October 10, 2014. 2 pages

Reply and list of main changes

We have significantly extended our R&D and simulation performance study according to the comments received. Below we summarize the main changes done to the TDR and provide a detailed reply to the reviewer committee comments.

List of main changes

- Transverse layout of the PSD modules was changed from "symmetric" to "elongated" to account for magnetic field distortion.
- All simulations were redone with the new "elongated" geometry.
- Procedures for the performance study of the centrality resolution and event plane determination were revised and new implementation of the analysis is completely real-data-like.
- Introduced new section with elliptic flow, v_2, performance study. Based on proton v_2 simulations with the UrQMD we provided projections for relative errors on v_2 of Λ and (rare) Ω^- hyperons.
- Section 5 "PSD performance" was completely rewritten and all plots are redone to improve presentation of the results.
- New Section 6.4 "Control and cooling systems" is added.

Review committee comments

C1 The collaboration should clearly define the requirements, operations parameters, and performance goals for the PSD. In detail:
Beam energy range
Max. beam intensity
Nominal field at each energy
Required reaction plane resolution
Performance criteria for the centrality determination

C2 Simulated performance for the complete energy range for the exact configuration that is being proposed. Specify the configuration that is being proposed for each beam energy (fixed geometry or variable geometry).

C3 Explain in detail how the temperature control and stabilization of the APDs is done and what are the requirements.

C4 Specify for each detector component if the proposed technology is available, not yet available, or under R+D. Assess risk for each component that is not yet available or under R+D. Include technology choice decisions in the time line and specify in the cost estimate how not yet available items or R+D items have been costed. More detailed cost breakdown.

Detailed reply

R1 The PSD operation beam energy range is SIS100 / SIS300. Maximum interaction rate is 1 MHz (intensity of about 10^8 particles/second). Higher luminosity running will require electronics upgrade. A table with different field configurations at each energy is now provided in the TDR. Updated 1st and 2nd order event plane resolution performance study. Based on proton v_2 provided an estimate of projected errors for v_2 of rare particles. Introduced new procedure for centrality determination. New geometry combined with the PSD subevents allow to use the PSD detector standalone for centrality determination (at least 5% centrality binning is possible) or improve the resolution of combined PSD plus STS centrality estimates.

R2 Prepared a set of new performance plots for different collision energies. The corresponding chapter of the TDR was updated. A summary table for detector configuration used at different energies is now included in the TDR.

R3 Demonstrated that the APDs temperature can be kept at a given value within 0.1 degree. The stability of the cooling system was tested with the existing calorimeter of the NA61 experiment, which utilizes the same technology. New section about temperature stabilization has been added to the TDR.

R4 All technologies are tested. Updated corresponding summary table in the TDR.