

## Elliptic Flow of charged particles in Au+Au collisions at $\sqrt{s_{NN}} = 7.7, 11.5$ and 39 GeV from STAR

The study of elliptic flow and non-flow effects over a wide energy range can provide information on the onset of collective effects in heavy-ion collisions. In 2010, STAR collected high statistics data samples at lower RHIC energies at  $\sqrt{s_{NN}} = 7.7, 11.5$  and 39 GeV. We will present measurements of charged particle elliptic flow using the event-plane ( $v_2\{EP\}$ ) determined from detectors separated in *eta*, 2-particle ( $v_2\{2\}$ ) and 4-particle ( $v_2\{4\}$ ) correlation methods integrated over  $p_t$  and  $\eta$  along with differential elliptic flow  $v_2(p_t)$  and  $v_2(\eta)$ . The difference using  $v_2\{EP\}$ ,  $v_2\{2\}$  and  $v_2\{4\}$  decreases with decreasing the beam energy. In addition we observe that no large differences ( $\sim 10\%$ ) are visible for the  $p_t$  dependence ( $|\eta| < 1.0$  and  $p_t > 0.5$ ) of  $v_2\{4\}$  starting from  $\sqrt{s_{NN}} = 39$  GeV. A change of the energy dependence is observed in the difference between  $v_2\{2\}^2$  and  $v_2\{4\}^2$  which is related to  $v_2$  fluctuations ( $\sigma_{v_2}$ ) and non-flow correlations ( $\delta_2$ ). The measurements will be compared to measurements at SPS, higher RHIC and LHC energies, as well as string hadronic/partonic and hydrodynamic model calculations.

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