6th International Workshop on DEPFET Detectors and Applications

Session on Optimization, Tracking and Vertexing

- „Old“ and „New“ framework
- Some ideas about online PXD data analysis

Frameworks for Optimization Studies

Three different frameworks have been around for PXD studies:

The old Belle framework (BASF)

used for alignment studies (Martin R.)
recently also for QED background simulation (Elena)

The ILC framework

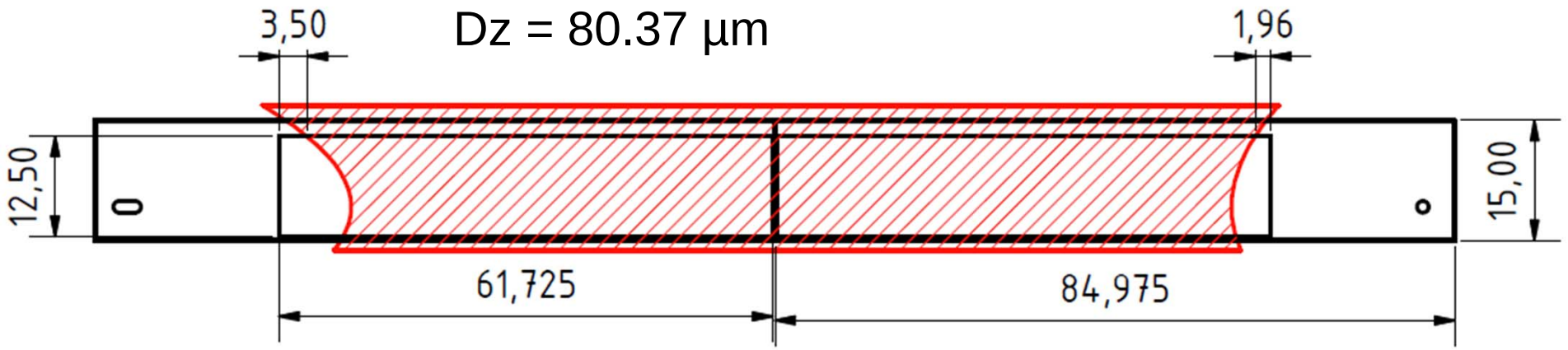
our „workhorse“ so far.
Main results: pixel sizes, sensor thickness, occupancies …
(Kolja, Andreas, Zbynek, Burkard ...)

The BASF2 framework

first framework to unify all detectors
indispenible for serious machine background studies for the PXD
(see talks by Andreas, Susanne, Peter, Martin H.)

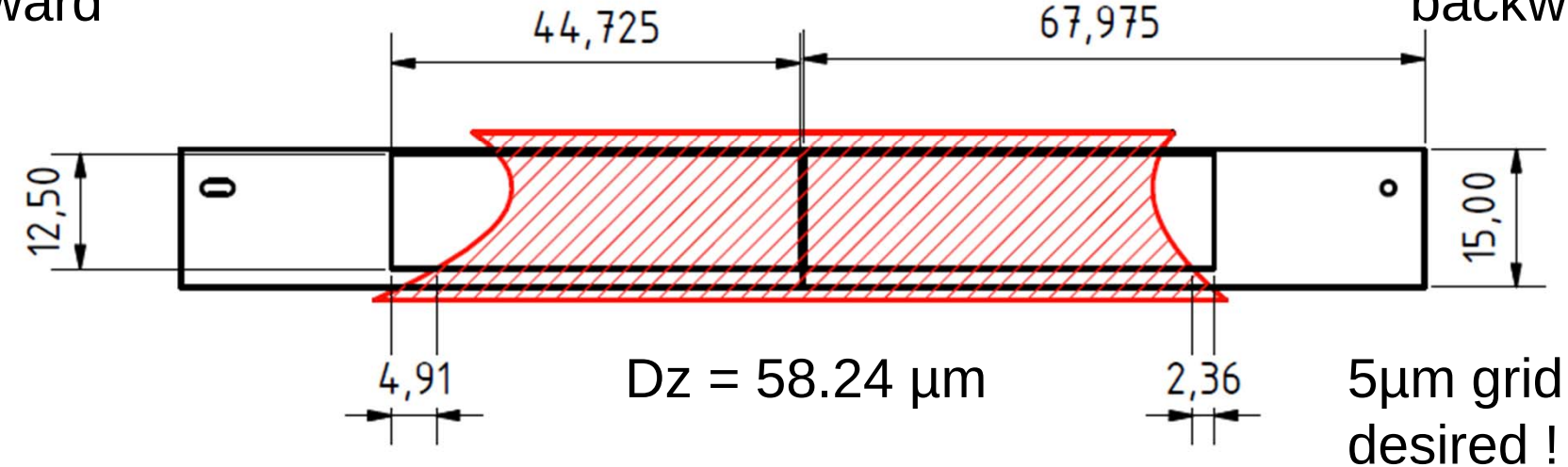
Pixel Sizes in z

Valencia: # of rows no longer 800, but 768 (6 x 128)
# of columns (=250) stays



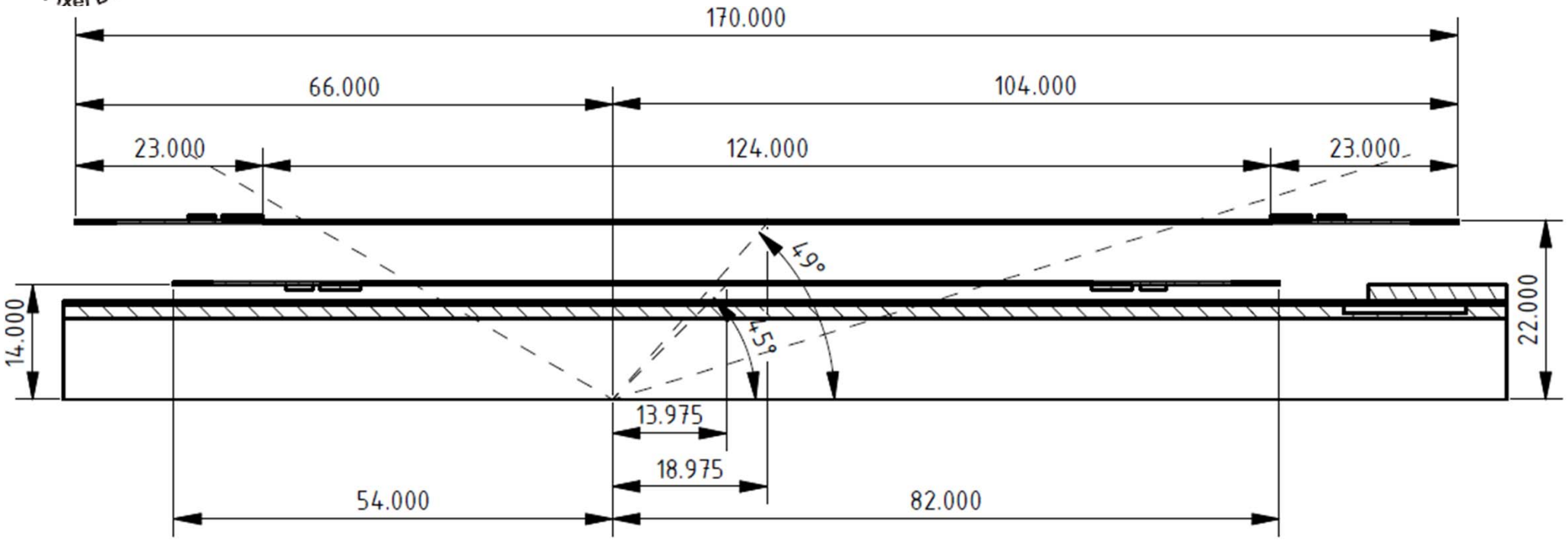
forward

backward



5µm grid desired !

Pixel Sizes in z (cont.)



Boundary conditions: stay in 5 µm grid, cover full acceptance

Inner layer: 256 x 55 µm + 512 x 60 µm (= 44.80 mm, + 25µm)
Outer layer: 256 x 70 µm + 512 x 85 µm (= 61.44 mm, - 285 µm)
or 768 x 80 µm

Scenario B: shorten the active part to match exactly the acceptance
(no tolerances due to multiple scattering)

Data Reduction: Amplitude Analysis

Cannot read out and store all PXD data (~10 x rest of Belle II)

- Background: maybe lots of synchrotron radiation photons (< 20-30 keV)

  ⟶ wait for machine spectra,
  need also machine elements of SuperKEKB near IP

- Slow pions: tracking will have difficulties to find tracks with p < 80 MeV

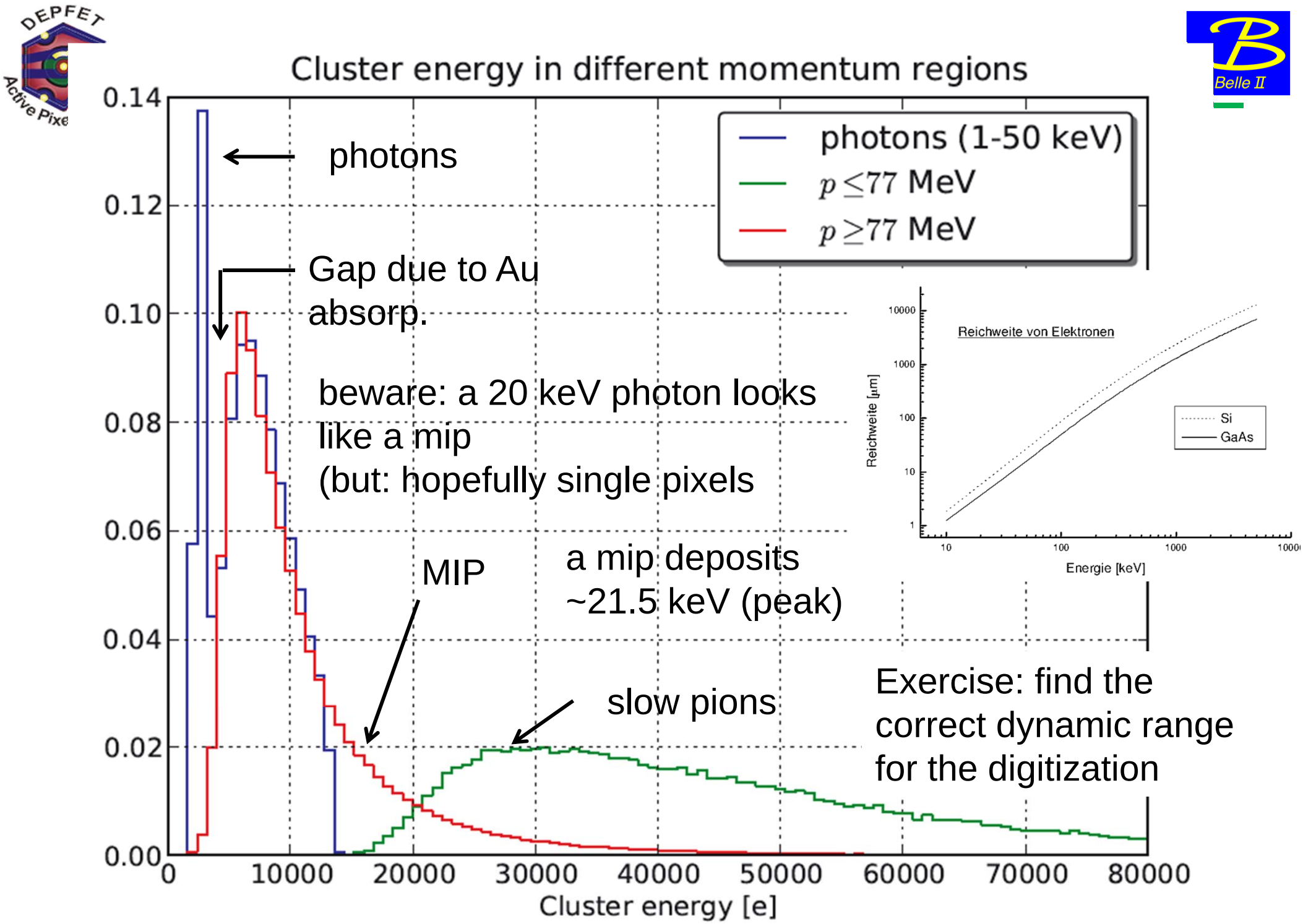
The basic idea:

⟶ look for large pulse heights coming from slow pions

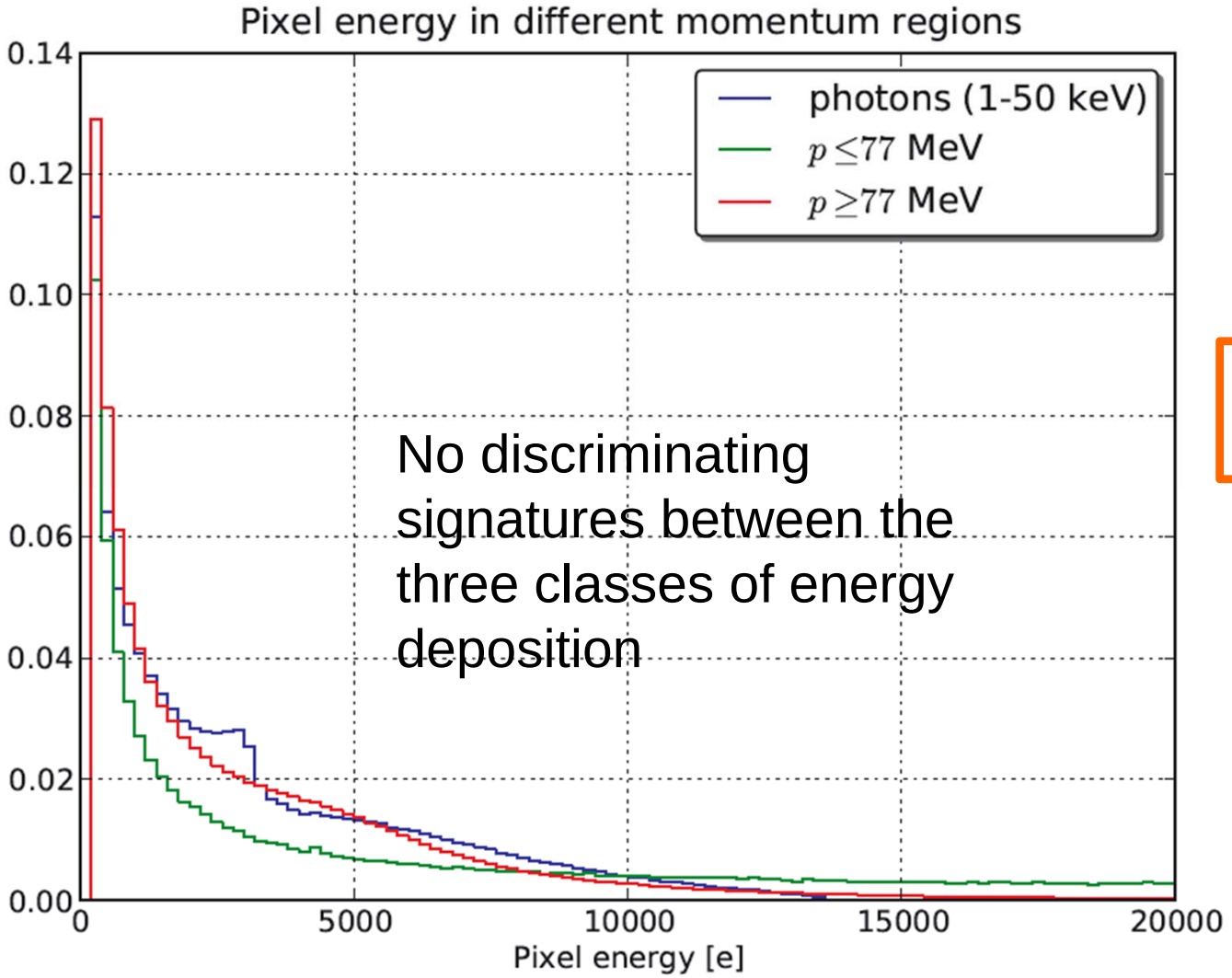
⟶ look for single pixel low pulse height photons

rescue clusters with ~3 x mip, reject clusters with < ½ mip

standalone data reduction !


Cluster energy in different momentum regions
photons (1-50 keV)
$p \leq 77$ MeV
$p \geq 77$ MeV
photons
Gap due to Au absorp.
beware: a 20 keV photon looks like a mip
(but: hopefully single pixels
MIP
a mip deposits ~21.5 keV (peak)
slow pions
Exercise: find the correct dynamic range for the digitization
Reichweite von Elektronen
Reichweite [µm]
Energie [keV]
Si
GaAs
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0
10000
20000
30000
40000
50000
60000
70000
80000
Cluster energy [e]

Amplitude Analysis (cont.)



No discriminating signatures between the three classes of energy deposition

analysis on the pixel level seems pretty hopeless

need clustering

Where can it be done ?

probably in the ATCA crate

Reminder: all these MC‘s are done only with BP and tracker
to make progress we now need the machine elements near Belle II and the spectra of the machine background

Schedule for Session

Monday, 07 February 2011

15:00	[12] **Some Remarks on New Optimization Strategies** by Christian KIESLING (15:45 - 15:55)
16:00	[9] **QED Background: Comparison of Data and Monte Carlo** by Elena NEDELKOVSKA (15:55 - 16:10)
	[37] **Studies of PXD Resolution at large Occupancies** by Zbynek DRASAL (16:10 - 16:25)
	[7] **The PXD Simulation with the BASF2 Framwork** by Andreas MOLL (16:25 - 16:45)
17:00	[8] **Background Studies in the New Framework** by Susanne KOBLITZ (16:45 - 17:05)
	[10] **Status of the Digitial Simulation of the PXD** by Peter KVASNICKA (17:05 - 17:25)
	[11] **Status and Plans of the Belle-II Tracking Software** by Martin HECK (17:25 - 17:45)