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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:

# 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

# Global alignment/calibration and monitoring?

Calibration/Monitoring algorithm developed within the TPC group

Generalization of the algorithm for all outer outer detectors

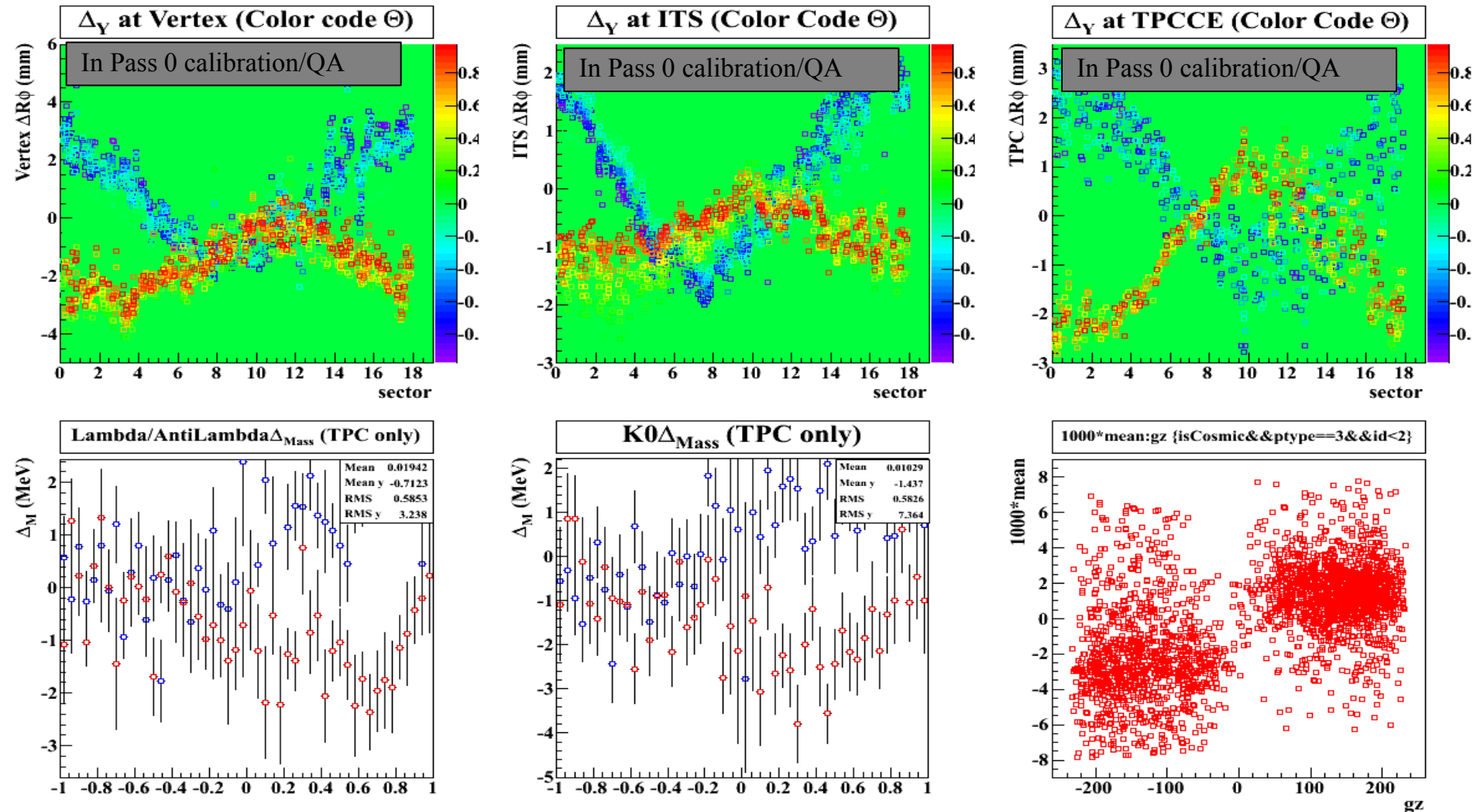
- Global alignment

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

# Differential QA observables / Global alignment

- **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  $\implies$  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
- **Global fitting of distortion parameters**

# Distortion models in global alignment + TPC calibration

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

36 (sectors) x (5 segments) 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

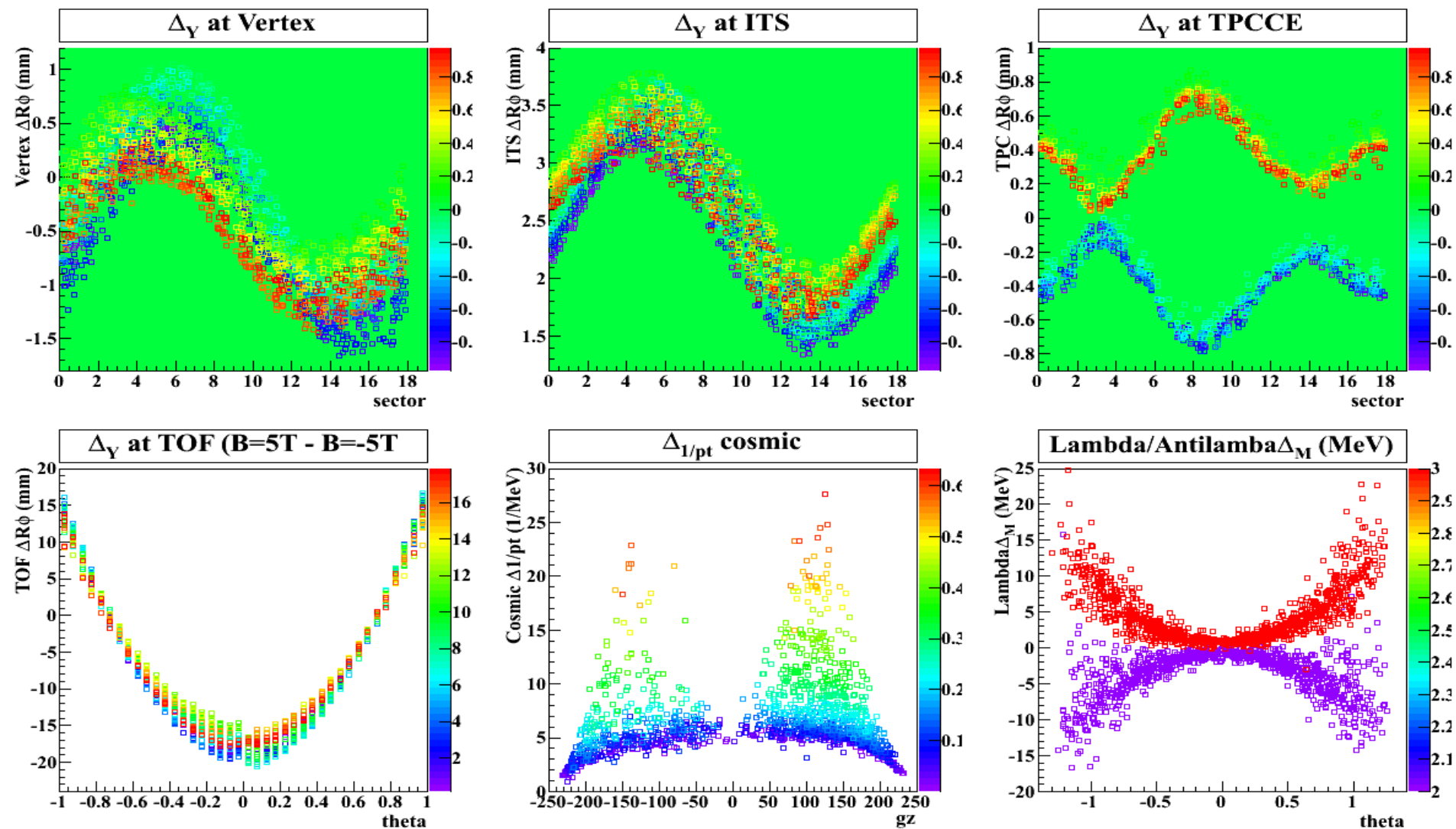
Detectors are moving – e.g

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

Currently Vertex/ITSOut/TRD/TOF used

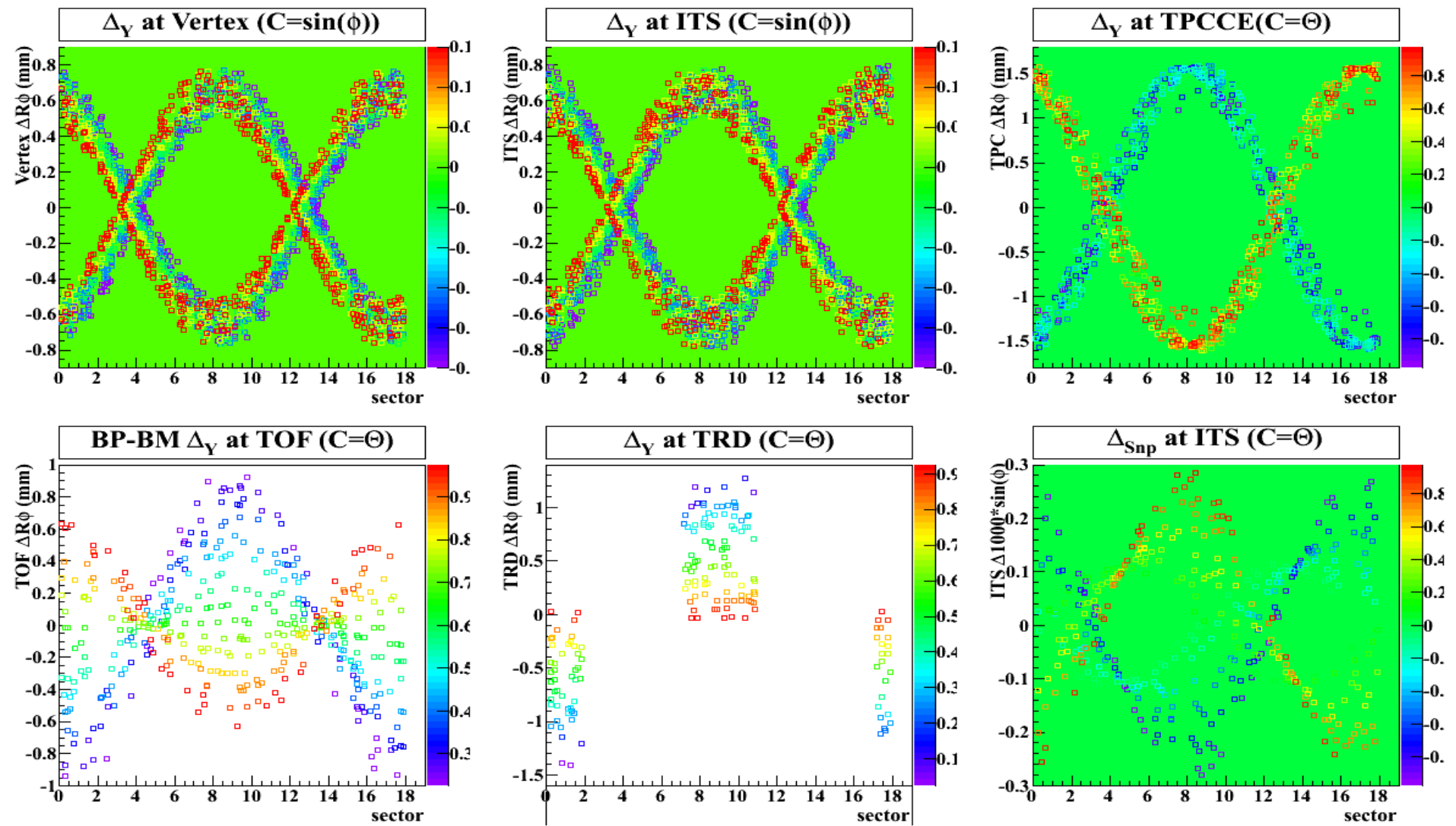


# Observable models example: ExB effect due B field non linearities



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 chi2)
- TPC track – decay product of the particle detected in the ITS

4 dimensional track reconstruction – Energy deposit/ PID part of the chi2 =>

- 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  $\implies$
- 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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