Elliptic and Triangular flow studies of ϕ meson in Nucleus-Nucleus Collisions at E_{lab} 10AGeV and 30AGeV

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Introduction

In this work, elliptic and triangular flow coefficients for Phi meson within the framework of string melting version of AMPT model have been studied. Au-Au collisions at E_{lab} 10AGeV and 30AGeV in three different centrality regions were simulated. These energies will be relevant at upcoming CBM experiment at Facility for Antiproton and Ion Research(FAIR), GSI, Germany.These studies will give us insight into flow properties at high baryon density and moderate temperature[1]. It will be also interesting to compare the results with Beam Energy Scan Program at RHIC (BESI and BES II).

Simulation

2.5 Million Events at 10AGeV and 30AGeV were generated with string melting version of AMPT model in 3 centrality classes.Lund String fragmentation parameters were taken as : a= (2.2)and b=(0.5).Parton-parton cross section is taken to be 3 mb (using strong coupling constant $\alpha_s = 0.47d0$ and screening mass μ_s=3.2264d0)

p_T dependence of v_2 and v_3

p_T dependence of Phi meson production in Au+Au collision at E_{lab} = 10AGeV and E_{lab} = 30AGeV has been studied and are plotted in Fig[1-4] for the below tabulated three different centrality classes

TABLE I: Three Centrality classes chosen corrsponding to various ranges of impact parameter b.

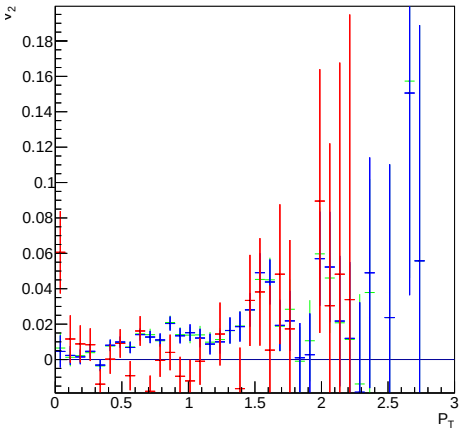

FIG. 1: p_T dependence of V_2 of Phi mesons at 30AGeV

	ImpactParameterb	*CentralityClass*	
1	0-5	0-10%	central
2	10-12.25	40-60%	mid-central
3	12.25-14.25	60-80%	peripheral

It can be seen from the figures that for a given centrality , v_2 as well as v_3 increases with increasing p_T, the rate of increase being steeper for larger p_T ($p_T \geq$1GeV). It can also be seen that we get a much larger value of v_2 as well as v_3 for data simulated at E_{lab}=10AGeV. One of the interesting features of simulated data at 30AGeV is that v_3 is predominantly negative for lower $p_T \leq$1GeV. At 10AGeV there is scarcely any particle with $p_T \geq$ 1.5GeV and large error bars in 30AGeV plots for $p_T \geq$ 1.5GeV is because of low number of high p_T particles.

Centrality dependence of v_2 and v_3

Centrality dependence of elliptic flow can provide us with valuable information on the

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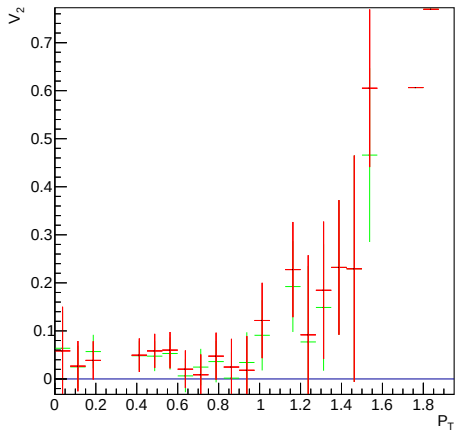

FIG. 2: p_T dependence of V_2 of Phi mesons at 10AGeV

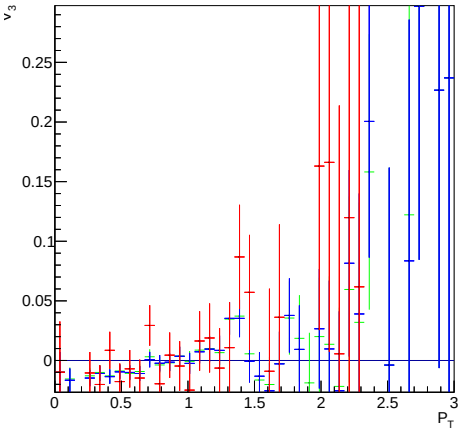

FIG. 3: p_T dependence of v_3 of Phi mesons at 30AGeV

nature of rescattering (whether hadronic or partonic) and the degree of thermalization achieved in the medium created in AA Collisions[2].As can be seen from fig.1 and fig.2 value of v_2 at mid-central collisions is generally larger than that observed in central collisions. Extreme peripheral collisions have not been studied in this work.

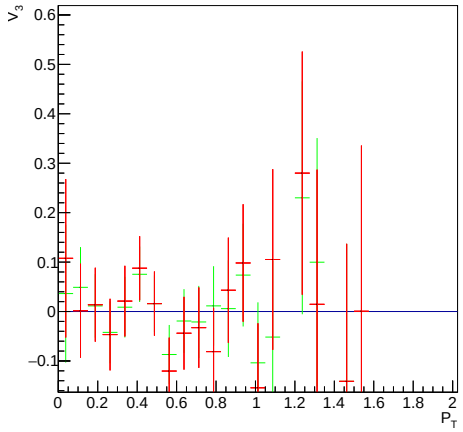

FIG. 4: p_T dependence of v_3 of Phi mesons at 10AGeV

Future plan

In future, we plan to calculate v2 and v3 of Phi mesons from cumulants and compare them with values obtained by other methods. In present simulated data reaction plane angle is taken to be zero. It will be interesting to perform the calculations with variation of reaction plane angle. Study on v2 and v3 will also be performed with different values of parton-parton cross-sections.

References

[1] B. Zhang, Comput.Phys.Commun. 109, 193 (1998).

[2] S.A.Voloshin and A.M.Poskanzer, Phys.Lett. B 474, 27 (2000).