

WG5 chapter on Flow and Correlations

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General stuff

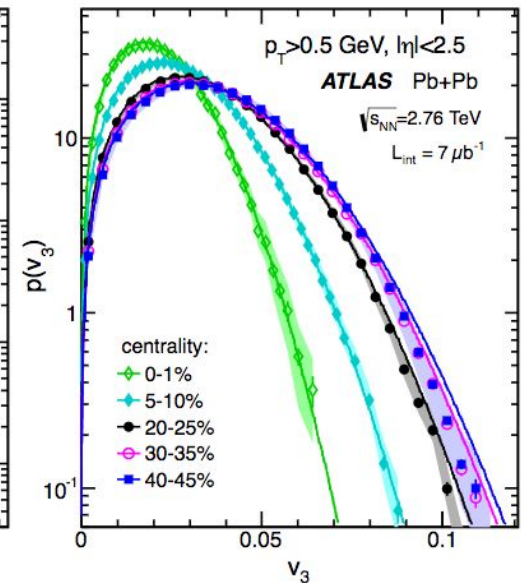
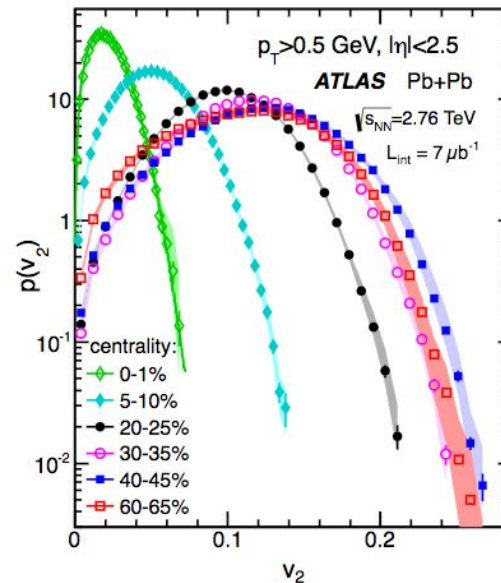
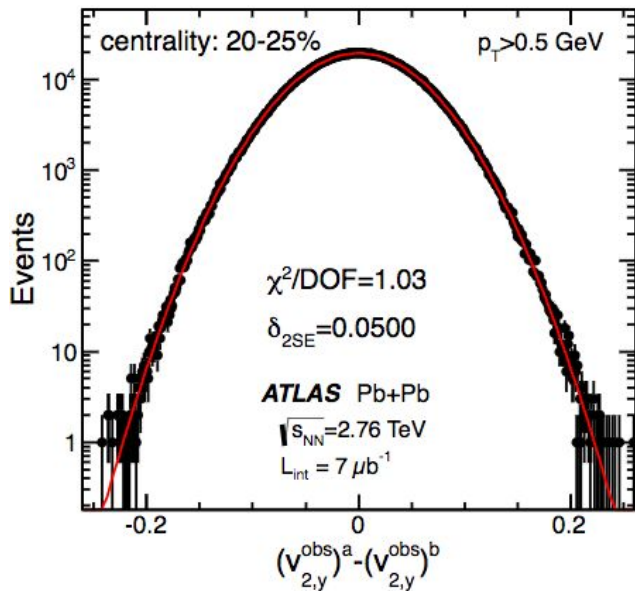
- Two meetings till now:
 - Jan-17 : <https://indico.cern.ch/event/696818/>
 - Mar-05 : <https://indico.cern.ch/event/711421/>
- Broad outline of chapter and contents (observables) discussed
- Also plan to invite other theorists/experimentalists to give their input into the chapter.
- General Questions:
 - Is there a latex template for the chapters?
 - Are there collaborative tools like central repository to host this and other chapters.
 - Would also be beneficial to look at structure/progress of other chapters.
 - Was there similar yellow report in Run-1?
- Regarding light ions
 - Would prefer to have it incorporated in this chapter rather than separate chapter by itself.
 - What do other chapter coordinators think?

Organization of the chapter

- Introduction (why measure flow & correlations)
- What we have learnt from Runs-1 and 2
 - Briefly touch on unanswered/new questions raised
- Go over current status of observables and how they will improve in Runs 3-4, and possible new observables.
 - Will only focus on new observables (not on traditional 2PC, SP etc)
 - Will need some projection plots from experiments and theory
 - will finalize the list as we proceed with writing the document
 - Will take into consideration finite turn-around time for requests
- Discuss briefly overlap with other chapters
 - Mainly small-systems
 - HF and high-pT v_n (depends on how much space is available)
- Summary

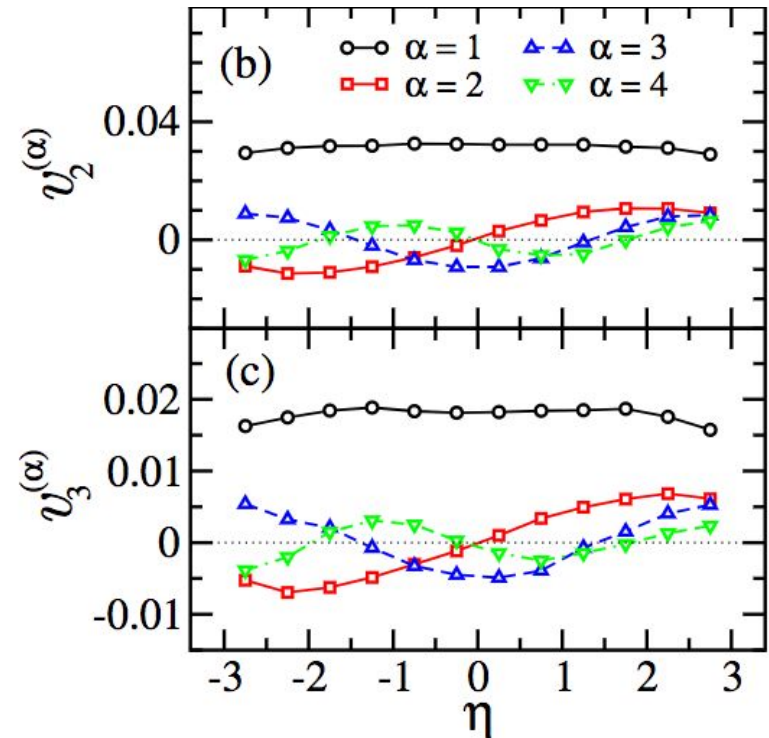
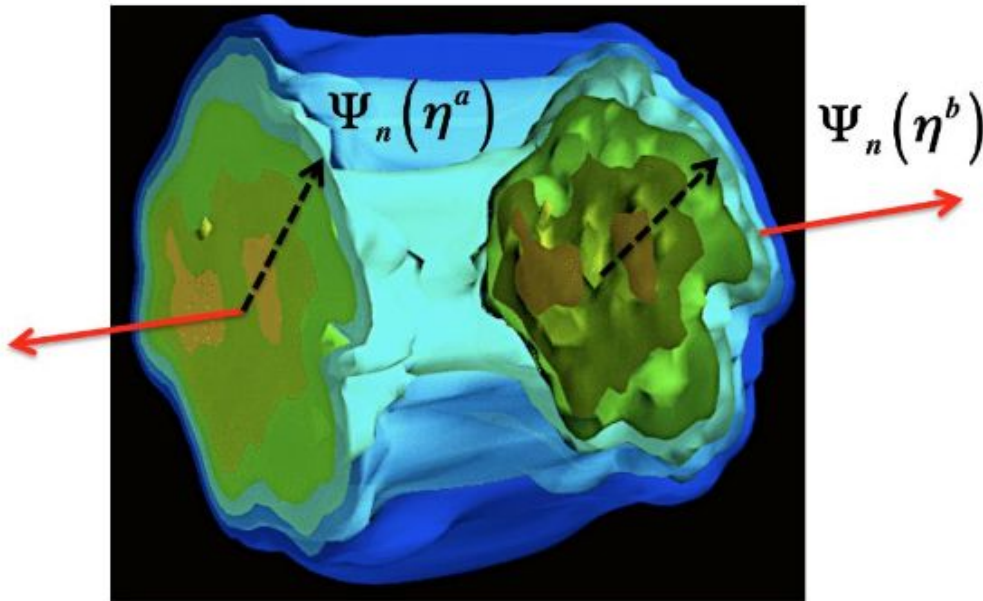
Physics Observables

- Event-by-Event v_n measurements:
 - a. Present measurements:
 - i. <https://arxiv.org/abs/1305.2942> (ATLAS event by event v_n)
 - ii. Also from CMS
 - b. Reason for improvement
 - i. Increased per-event acceptance (+4 units in eta)
 - ii. Better unfolding to truth
 - c. Additional: UC collisions, XeXe, ArAr
 - d. Asked ATLAS for projection plots



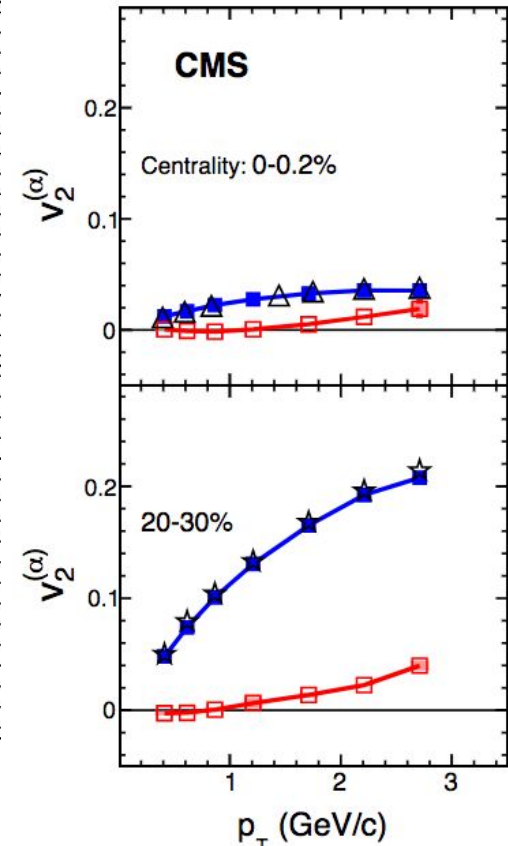
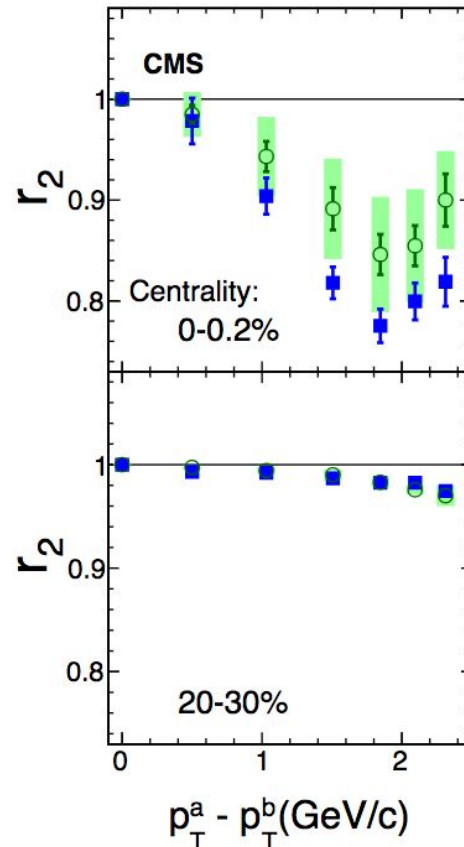
Physics Observables

- Longitudinal flow fluctuations:
 - a. Present measurements:
 - i. <https://arxiv.org/abs/1709.02301> (ATLAS event-plane decorrelations)
 - ii. <https://arxiv.org/abs/1410.7739> (Theory Principal component analysis)
 - iii. <https://arxiv.org/abs/1710.07864> (CMS EP decorrelations)
 - b. Reason for improvement:
 - i. Larger eta acceptance to study de-correlations over longer eta range
 - ii. Study longitudinal fluctuations (PCA)
 - c. Asked ATLAS for projection plots (EP decorrelation)



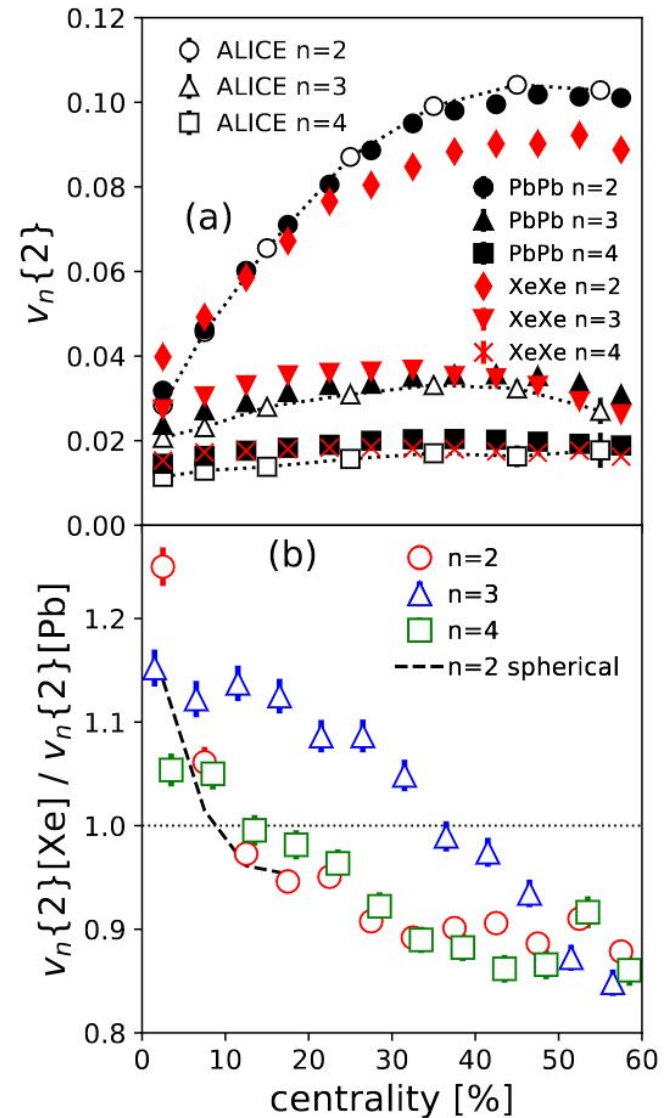
Physics Observables

- v_n in ultra-central collisions
 - a. Present measurements:
 - i. <https://arxiv.org/abs/1312.1845>
(CMS v_n in UC collisions)
 - ii. <https://arxiv.org/abs/1708.07113>
(CMS UC collisions principal component analysis)
 - b. Reason for improvement
 - i. More statistics (UC triggers)
 - ii. More per-event multiplicity (better acceptance)
 - c. Other : UCC in XeXe and ArAr
 - d. Ask CMS experiment for projection plots (To Do)



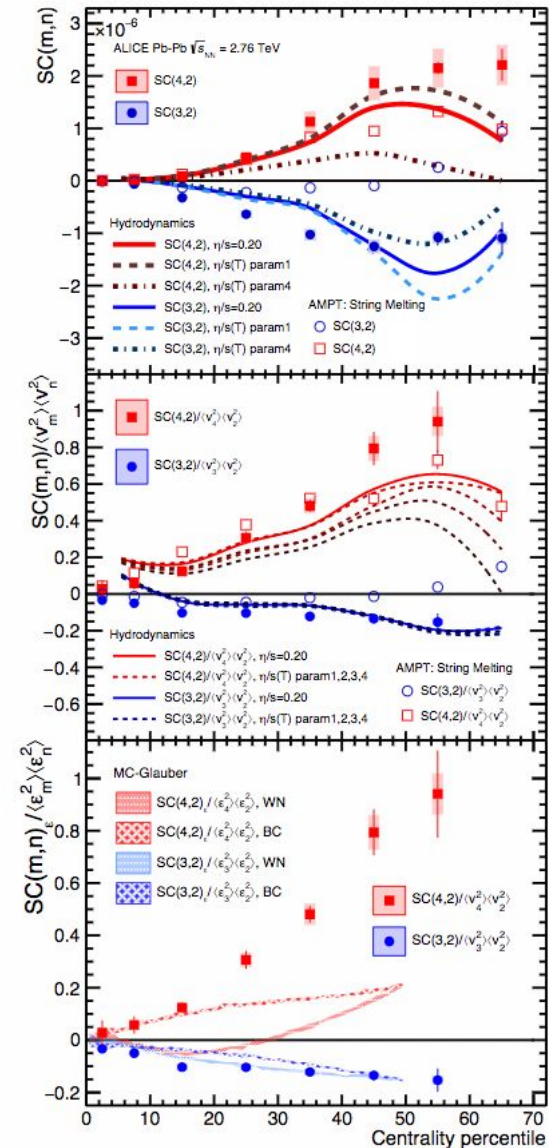
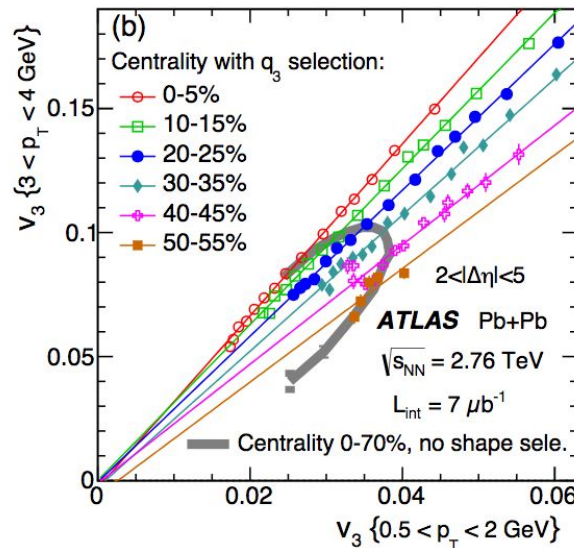
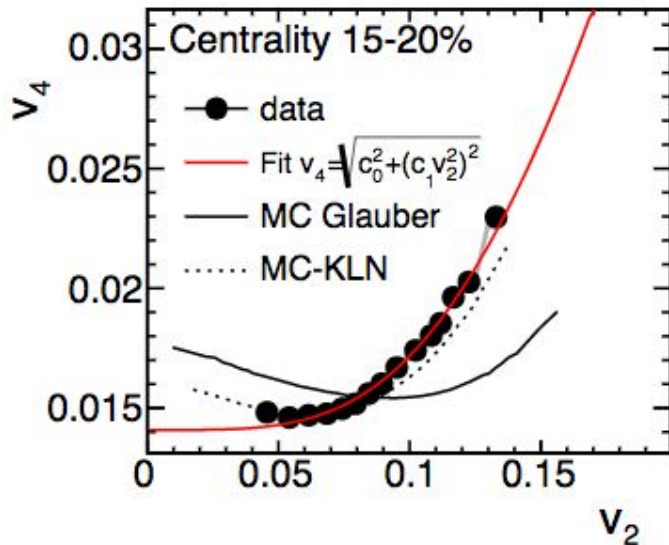
Physics Observables

- Cross-system comparisons (ArAr, XeXe)
 - Hope to get results from LHC collaborations by QM (Standard 2PC/SP, cumulant measurements.)
 - Add in missing points (for system size) between PbPb and p+Pb
 - Plot from arXiv:1711.08499 (Giacalone et al.)
 - Also ask theorists for predictions for XeXe and other light ions (and how these can constrain theory)



Physics Observables

- Correlation between flow harmonics and event-planes:
 - Current measurements:
 - <https://arxiv.org/abs/1504.01289> (ATLAS v_n - v_m correlations)
 - <https://arxiv.org/abs/1403.0489> (ATLAS event-plane correlations)
 - <https://arxiv.org/abs/1604.07663> (ALICE symmetric cumulants)
 - <https://arxiv.org/abs/1709.01127> (ALICE symmetric cumulants long paper)
 - <https://arxiv.org/abs/1709.09189> (CMS symmetric cumulants)
 - Event-shape selected soft-hard (soft-HF) correlations (CMS)

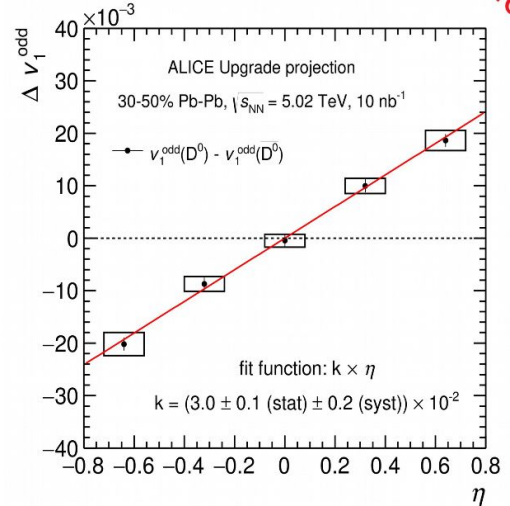
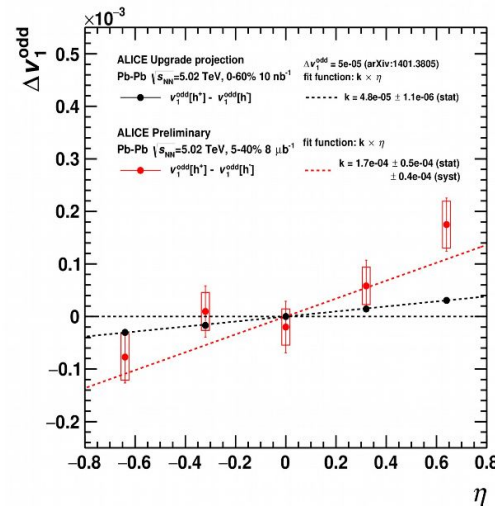
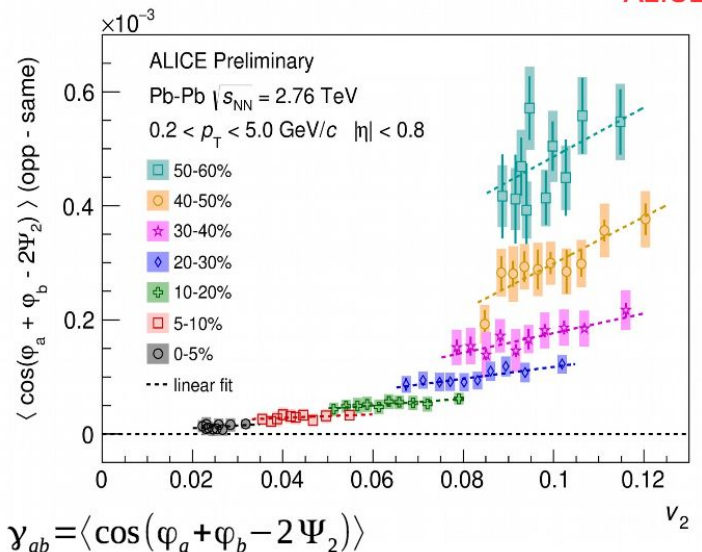


Physics Observables

- Magnetic field: Charged particle/ Charm directed flow, CME related measurements

a. Current measurements:

- <https://arxiv.org/abs/1401.3805> (U. Gursoy et al., magnetic field from charged particle v_1)
- <https://arxiv.org/abs/1608.02231> (S. Das et al., magnetic field from charm v_1)
- <https://arxiv.org/abs/1610.00263> (CMS, CME in pPb)
- <https://arxiv.org/abs/1708.01602> (CMS, CME ESE in pPb and PbPb)
- <https://arxiv.org/abs/1709.04723> (ALICE, CME ESE in PbPb)
- <https://arxiv.org/abs/1708.08901> (CMS, CMW in pPb and PbPb)
- <https://arxiv.org/abs/1512.05739> (ALICE, CMW in PbPb)



Physics Observables

- Vorticity: Lambda (transverse and longitudinal) polarization
 - a. Papers:
 - i. <https://arxiv.org/abs/1707.07984> (Becattini et al., longitudinal polarization)
 - ii. <https://arxiv.org/abs/1610.02506> (Becattini et al., global polarization)
 - iii. <https://arxiv.org/abs/1710.08934> (Voloshin, global polarization)
- +Some other topics