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TPC gain calibration status and prospects

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Changes in the procedure

- **Original scheme**
  - Full gain calibration only in CPass0
  - QA (residual calibration) in CPass1
  - Problems
    - Inter dependent calibrations: average position vs. time, tan(λ), pad-region equalisation, multiplicity, …
    - Multiplicity estimator depends on event selection (pile-up → possible bias)
- **Updated scheme**
  - Full gain calibration in CPass0
  - QA (residual calibration) in CPass1 + update full with residual
  - QA (residual calibration) in CPass2 (VPass)
  - Don't use multiplicity correction

Plans for PbPb reconstruction

- Problem
  - CPass0 already ran
- Solution
  - Assume run-by-run variations are small
  - Use one common CPass0 gain calibration object from benchmark for all Pb-Pb runs (residual will be caught in CPass1)

Current status

- Common object committed to OCDB

  https://alice.its.cern.ch/jira/browse/ALIROOT-6600

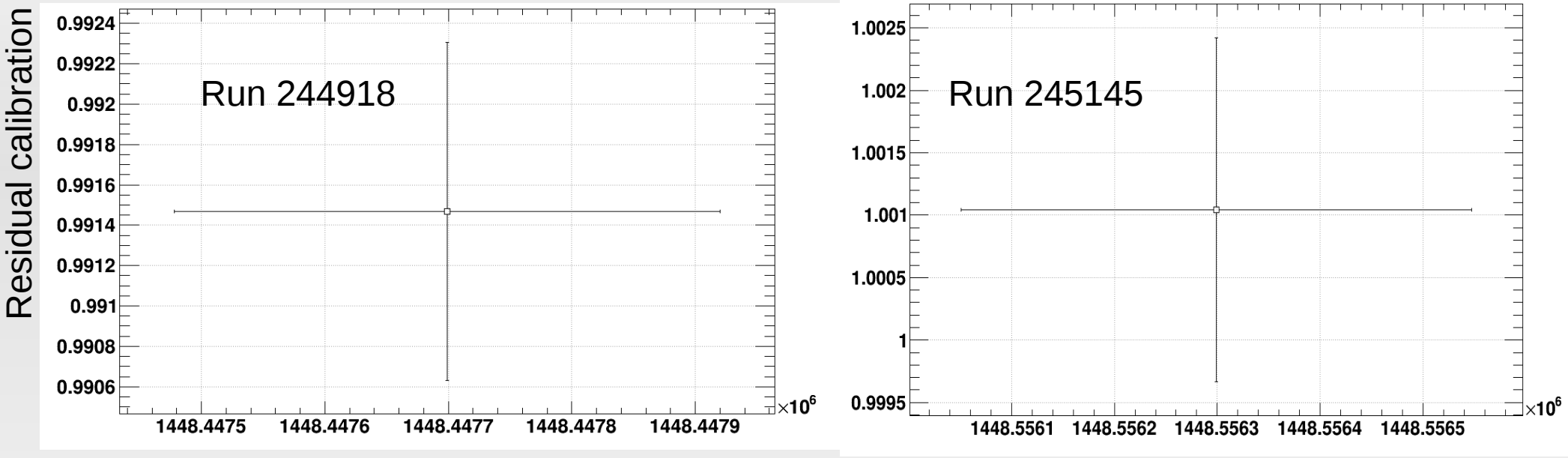
- Code to update gain calibration in CPass1 developed

  https://alice.its.cern.ch/jira/browse/ATO-342

- Fully tested using benchmark scripts at GSI (raw data of three runs available)
  - Code running stably
  - Code committed to AliRoot/AliPhysics

Results

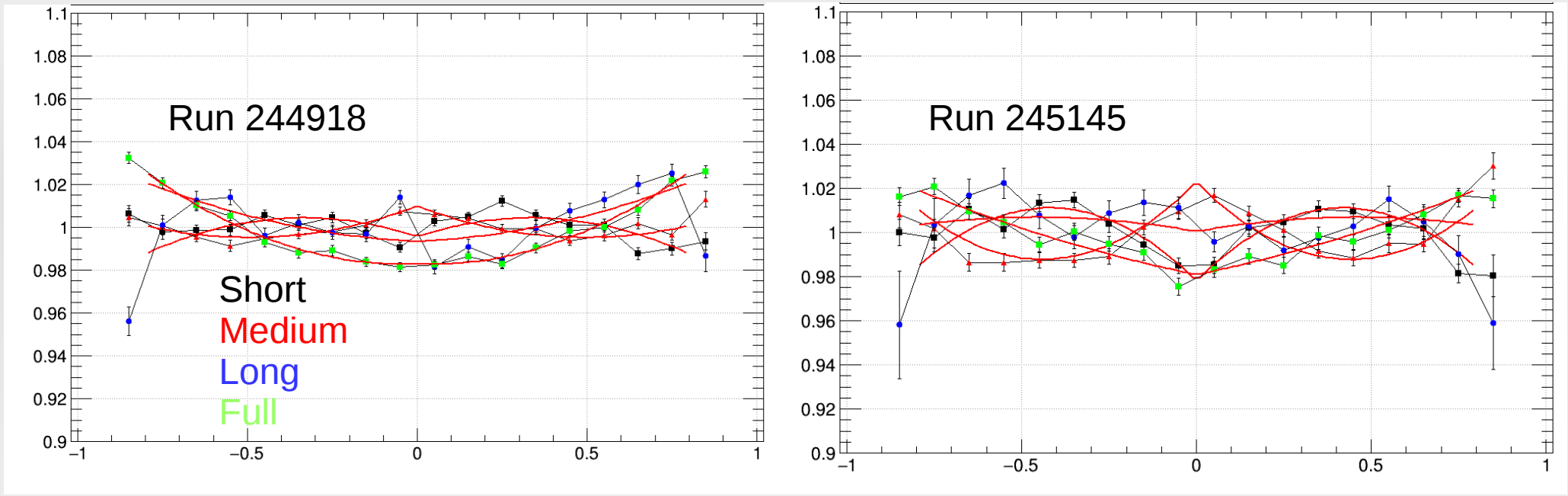
Residual average calibration



- Residual average calibration within ~0.1% for the two tested runs

Results

Residual average calibration



- Residual dip angle correction
  - Max ~2% in individual pad-regions and full track
  - Up to 8% uncorrected

TODO

- Next
  - Run tests on alien
  - Run tests for pp CPass1
- Open Issues
  - Inter-dependence of variable not fully solved
  - → Develop new procedure

Prospects for TPC gain calib.

- Updated procedure based on filtered trees using V0 selected pure samples
- Iterative calibration till convergence within one calibration pass
- Major development (till end of the year)

Backup

Changes

- Implement more flexible set up for gain calibration in AliTPCPreprocessorOffline

  enum EGainCalibType {kNoGainCalib=0, kFullGainCalib,
  kResidualGainQA, kCombinedGainCalib, kNGainCalibTypes};

- Allow for Full/ResidualQA/Combined (residual(+)Full) + ResidualQA
- Steerable via environment variables (TPC_CPass0_GainCalibType, TPC_CPass1_GainCalibType)
- Overwritable via JDL
- Changed calib files:

```
PWGPP/CalibMacros/CPass0/AddTaskTPCCalib.C
PWGPP/CalibMacros/CPass0/makeOCDB.C
PWGPP/CalibMacros/CPass0/mergeMakeOCDB.byComponent.perStage.sh
PWGPP/CalibMacros/CPass0/runCPass0.sh
PWGPP/CalibMacros/CPass1/AddTaskTPCCalib.C
PWGPP/CalibMacros/CPass1/makeOCDB.C
PWGPP/CalibMacros/CPass1/mergeMakeOCDB.byComponent.perStage.sh
PWGPP/CalibMacros/CPass1/runCPass1.sh
```

Example implementation

runCPass0.sh

```
# ===| TPC default values |================================================
# can be overwritten by JDL below
# JDL will overwrite the config file
#
# ---| gain calibration |---------------------------------------------------
# default in CPass0 is full calibration,
#    for number convention see AliTPCPreprocessorOffline::EGainCalibType
#
export TPC_CPass0_GainCalibType=1

# ===| TPC JDL overwrites |================================================
#
export TPC_CPass0_GainCalibType=${ALIEN_JDL_TPC_CPass0_GainCalibType-$TPC_CPass0_GainCalibType}

echo "TPC_CPass0_GainCalibType=${TPC_CPass0_GainCalibType}" | tee -a calib.log
```

- Current defaults:
  - Full Calibration in CPass0 (kFullGainCalib)
  - Combined calibration + Residual QA in CPass1 (kCombinedGainCalib)

Current status

- Code debugging finished
- Created Full gain calibration object for Pb-Pb
  - CPass0 already ran, same object will be used for all runs, based on run 245785
- Procedure tested with limited statistics on runs 244918 (low mult) and 245145 (high mult)