Upper rate cut study
and
An estimation of the systematic error
due to the excess between K-alpha and K-beta

upper rate = scaler(upper)/{scaler(clock)/100 kHz}
scaler(upper) = counts of the upper threshold discriminator

upper rate cut is defined by "upper rate < 1 kHz"
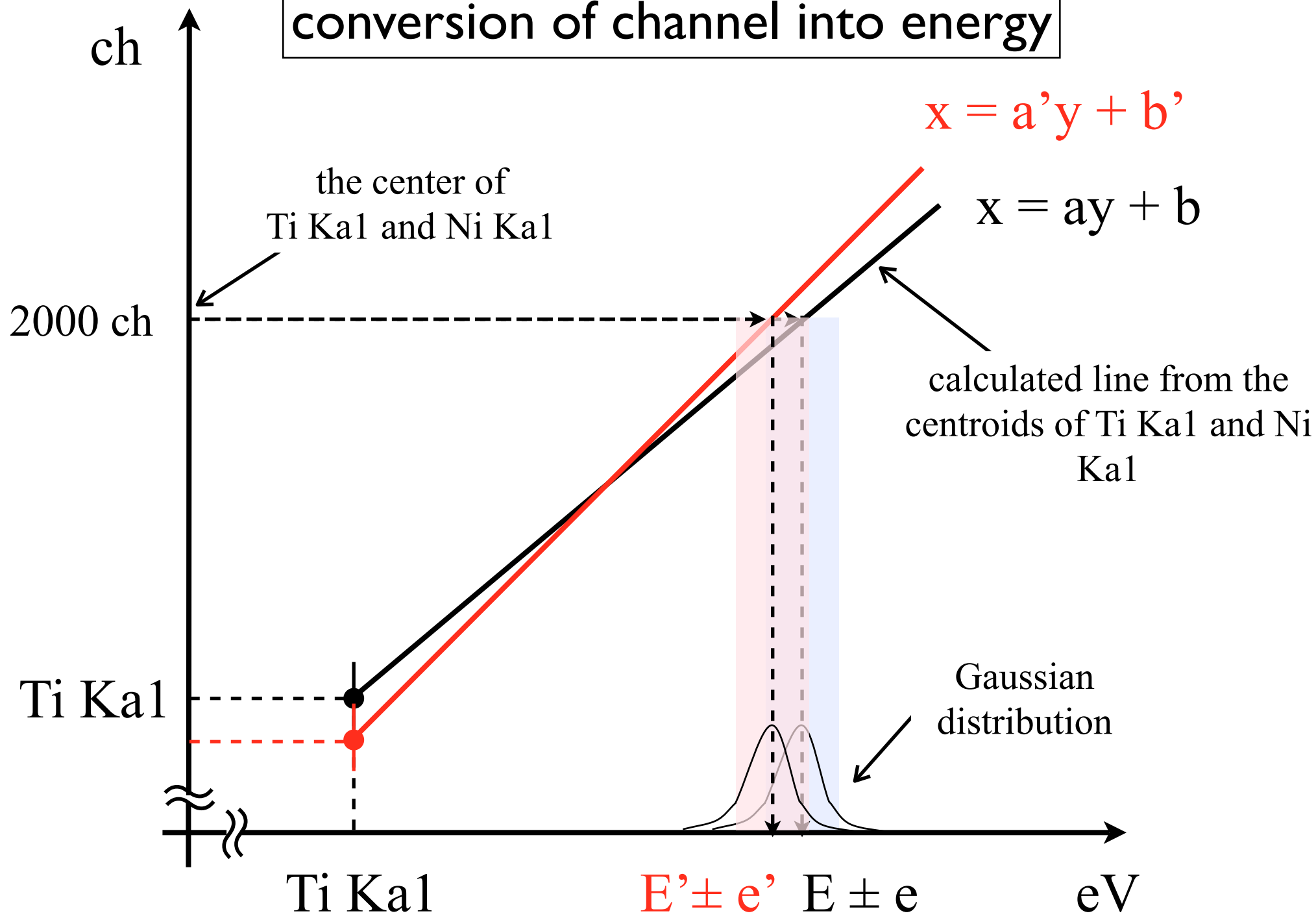 → can reject the pile-up phenomenologically

1. goal

An estimation of a systematic error due to the excess between K-alpha and K-beta
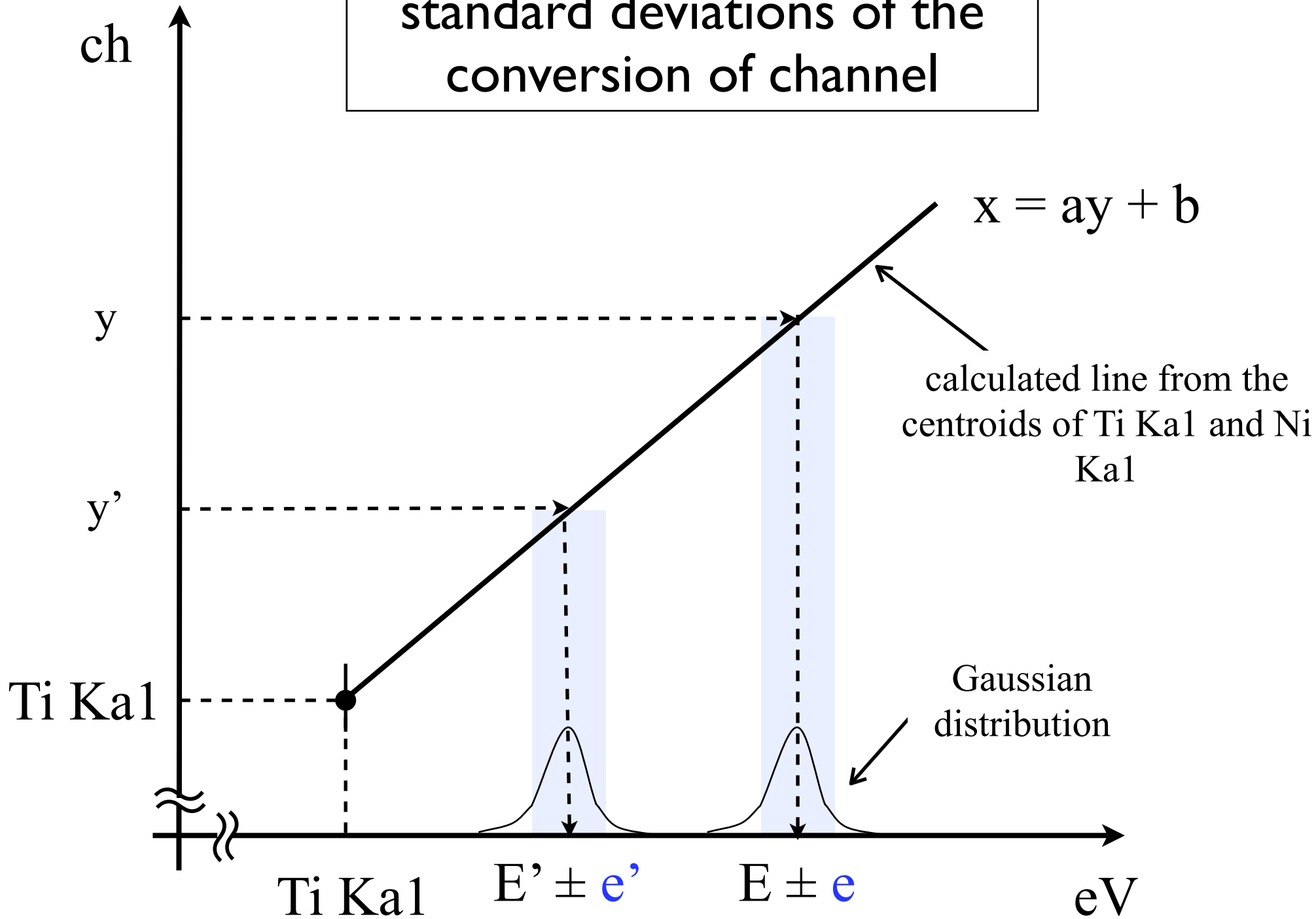
2. method

Comparing **the conversion of channel into energy** of upper cut data with that of no upper rate cut data

* figures are shown in another file
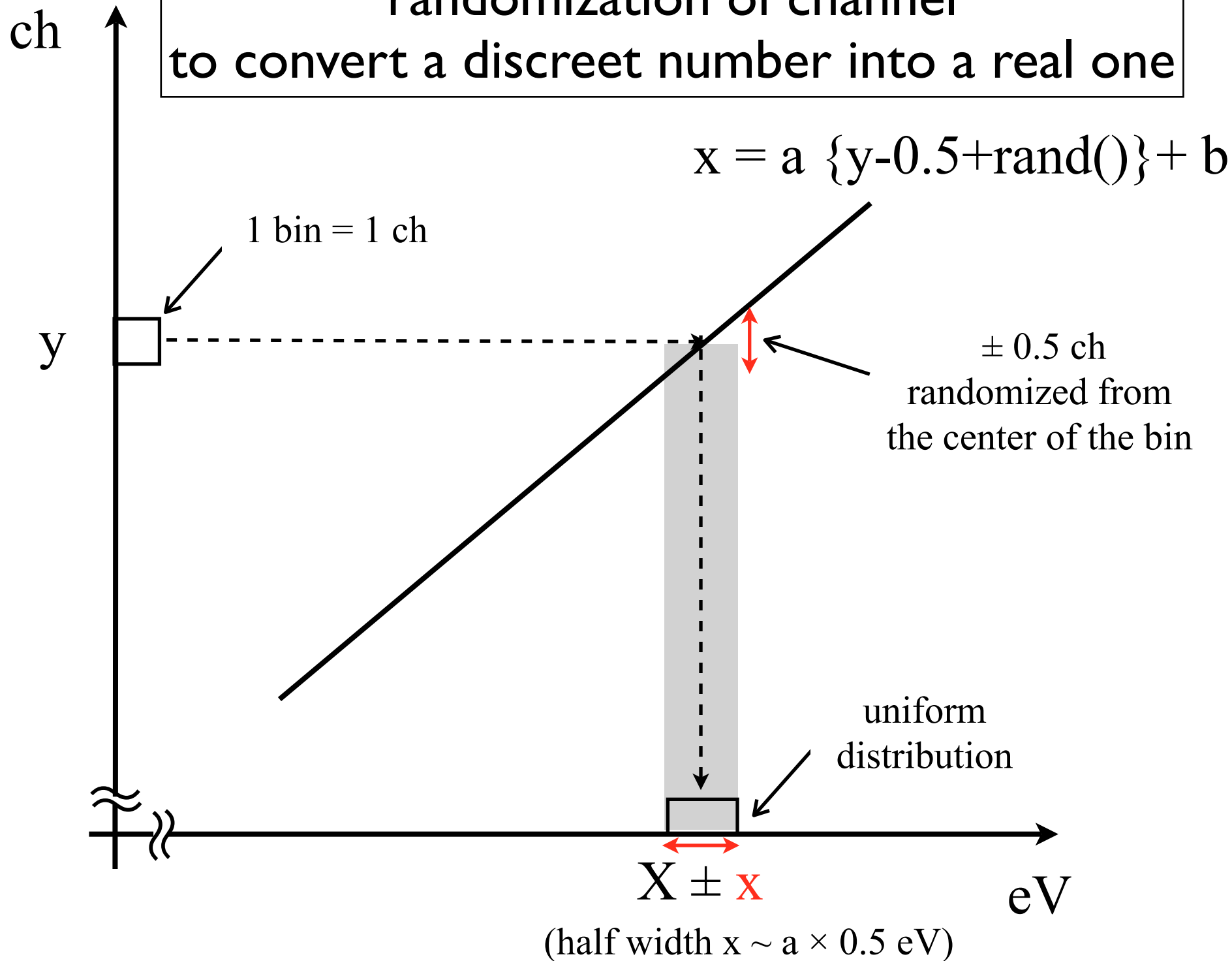
conversion of channel into energy

ch

the center of
Ti Ka1 and Ni Ka1

$x = a'y + b'$

$x = ay + b$

2000 ch

calculated line from the
centroids of Ti Ka1 and Ni
Ka1

Ti Ka1

Gaussian
distribution

Ti Ka1

$E' \pm e'$ $E \pm e$ eV

standard deviations of the conversion of channel

ch

$x = ay + b$

calculated line from the centroids of Ti Ka1 and Ni Ka1

Gaussian distribution

y

y'

Ti Ka1

Ti Ka1   E' $\pm$ e'   E $\pm$ e

eV

ch

randomization of channel
to convert a discreet number into a real one

$x = a \{y - 0.5 + rand()\} + b$

1 bin = 1 ch

y

± 0.5 ch
randomized from
the center of the bin

uniform
distribution

$X ± x$

(half width x ~ a × 0.5 eV)

eV

standard deviation of the conversion of channel **with** randomization

ch

1 bin = 1 ch

$x = ay + b$

y

± 0.5 ch randomized from the center of the bin

Gaussian * uniform distribution

Ti Ka1

Ti Ka1

$E \pm \mathrm{sqrt}(e^2 + a^2/12)$ eV

$\sigma(\mathrm{uni}) = 1/\mathrm{sqrt}(12)$
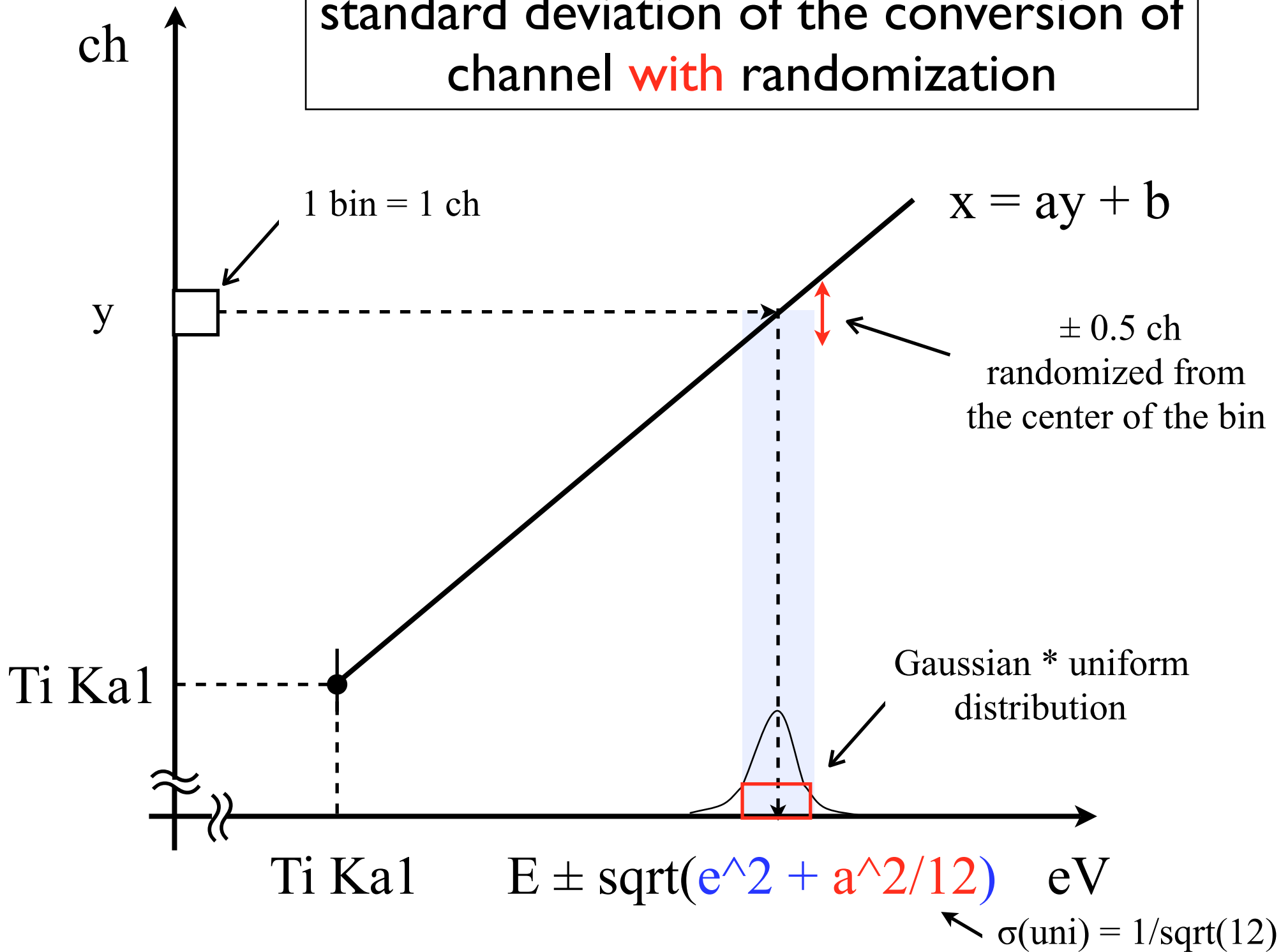
Summary

There is some difference between the conversion of channel into energy of no upper rate cut data and that of upper rate cut data.

The center of the converted energy of no upper rate cut data have $-2 \sim +4$ eV difference from that of upper rate cut data. The differences dependent on "run part" (the runs are packed about $1 \sim 1.5$ shifts).

The statistical errors are slightly larger than the half width of the randomization. This means ...?
Must the statistical errors be almost same as the half width of the randomization ?? → can be a run packing criteria