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Outlook

TPC calibration

Global differential QA, calibration and alignment

Reconstruction updates

TPC calibration and Pass 0 calibration

TPC calibration developed and debugged at GSI

Stable parts of the calibration framework run on Alien – integrated into **Pass0 calibration** - together with the TRD calibration (since November 2010)

Calibration entries are depending on the algorithm used in the reconstruction

Calibration entries obtained in Pass 0 calibration follow the improvement (bugs) in the reconstruction and calibration code

Work in progress:

- Second order dEdx and PID correction calibration

- Space point distortion calibration (ideally global)

Global alignment/calibration and monitoring?

All outer detectors aligned in respect with the TPC

- Alignment done at different time with different OCDB/AliRoot used for the TPC space point correction
- In some cases alignment using tracks not yet done ?

TPC space point distortion calibration evolving in time

- Inter detector alignment changing
- Detectors are moving

Problems - time dependent changes reported to the PWG1 ==> TPC

- **Difficult to answer - what changed between different reconstruction passes ?**

Track matching with outer detector used as additional constraints for the TPC calibration (Vertex,ITS,TRD,TOF)

- Inter detector alignment byproduct of the TPC calibration

Global alignment/calibration and monitoring?

Calibration/Monitoring algorithm developed within the TPC group

Generalization of the algorithm for all outer outer detectors

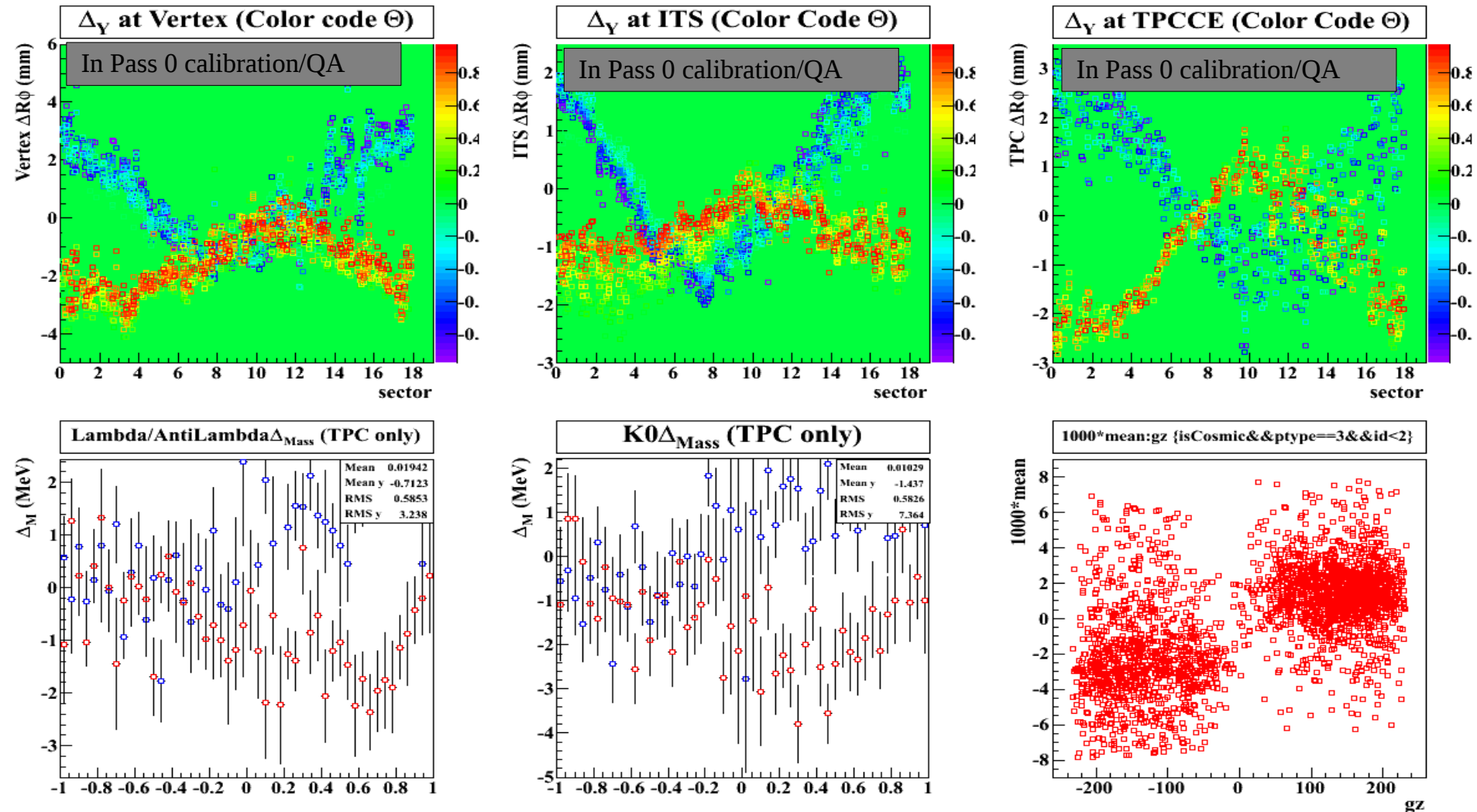
- Global alignment

Possible to integrate the algorithm in the Pass0 or PassX calibration

Work in progress

- MI, Jochen in collaboration with EMCAL
- +

Differential QA observables / Global alignment



Differential QA variables (detector matching, V0 mass, cosmic track matching)
partially part of the current Pass0 calibration
Input for the TPC/global alignment calibration

1) Detector matching – residual histogram

- Differential Residual (4D) histogram in bins of $\phi, \eta, 1/p_T$
 - 20 000 bins
 - 10^6 events - 10^7 tracks \Rightarrow 5000 entries in bin

• Creation of distortion maps

- Very small Statistical error = $\text{rms}/\sqrt{\text{entries}}$ e.g.
 - TPC-ITS \sim 20 microns
 - TPC-TOF \sim 300 microns

1) Global fitting of distortion parameters

Distortion models in global alignment + TPC calibration

TPC internal alignment (rms ~ 0.1 mm) and E field non linearities due component alignment (up to 7 mm)

36 (sectors) x (5segments) x 6 (alignment parameters)

Alignment of 72 rod (up to 7mm non linear distortion)

IFC (inner field cage) , OFC (outer field cage), CE (central electrode),
Redaout plane Z alignment (up to 2 mm non linear distortion)

Inter detector alignment

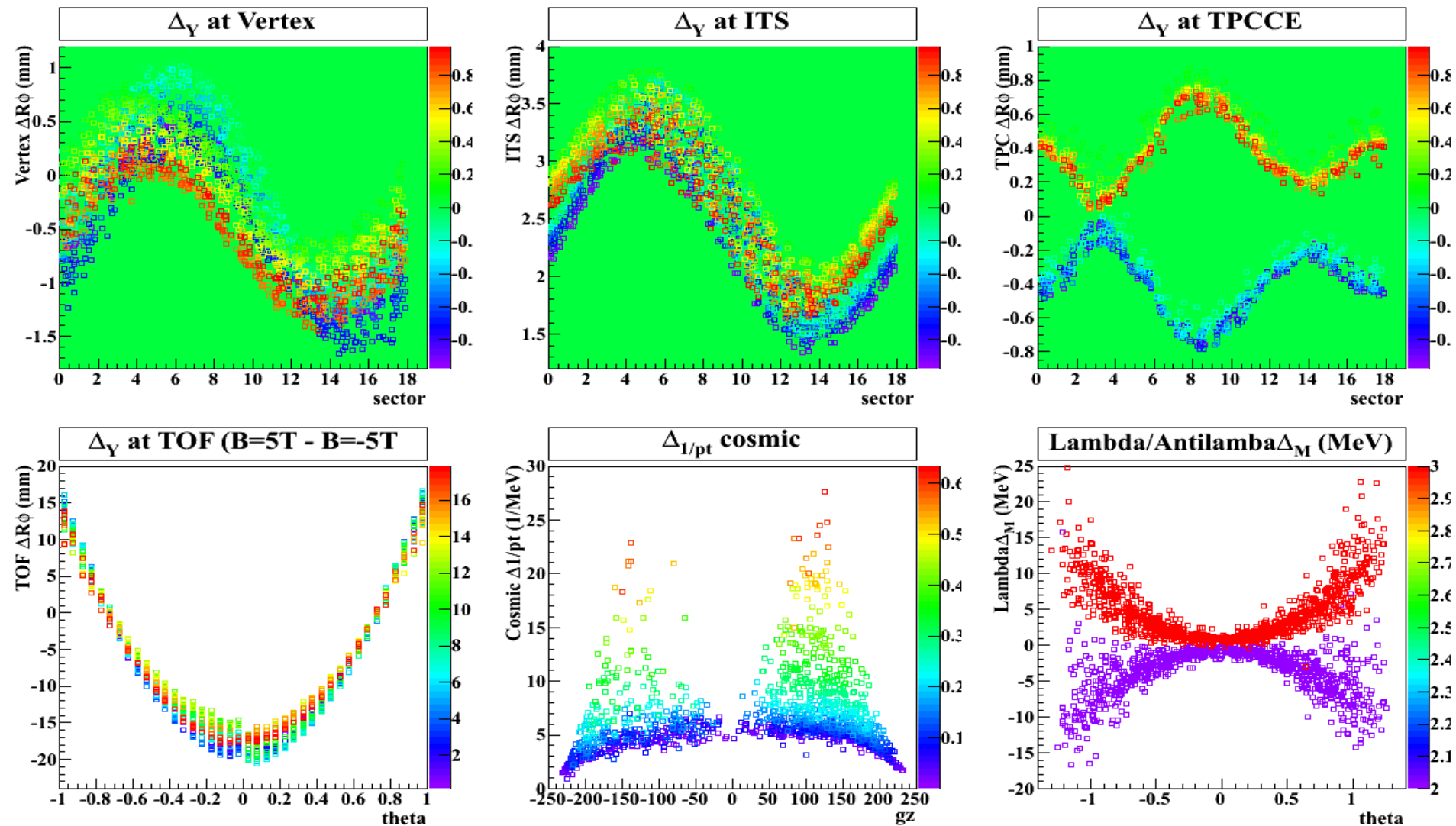
Global – 6 parameters for detector alignment

Detectors are moving – e.g

- ITS-TPC ± 0.5 mm for two field polarities
- TPC-TOF ± 1 mm difference for B+ B- setting – sector dependent

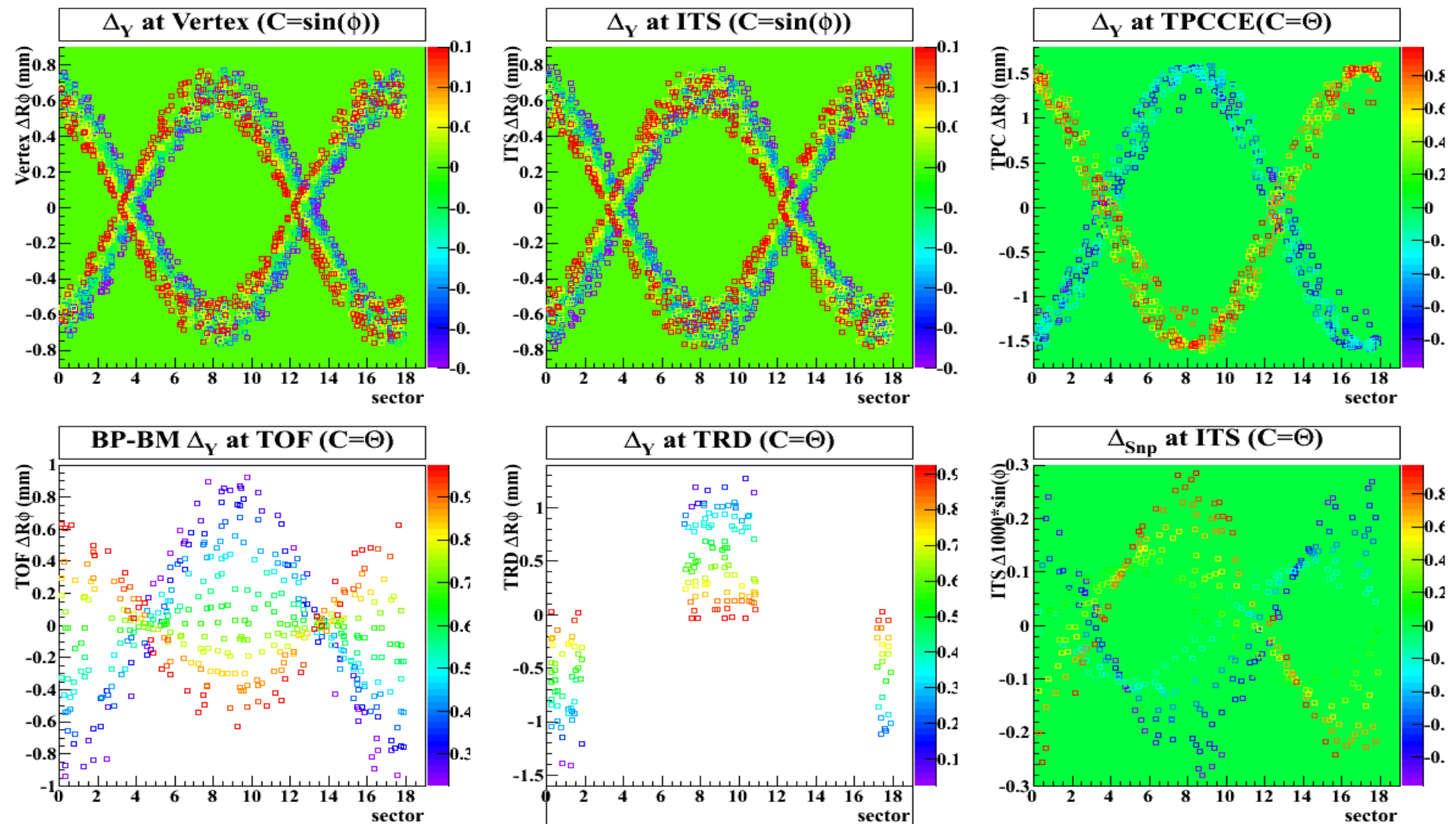
Currently Vertex/ITSOut/TRD/TOF used

Observable models example: ExB effect due B field non linearities



Observed distortion linear combination of partial distortions
Internal TPC calibration (2 parameters)

Observable models: ExB effect – B field alignment



TPC Reconstruction

Main focus on optimal calibration and usage of the calibration

Dedx and PID

- Tuning for the PbPb
- Tuning of algorithms (TPC operates with smaller gain) correction for the “clusters” below threshold

Tracking

- Speeding up of the algorithm possible but not critical
- TPC tracking time small in comparison with the global tracking
- Can change with increased luminosity
- Possible improvements:
 - Using AliRiemann fit for seeding – Kalman only for refit
 - Using internal cuts on the number of crossed rows instead cut on the number of clusters during tracking

Global reconstruction

The ITS standalone tracks not used in physics analysis

New algorithm to be implemented to improve the tracking efficiency at low momenta region

Combinatorial search – TPC standalone + ITS standalone

- Cases – ITS track prolongation of the TPC track but rejected due some criterias (e.g χ^2)
- TPC track – decay product of the particle detected in the ITS

4 dimensional track reconstruction – Energy deposit/ PID part of the $\chi^2 \Rightarrow$

- Reduced amount of fakes
- TPC does not have fake tracks

Global reconstruction?

Global tracking for heavy fragments

- Currently only 5 mass and 1 charge hypothesis allowed
- For Heavy fragments the mass of the pion is used ==>
- Biased momenta measurement
- Loss of the matching efficiency

Proposed solution:

- Usage of “non physical” mass during tracking for tracks – obtained scaling the TPC dedx
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