

## Inclusive charged hadron elliptic flow in Au + Au collisions at $\sqrt{s_{NN}} = 7.7, 11.5$ and 39 GeV

We present a systematic study of the transverse momentum ( $p_T$ ), rapidity and centrality dependence of elliptic flow,  $v_2$ , using several methods in Au + Au collisions at  $\sqrt{s_{NN}} = 7.7, 11.5$  and 39 GeV. The difference between  $v_2$  using event plane from detectors separated in rapidity ( $v_2\{2\}$ ) and four particle cumulants ( $v_2\{4\}$ ) seems to decrease as the beam energy decreases. The implications of this result towards understanding the energy dependence of non-flow and flow fluctuations will be discussed. The energy dependence of  $v_2$  will be presented by a comparison with results from high energies at RHIC ( $\sqrt{s_{NN}} = 62.4$  and 200 GeV), at LHC ( $\sqrt{s_{NN}} = 2.76$  TeV) and similar energy at SPS ( $\sqrt{s_{NN}} = 7.6$  GeV). We observe the  $v_2(p_T)$  are very comparable ( $\sim 10\%$ ) at mid-rapidity and  $p_T > 0.5$  GeV/c beyond  $\sqrt{s_{NN}} = 39$  GeV. We will also compare our results to transport model calculations, such as those from UrQMD model, AMPT default model and AMPT string-melting model with different parton cross sections.

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