

What do we still want to do/improve in Run-2

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A somewhat loose collection
of thoughts/items from PC/the PWGs
Tried to indicate impact/priorities in the slides

Main items to be discussed

- **Effects of pile-up on dE/dx (Run 2)**
 - Mostly seen in electrons; likely affects all particles
- **2010/2011 tracking/MC differences**
 - To be understood, affects several analyses
- **GEANT 4 validation/use**
 - Ongoing; to first order 'technology driven'
- **MC-to-MC embedding: reuse of PbPb background events**
 - Mostly a matter of resources; development ongoing
- **TRD in tracking**

'Smaller' items

- AliRoot/AliPhysics release validation
 - With selected analysis tasks; e.g. check that example tasks don't break
 - With simulation: important for tracking unexpected changes/breakages (in the works?)
- LEGO trains on $p_{T,hard}$ bins
 - META-samples being implemented (Markus Z)
 - Merging with weights already available (Ruediger H)
- TPC gas change to neon
 - Not expected to be a major effort; cannot rule out surprises

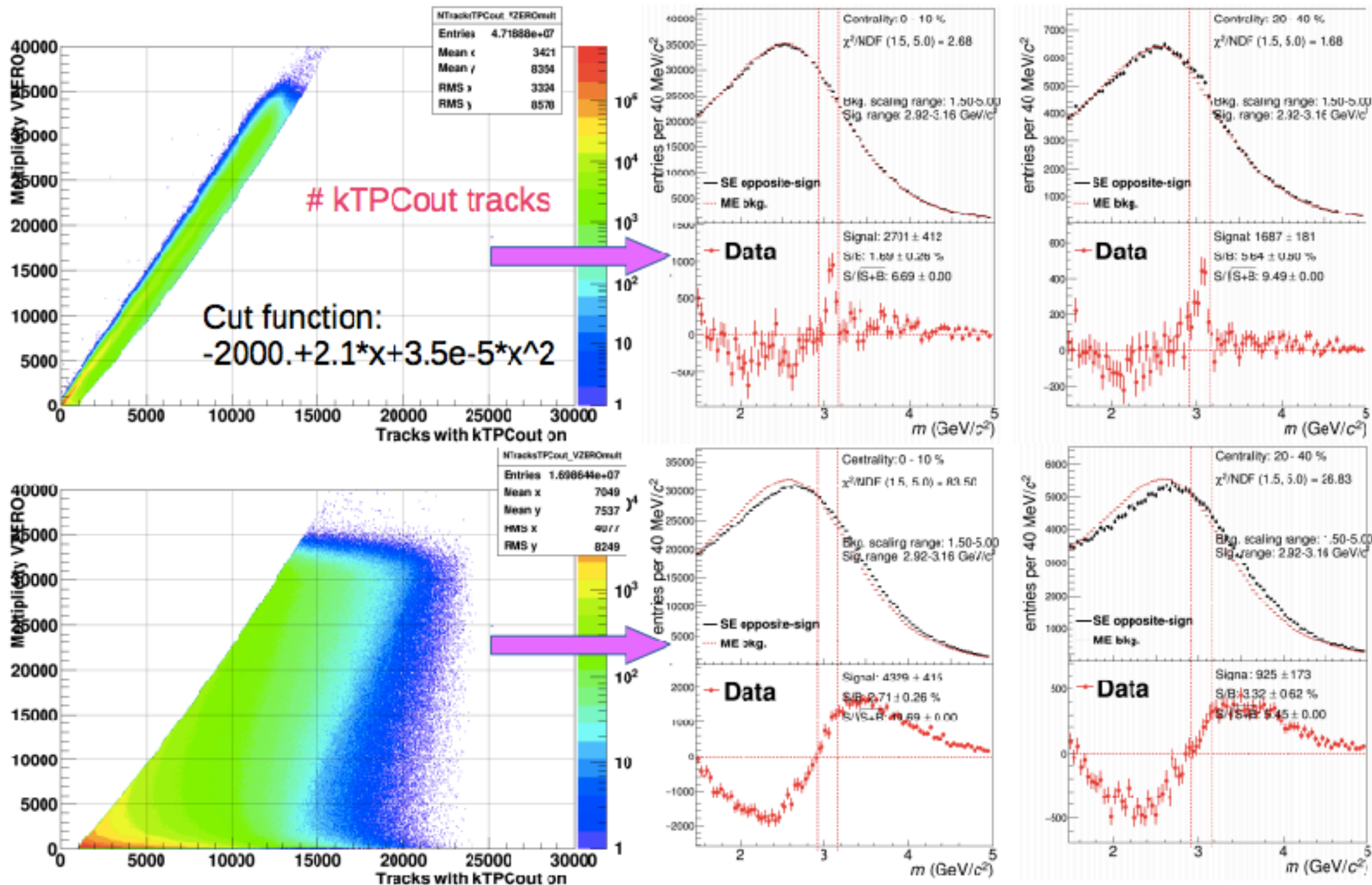
And: ongoing reconstruction, calibration, QA, Monte Carlo
This is a major effort, and will continue throughout run 2

Effect of pile-up on dE/dx

- First noticed in $J/\psi \rightarrow ee$: many 'fake candidates' in high rate runs
- Most likely explanation: pile-up causes shift in dE/dx ; pions contaminate electron sample
 - Requires studies to understand underlying effects
 - Once understood, may require fix (post-calibration?)

NB: Run-2 analysis is only just reaching full swing; new/other issues may still be uncovered

Impact of the event selection on the J/psi signal extraction



Ionut Arsene, Analysis QA meeting 9 Dec 2016

Quantity '#Tracks with TPCout per event' to be added to AOD

2010/2011 differences

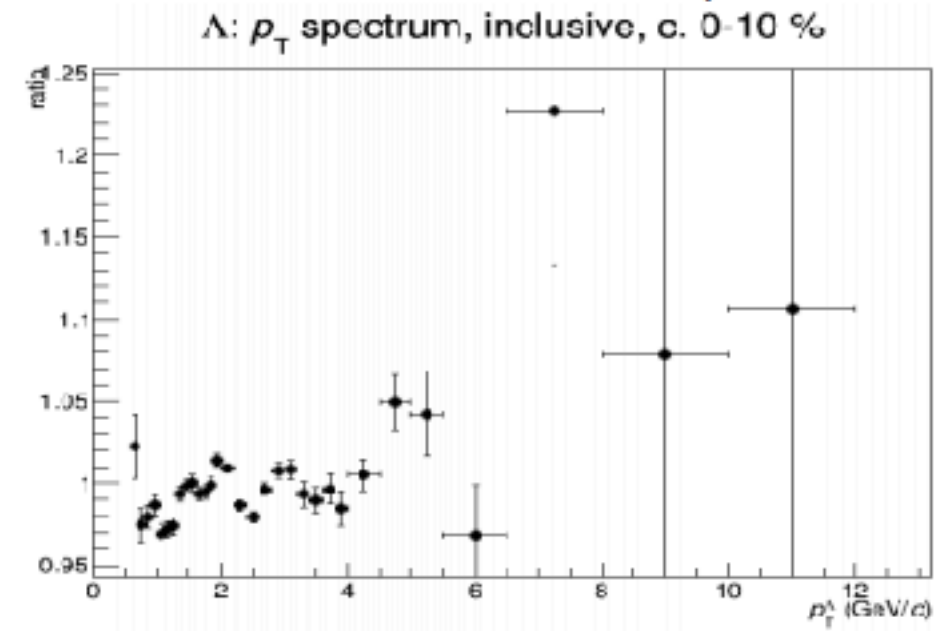
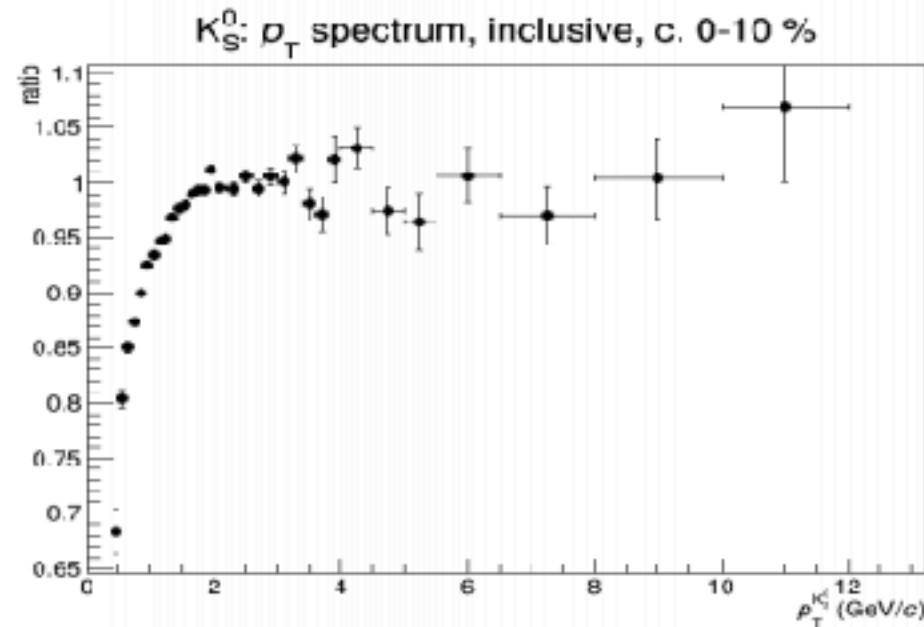
V02010vs2011Studies Twiki

- Effect mostly seen in K^0 , Λ , but could also be present in charged tracks
 - Deviations also seen in comparison of mean p_T for charged tracks (E_T analysis)
- Raw data spectra are similar
- MC efficiency different: lower in 2011 \rightarrow final result higher
- **Blocks several results based on 2011 data**
 - Analysis manpower has mostly disappeared; probably need to revive the effort
- **Currently no clear origin of the effect identified**
 - Needs studies and follow-up; probably combination of strangeness/LF and tracking people

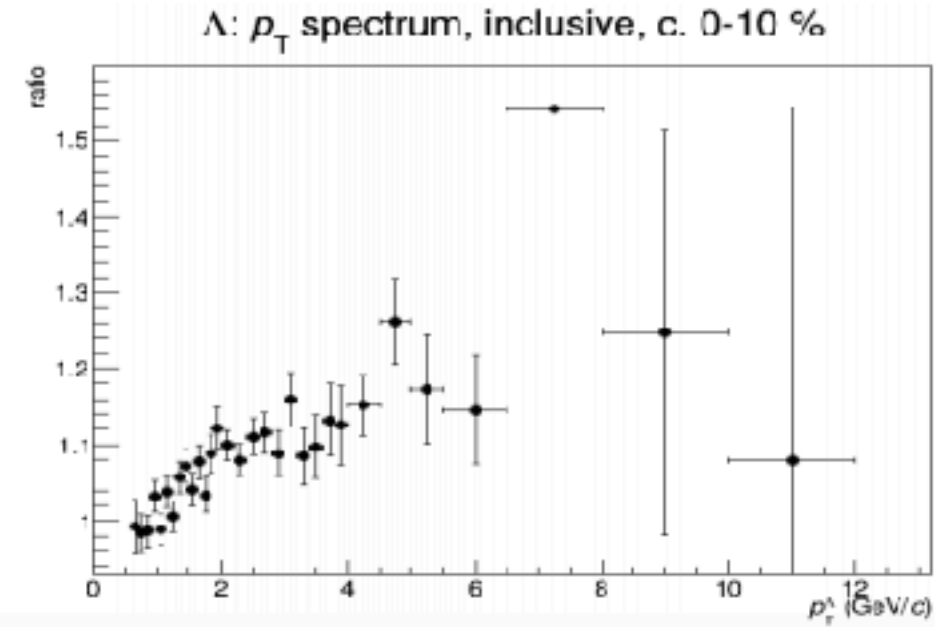
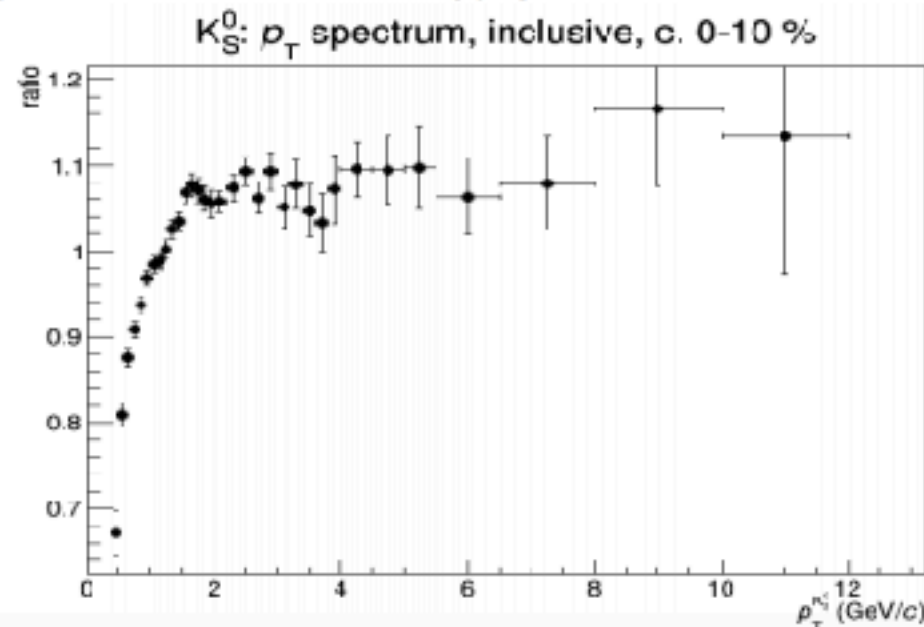
K^0, Λ 2011 vs 2010

Comparison 2011 vs 2010, 0–5 %, inclusive

(this analysis 2011)/(this analysis 2010), **uncorrected** – agreement ($p_T^{V0} > 2 \text{ GeV}/c$)



(this analysis 2011)/(this analysis 2010), **corrected** – disagreement



TRD in tracking

See Marian's talk

- Main effect: improvement in p_T resolution for a large fraction of tracks
- Main uncertainty: simulation of remaining misalignment/calibration

Definitely worth pursuing

However: no clear picture yet of impact on analysis; high- p_T track performance in run 2 still under study

On the other hand: may be/likely important for high-stats 2018 PbPb

Too early to tell? Need effort to know the impact...

GEANT 4 validation/use

- Validation stage: new larger scale MC anchored to 2010 pass 4 data about to start
- Expect to need several more MCs; e.g. one anchored to newer data
- Expected improvements in detector simulation:
 - Main known feature: Improved treatment of anti-protons (no GEANT3/FLUKA correction needed) and light nuclei
 - Some hopes for improved treatment of hadronic showers in EMCal; however, known problem with shower shape description will likely not be solved

MC-to-MC merging/embedding

[JIRA ticket](#)

See also Chiara and Ruben's talks

- Idea: reuse Pb-Pb background events — merge with multiple signal events and reconstruct (one by one)
- Large gain in CPU use for heavy PbPb MCs
 - Estimated maximum gain with current code: factor 3-4 (limited by SDigitisation)
- Development already ongoing (~small effort):
 - Treatment of merged Kinematics/Stack in Analysis/QA
 - Use of merged Kinematics/Stack in reconstruction (label cleaning for ITS)
 - Fix labels for all except: ITS, TPC, TRD and PMD
 - Potential gains in TPC SDigitiser — Not critical, but probably worth looking into anyways?

In the run-up to run 3...

- Should collect/reflect on experience from run-2 and possible improvements
 - Where can we reduce systematic uncertainties from MC?
 - Improve detector response simulation?
- HLT tracking: use run-2 data as dry-run/testbed
 - Would need coordination with PWGs; analysis-level validation would be most accurate
- Nano AOD/Skimmed trees
 - Some development done; may need further development of use cases and bookkeeping