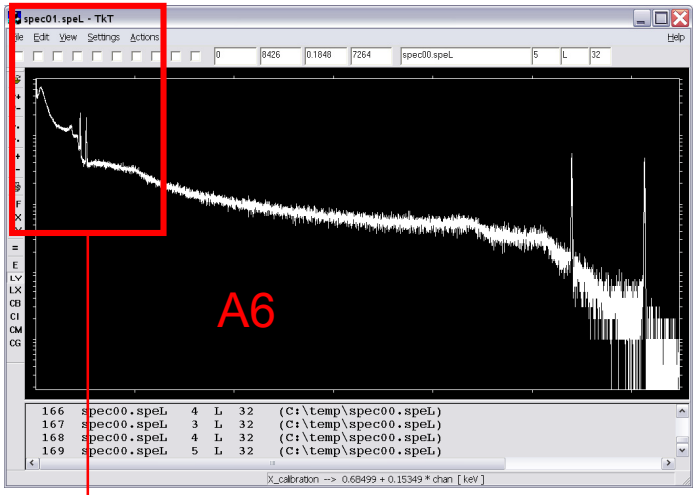
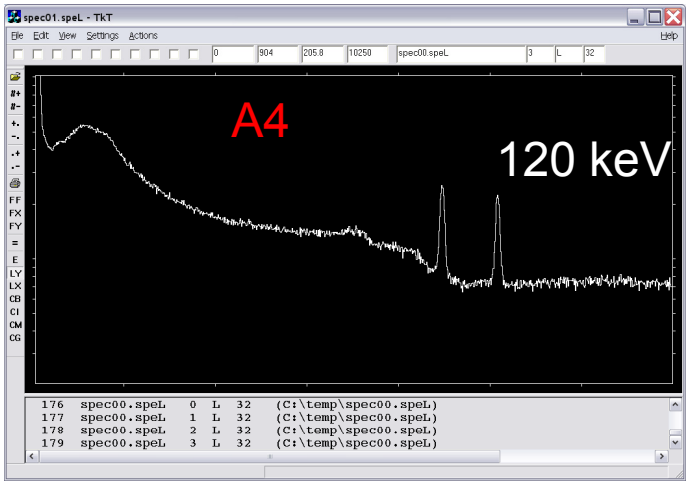
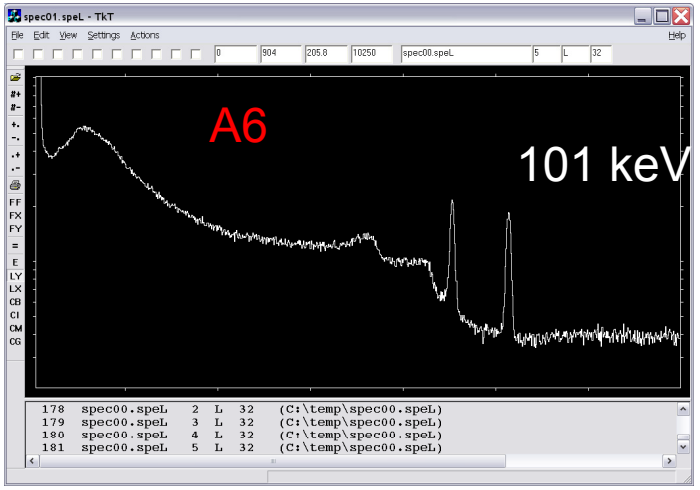
Effects of a broken segment (A5)

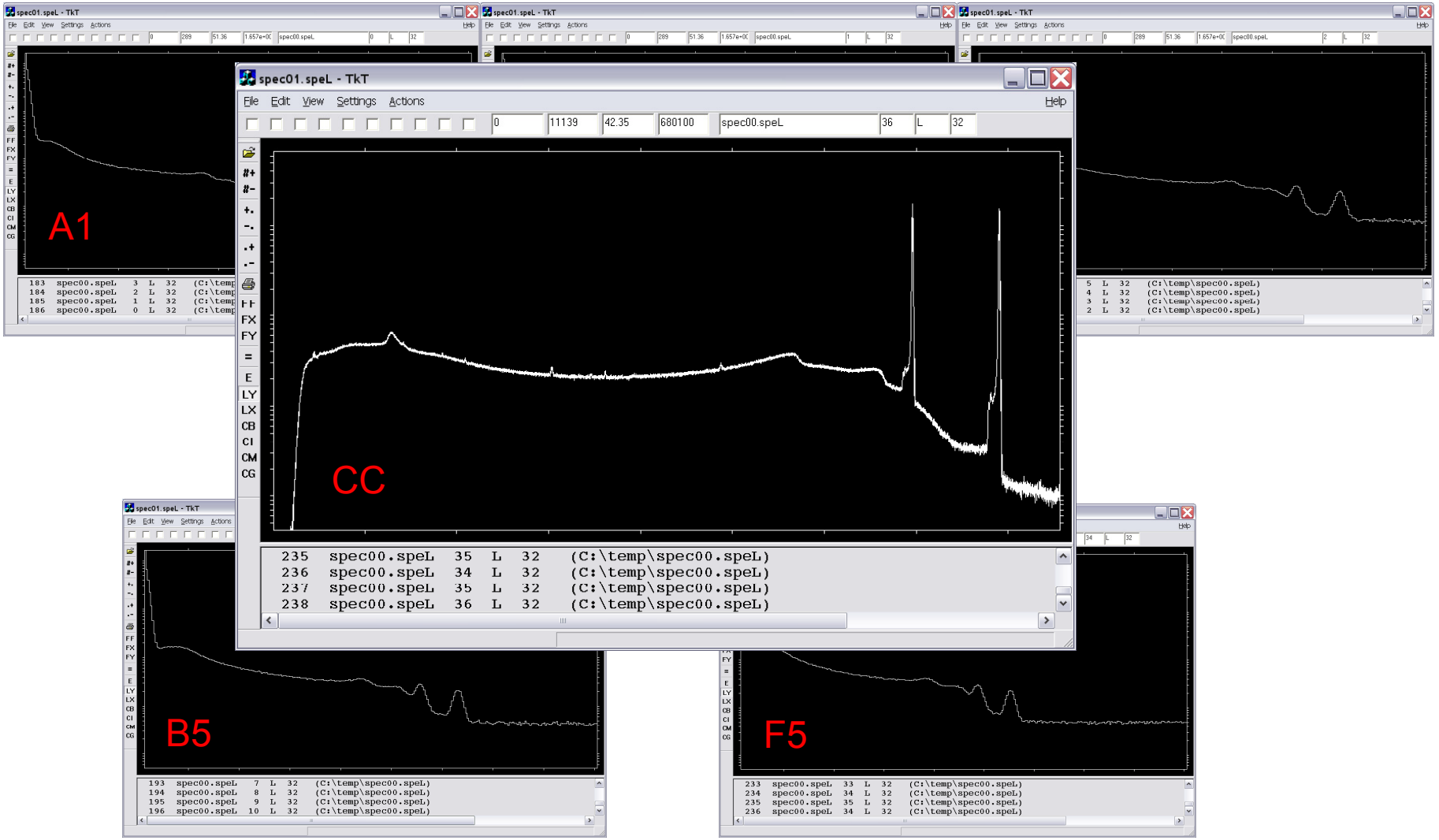


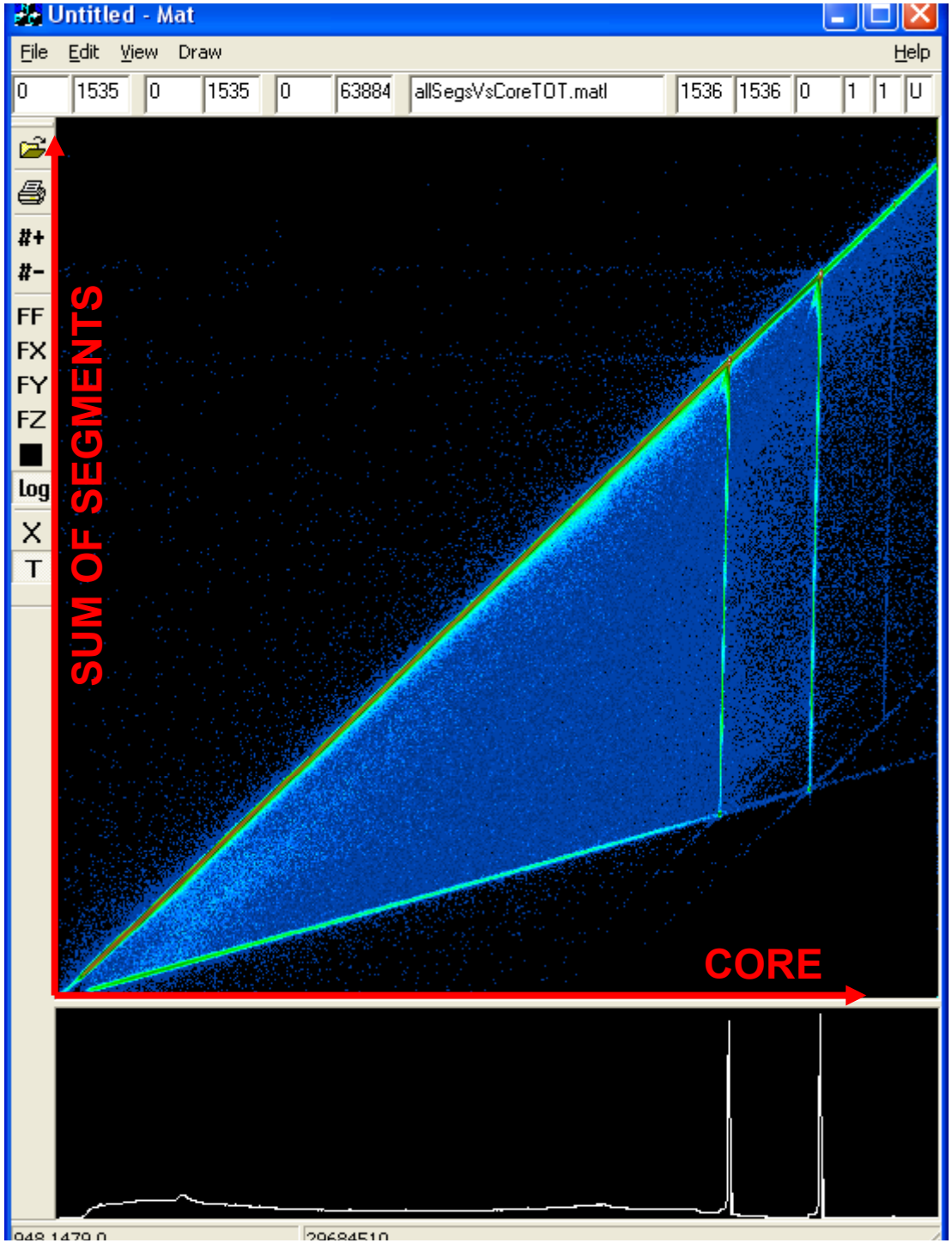






Effects of a broken segment

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0 1535 0 1535 0 63884 allSegsVsCoreTOT.matl 1536 1536 0 1 1 U
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FF
FX
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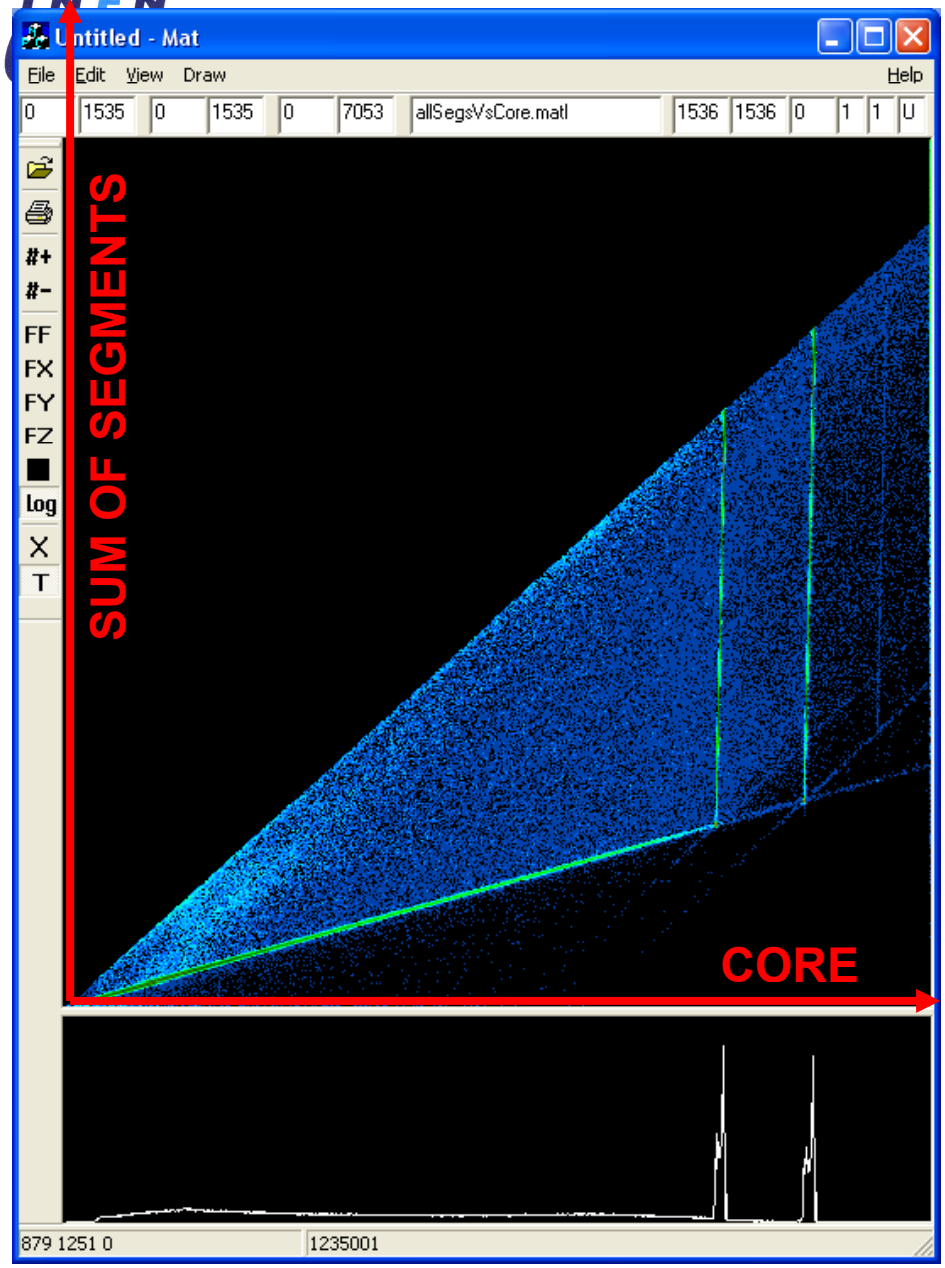
log
X
T
SUM OF SEGMENTS
CORE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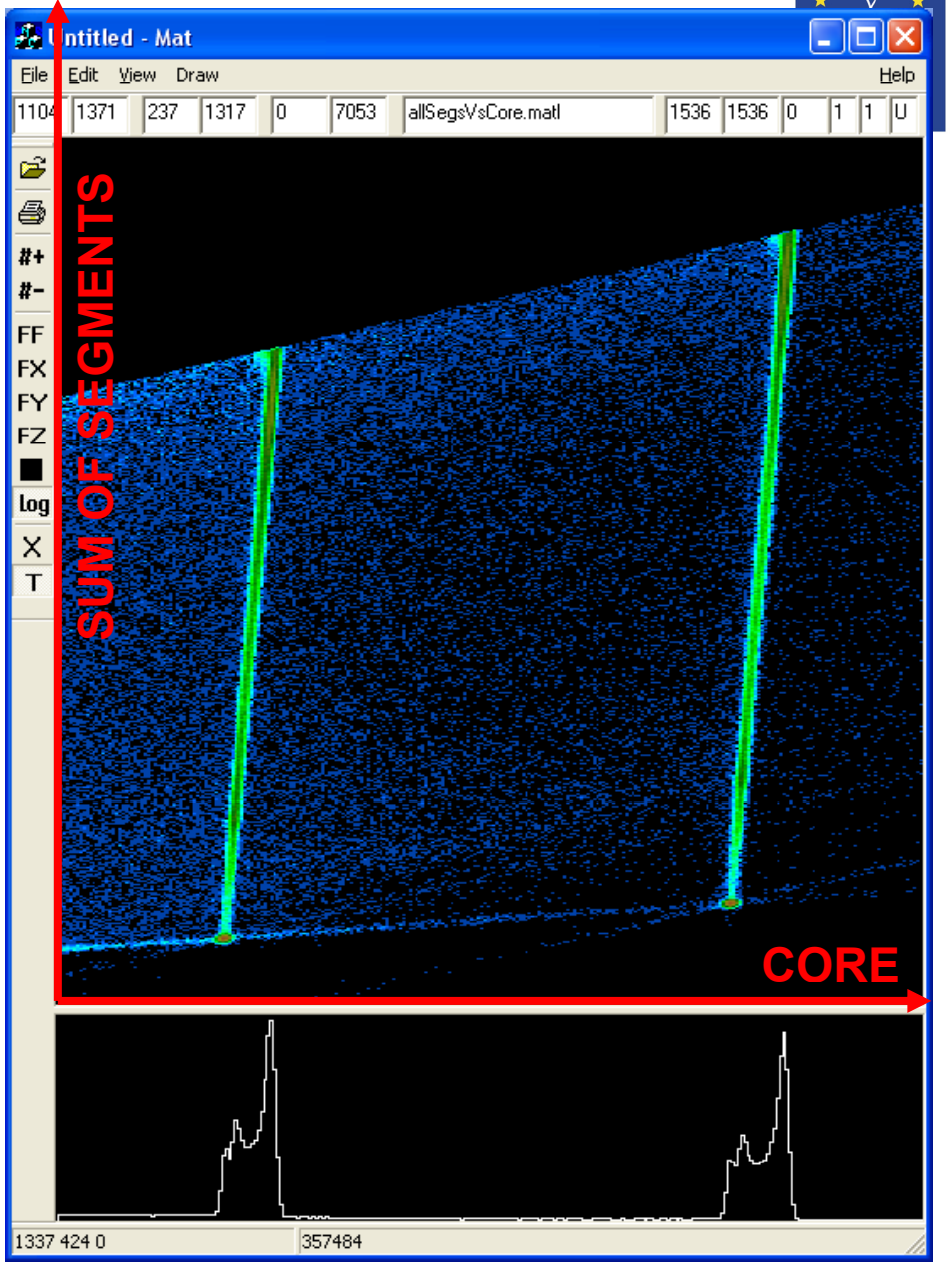
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SUM OF SEGMENTS
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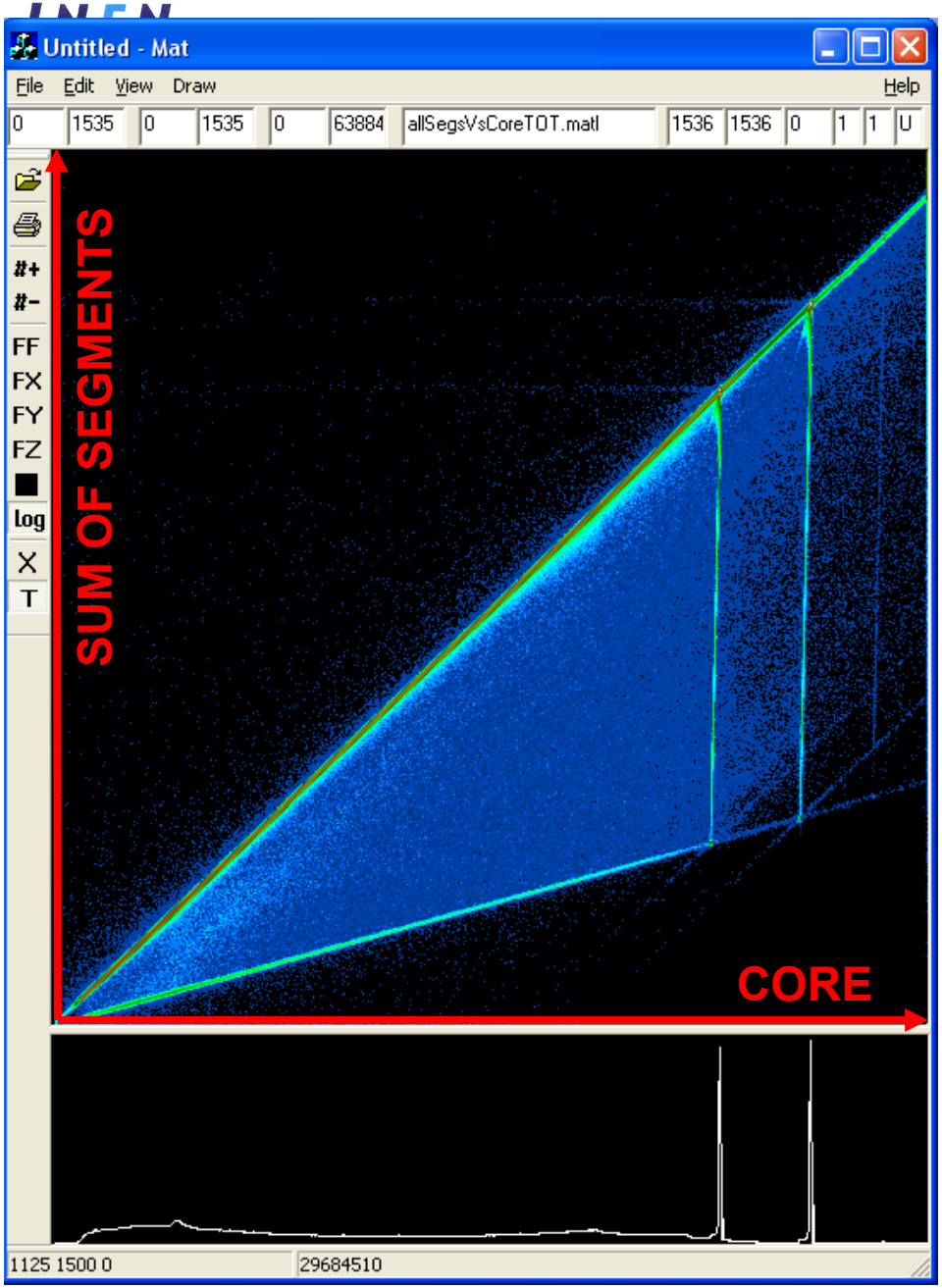
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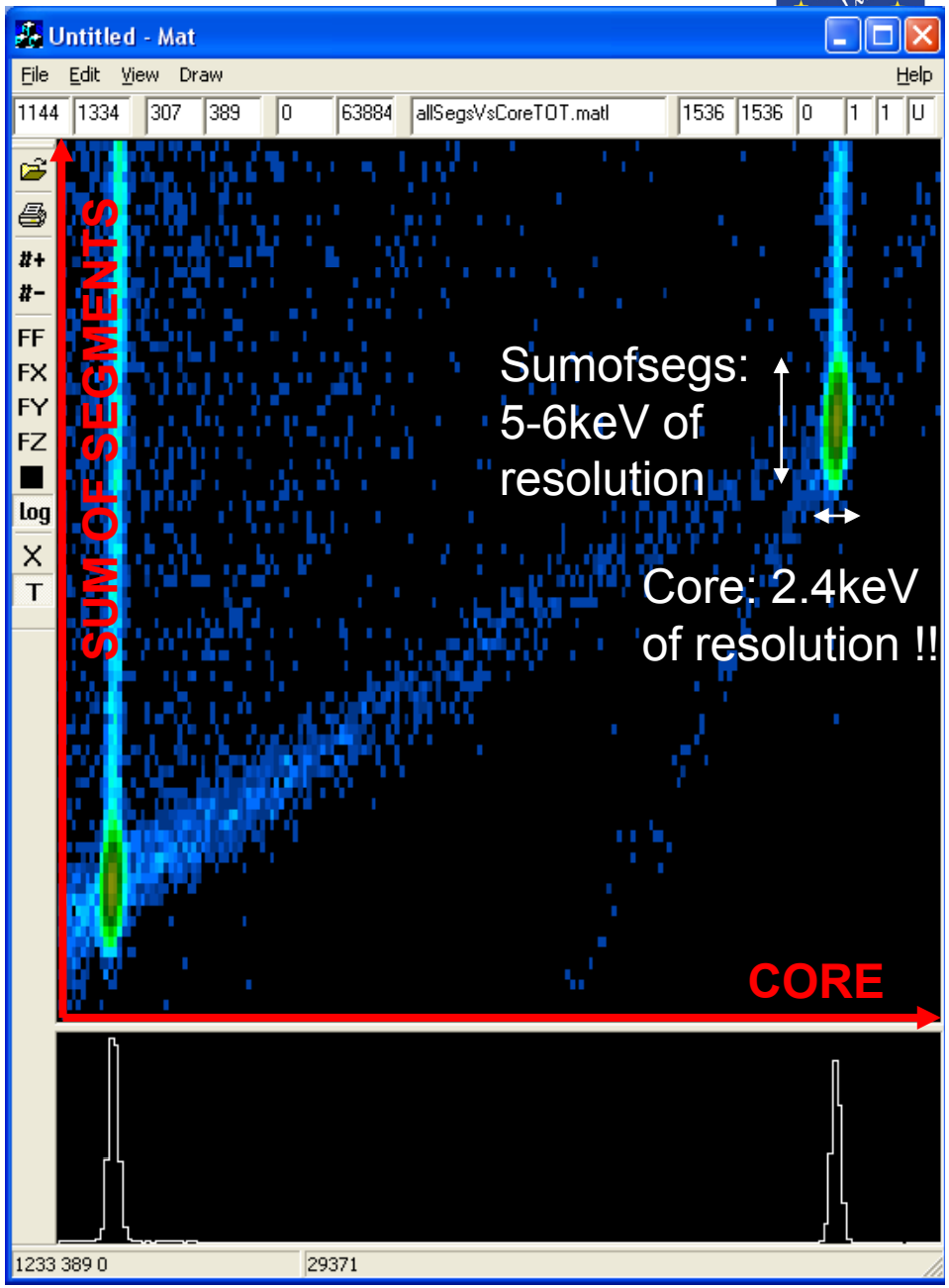
Untitled - Mat
File Edit View Draw Help
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X
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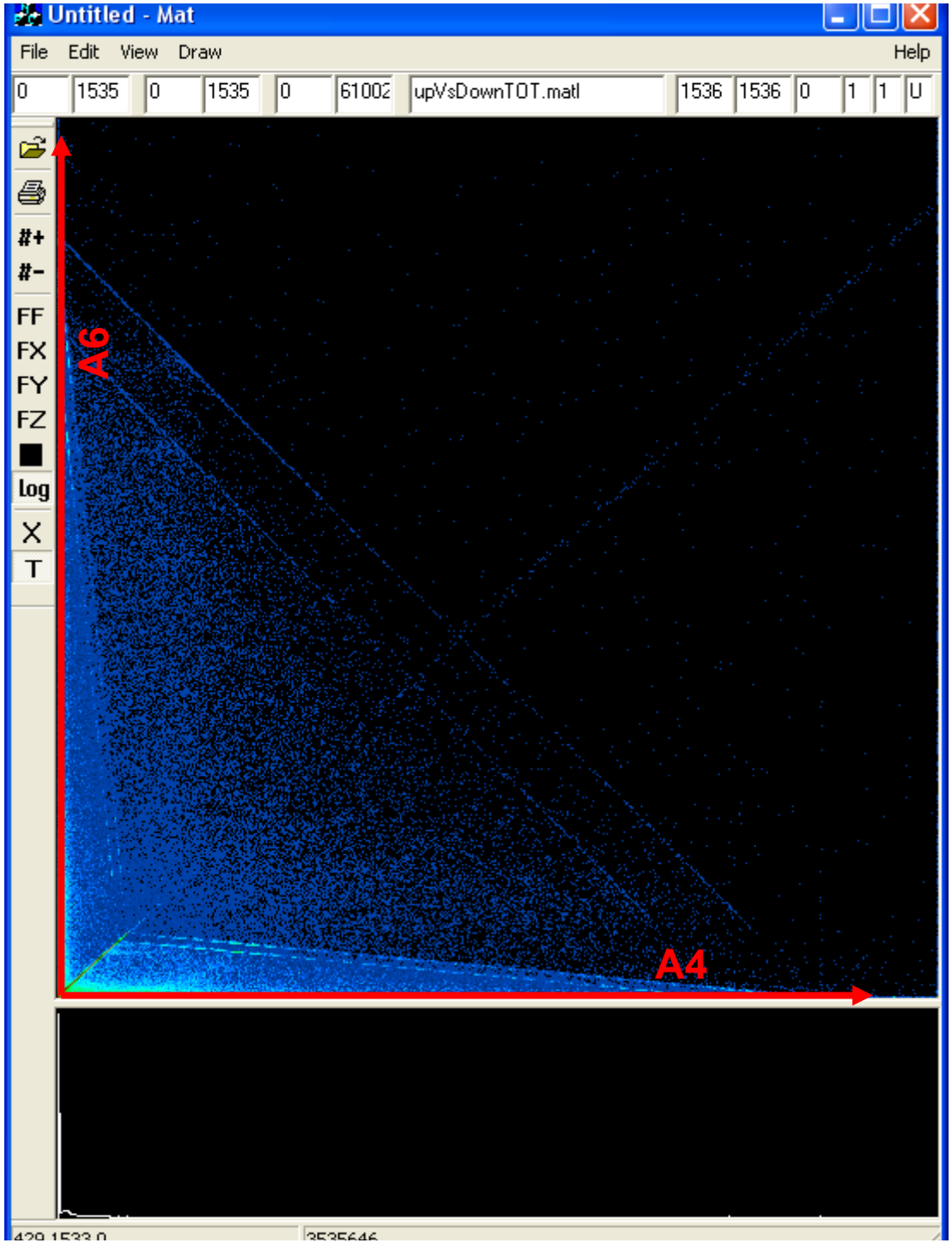
SUM OF SEGMENTS
Sumofsegs:
5-6keV of
resolution
Core: 2.4keV
of resolution !!
CORE
1233 389 0
29371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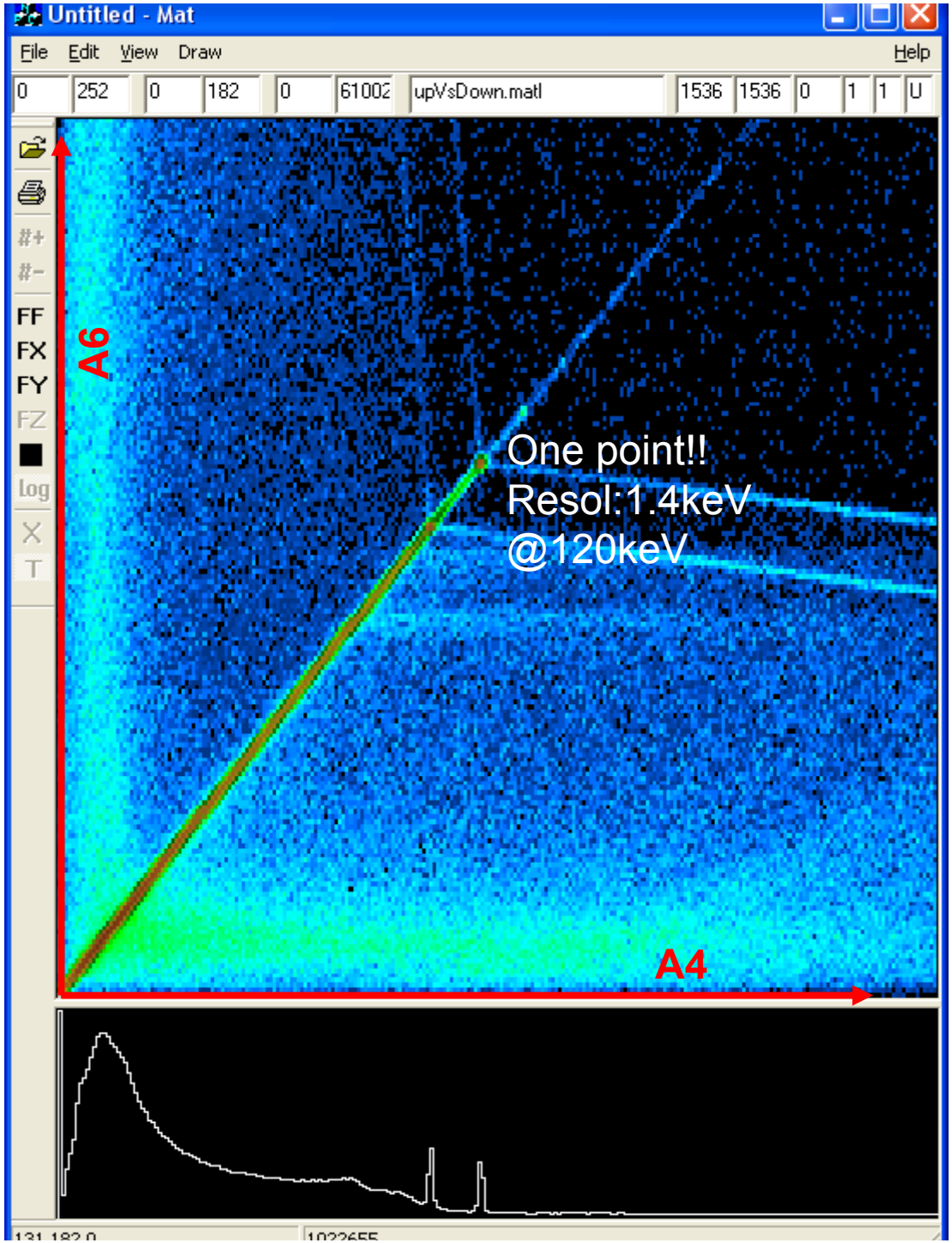
A6
A4



-> Energy seen by neighbors segments does not depend on the position of the interaction

->XTalk like!

Recovering the missing energy

Problems:

- Missing energy
- XT >> “normal” XT
  - Wrong multiplicity of segments firing
- Strong XTalk to CC
  - Around 20 keV
  - Segment dependent calibration is not possible

1 MeV in A5

BACK

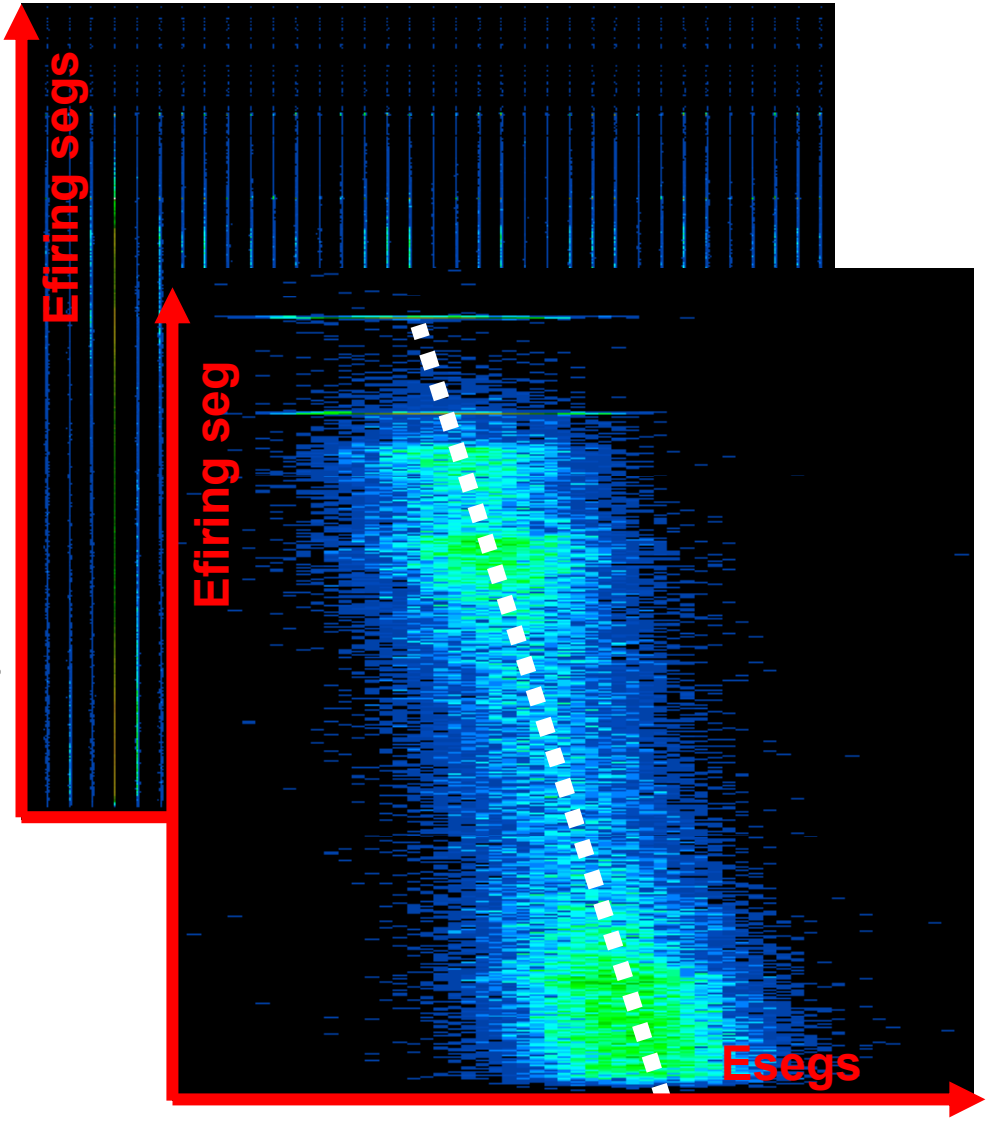
E6	3 F6	80 A6	3 B6	C6	D6
E5	25 F5	A5	25 B5	C5	D5
E4	3 F4	90 A4	3 B4	C4	D4
E3	F3	25 A3	B3	C3	D3
E2	F2	25 A2	B2	C2	D2
E1	F1	20 A1	B1	C1	D1

FRONT

Core: 985 keV(**-15 keV**)
Sum of segs: **~350 keV**

The usual way we correct XTalk

- Estimate the XT matrix
  - Selecting fold 1 of segment firing
  - The matrix elements are the energies seen by the other segments



The usual way we correct XTalk

- Estimate the XT matrix
  - Selecting fold 1 of segment firing
  - The matrix elements are the energies seen by the other segments
- The measured energies (E_i^*) are a biased estimation of the deposited energies (E_i)
- Use the inversion of XT matrix to extract the good E_i from the biased E_i^*

$$XT = \begin{pmatrix} 1 & x_{12}=\frac{E1}{E2} & x_{13}=\frac{E1}{E3} & \dots & \dots & \dots & \dots & x_{1N}=\frac{E1}{EN} \\ x_{21}=\frac{E2}{E1} & 1 & x_{23}=\frac{E2}{E3} & & & & & \dots \\ x_{31}=\frac{E3}{E1} & x_{32}=\frac{E3}{E2} & 1 & & & & & \dots \\ \dots & & & \dots & & & & \dots \\ \dots & & & & \dots & & & \dots \\ \dots & & & & & \dots & & \dots \\ \dots & & & & & & \dots & \dots \\ x_{1N}=\frac{EN}{E1} & \dots & \dots & \dots & \dots & \dots & \dots & 1 \end{pmatrix}$$

Measured when segment 1 is firing alone

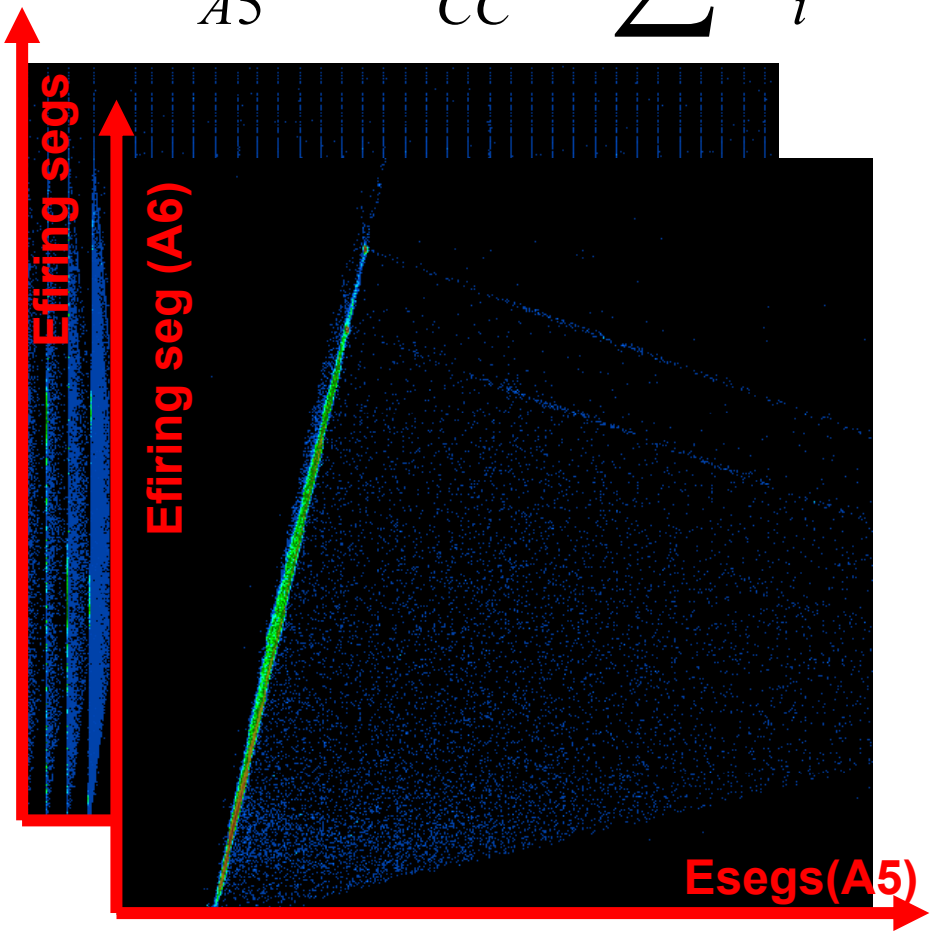
$$\vec{E}^* = XT \cdot \vec{E}^* \approx XT \cdot \vec{E}$$

$$\vec{E} \approx XT^{-1} \cdot \vec{E}^*$$

Recovering the missing energy

- Starting point: biased measure of the energy in A5
- Calibration of the new E_{A5}
- XT matrix
  - high fold of segments has to be used →

$$E_{A5} = E_{CC} - \sum E_i$$

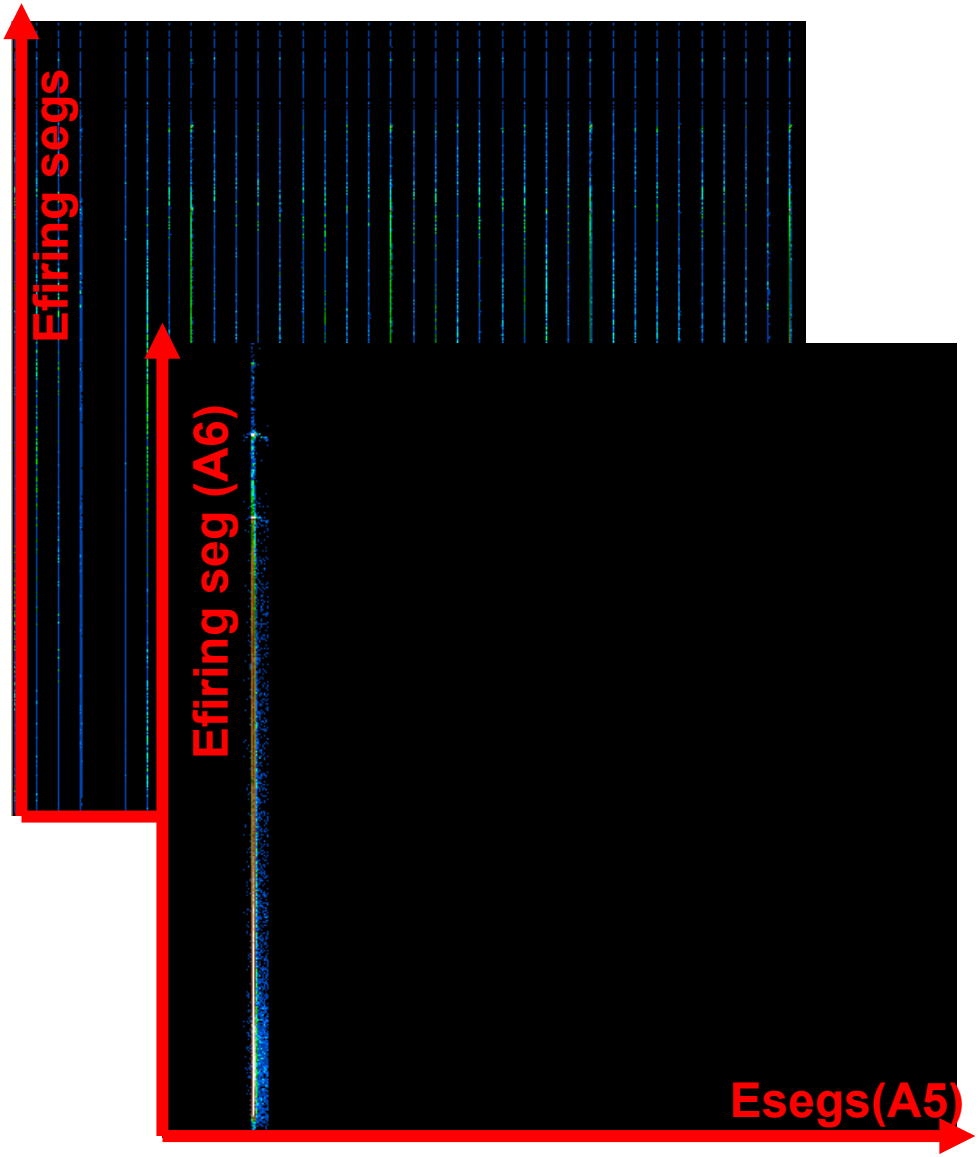


Recovering the missing energy

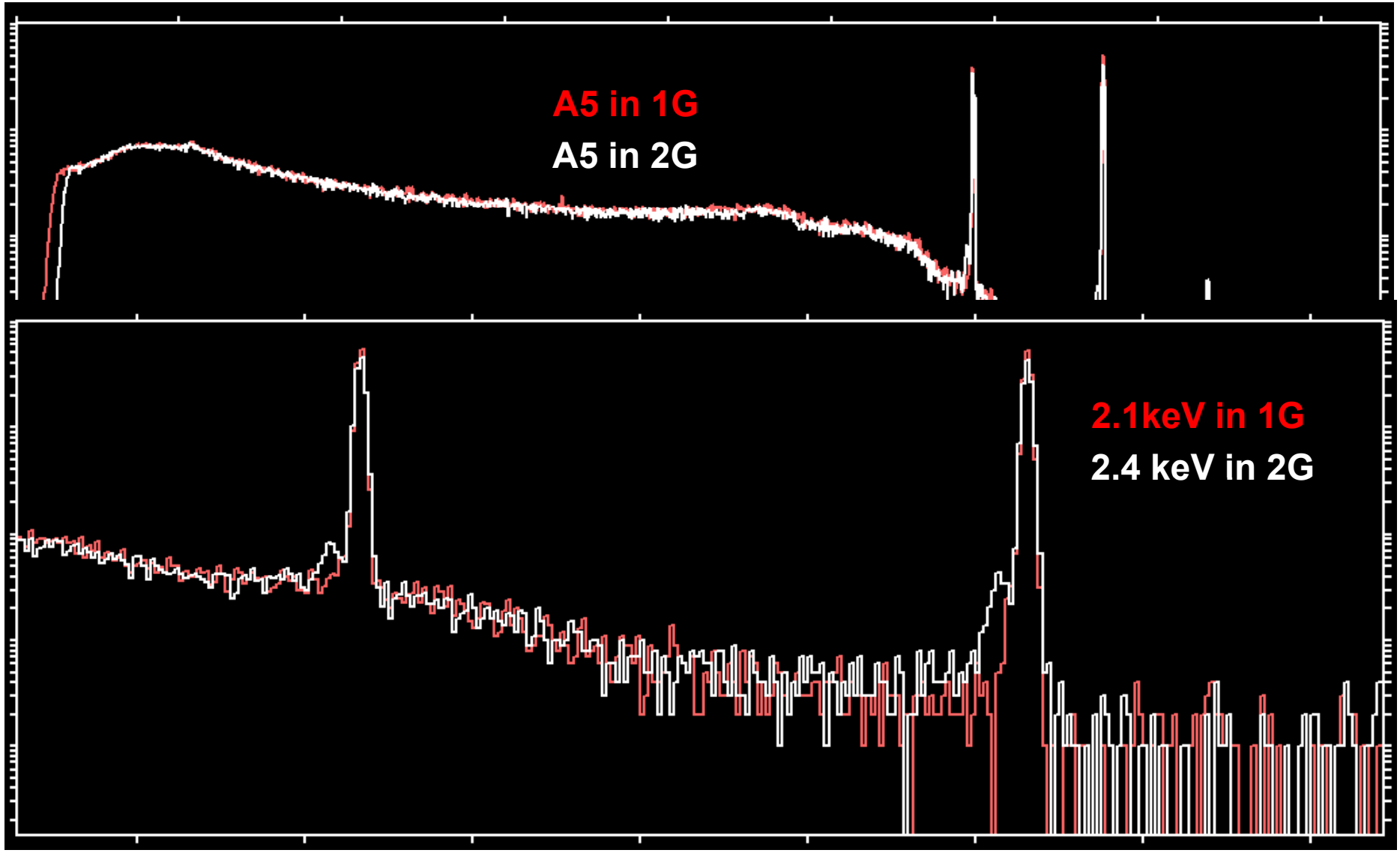
- Recover XTalk

$$\vec{E} \approx XT^{-1} \cdot \vec{E}*$$

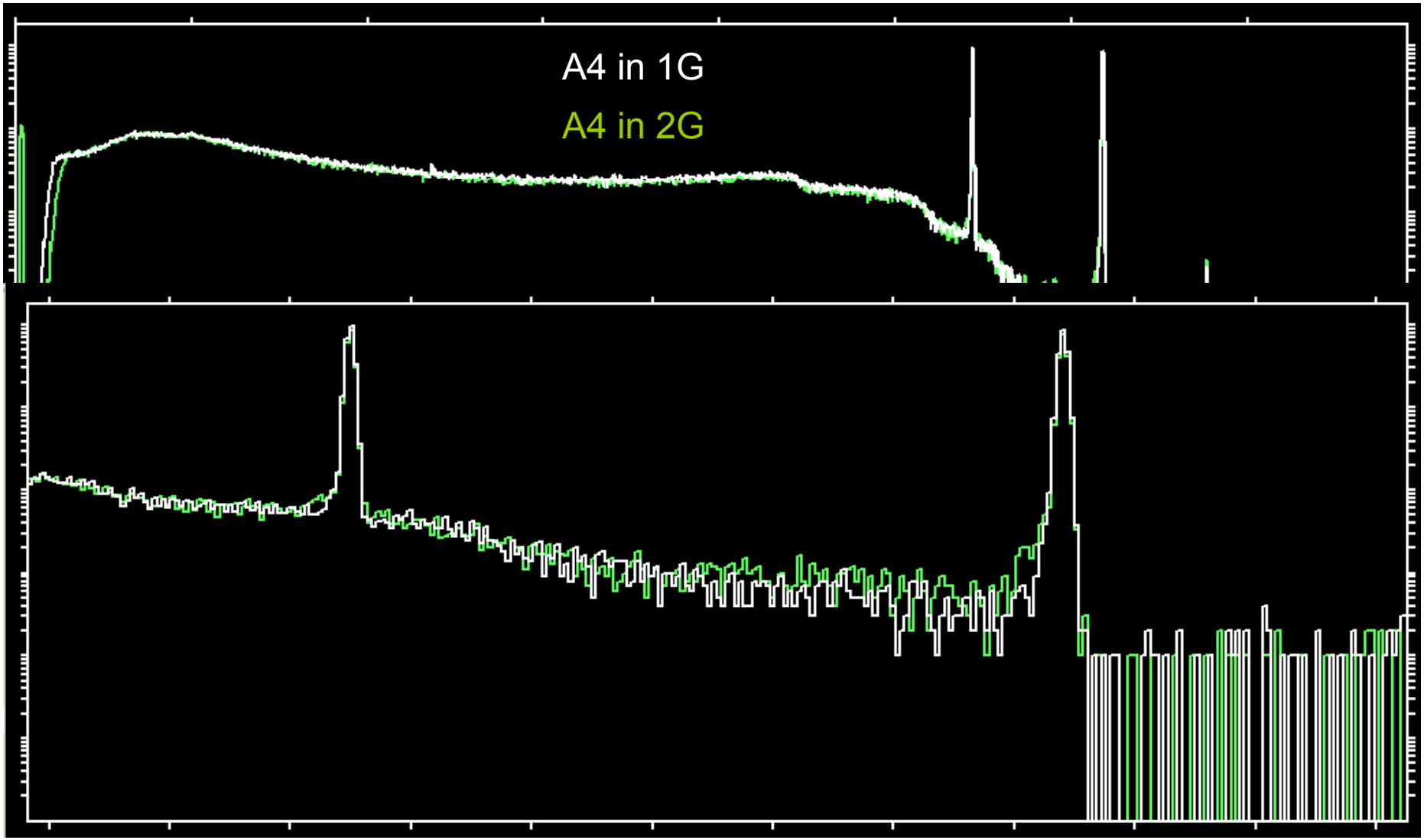
- Recalculate multiplicity
- Recalibrate core in coincidence with the broken segment



Performance: missing segment[A5]



Performance: neighboring segments [A4]



Performance:CC