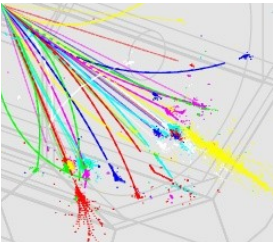
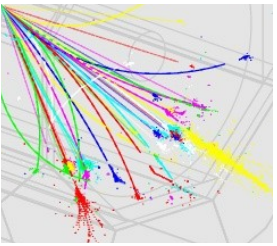


Detector Optimization using PandoraPA

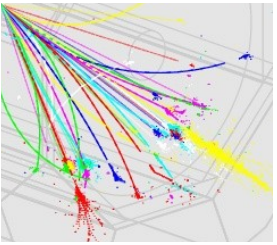
14.05.2008

M. Stanitzki



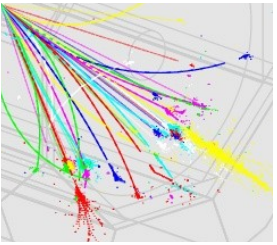
What is LDC00Sc ?

- Tracker radius=1.69 m
- Tracker Z=2.73 m
- ECAL SiW 30+10 layers, 1x1 cm tiles
  - 1.4 mm/4.2 mm W + 2.5mm Gaps
- HCAL Fe-Scint 40 layers 3x3 cm tiles
  - 18 mm Iron + 7.5 mm Gap
- 4 T Field
- Basically the old Tesla Design



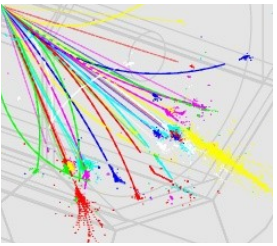
What is SID-ish

- Tracker radius=1.25m
- Tracker Z=1.7 m
- TPC tracker
- ECAL SiW 20+10 layers, 1x1 cm tiles
- HCAL Fe-Scint 40 layers 3x3 cm tiles
- Same Calorimeter layout as LDC00Sc (besides ECAL 30+10->20+10)
- 5 T Field



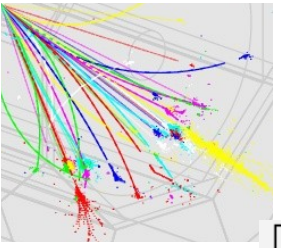
Short Addenda

- Results for 45 GeV & 100 GeV jets
- Numbers quoted are
  - cos(Thrust)< 0.7 : Barrel Events
  - using α in % $\frac{\sigma_E}{E} = \frac{\alpha}{\sqrt{E}}$
- There are a set of caveats
  - Calibrate Response for different detector variations
  - Calibration can be retuned with existing samples

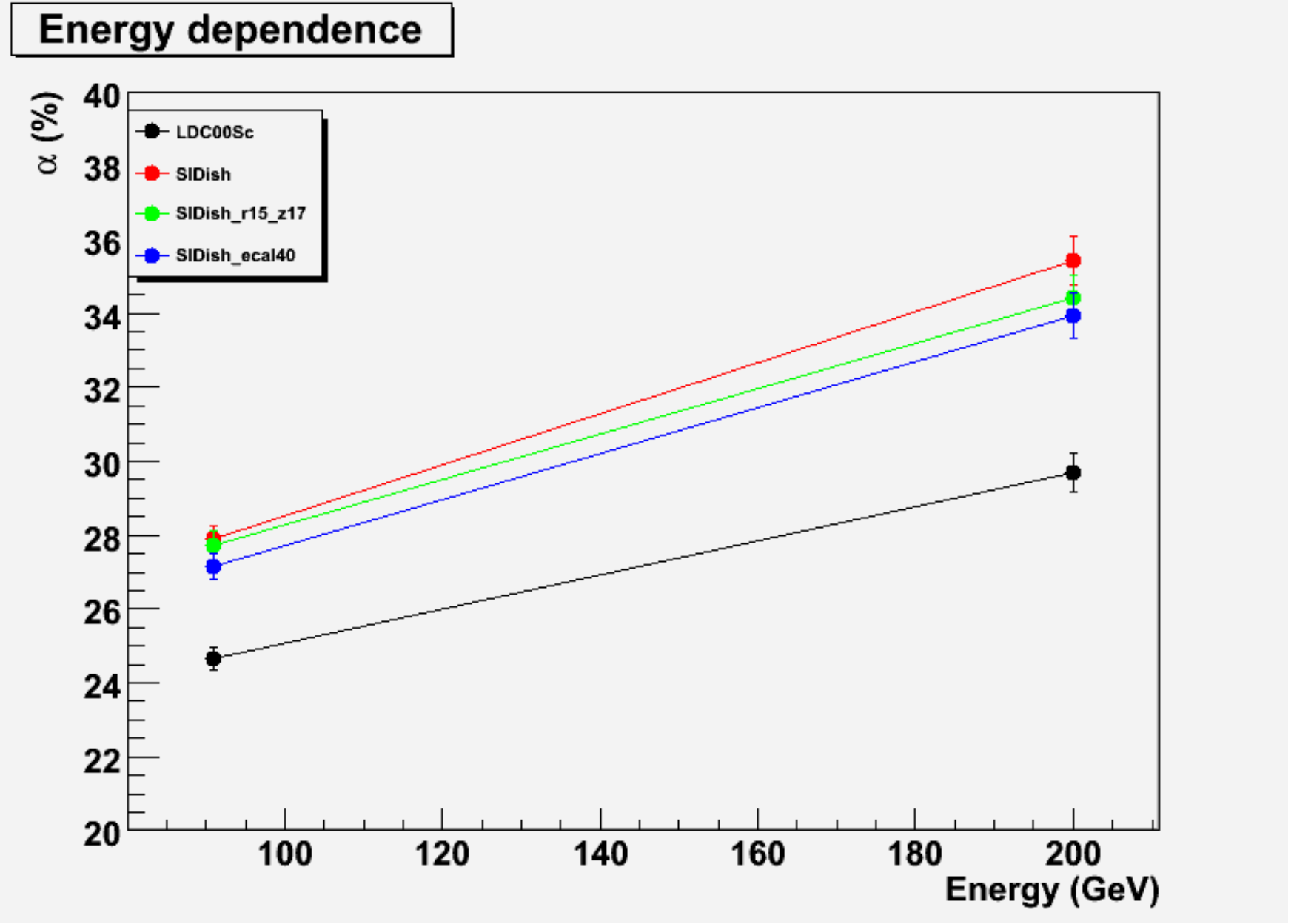


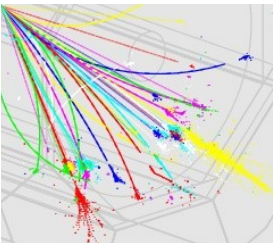
Summary from RAL talk

- Radius is important
  - 1.25->1.5 meters
  - ~ 1 % (rough estimate)
- Thickness of the ECAL
  - going from 20+10 to 30+10
  - ~ 2 % (rough estimate)
- B field has less impact
  - at Z pole 4 T->5 T < 1 %
  - at 200 GeV 4T->5 T 4%
  - not always gaining by raising B field -> loopers
  - Sweet spot for B and R !



Summary plot





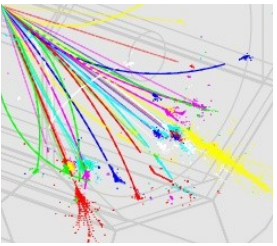
News since then

- Run a version with the RPC's both for
  - LDC00
  - SIDish_RPC
- basically the same as LDC00Sc and SIDish
- Didn't change any of the cuts

Scintillator

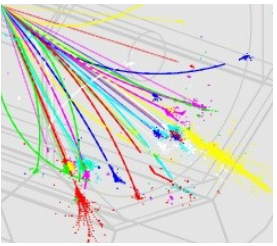
RPC

Detector	91 GeV		200 GeV	
	α %	Error	α %	Error
LDC00Sc	24.6	0.3	29.7	0.5
LDC00	27.0	0.5	31.7	0.6
SIDish	27.9	0.4	35.4	0.7
SIDish_rpc	31.7	0.5	38.9	0.7



Some more points

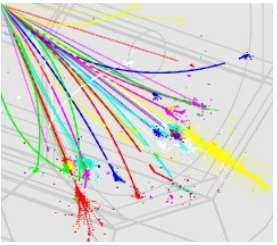
- the Pattern recognition in the TPC really matters
  - Kink finding, V^0
  - See Ron Cassell's studies
- RPC's do worse than Scintillators (3 %)
  - Independent of radius
  - Independent of segmentation
- Reasons ?
  - Algorithms might no be optimal for RPC's
  - Impact of hadronic shower response gas/scintillator
  - again compare Ron Cassell's studies



Putting it together

	SiDish	SID	LDC00Sc	Comments
Starting point (200 GeV qq)	35%	46%	30%	from Pandora/ Memory
- RPC (3%)		43%		from Pandora
6 more layers in HCAL (2 %)		41%		guesstimated
+TPC Tracking tricks (2 %)		39%		guesstimated
+10 layers in ECAL (2 %)	33%	37%		from Pandora
+0.25 m radius (1 %)	32%	36%		from Pandora
+0.2 m radius – 1T B field (2 %)	30%	34%	30%	from Pandora

Just an exercise with plenty of caveats !



What's next

- Studying HCAL segmentation (first results should be ready on Wednesday ...)
- Impact of ECAL depth and segmentation (Idea raised by Harry Thursday night)