



Contribution ID: 579

Type: **Contributed Talk**

## Elliptic flow of light nuclei and identified hadrons, their centrality and energy dependence in STAR

*Monday, May 19, 2014 3:00 PM (20 minutes)*

A strongly interacting medium, namely Quark Gluon Plasma (QGP), is formed in high energy heavy ion collisions at RHIC. Elliptic flow ( $v_2$ ), the second order Fourier coefficient of azimuthal distribution of the produced particles with respect to reaction plane, is used to investigate the properties of QGP. Light nuclei ( $d$ ,  $\bar{d}$ ,  $t$ ,  ${}^3He$ ), produced in such collisions, are believed to be formed by coalescence of nucleons. By comparing  $v_2$  of light nuclei with their constituents, we can understand the production mechanism of nuclei in heavy ion collisions. At top RHIC energies, identified hadron  $v_2$  revealed many features like the number-of-constituent quark (NCQ) scaling and mass ordering. With the combined statistics, we can test the scaling behaviors for rare multi-strange particles ( $\phi$ ,  $\Xi$  and  $\Omega$ ). An energy dependent difference in  $v_2$  ( $\Delta v_2$ ) between particles and anti-particles was also observed in beam energy scan data at STAR.

In this talk, we show the  $p_T$  and centrality dependence of  $v_2$  of light nuclei ( $d$ ,  $\bar{d}$ ,  $t$ ,  ${}^3He$ ), and identified hadrons ( $\pi^\pm$ ,  $K^\pm$ ,  $K_s^0$ ,  $p$ ,  $\bar{p}$ ,  $\phi$ ,  $\Lambda$ ,  $\bar{\Lambda}$ ,  $\Xi^\pm$ ,  $\Omega^\pm$ ) at mid-rapidity for Au+Au collisions at  $\sqrt{s_{NN}} = 7.7, 11.5, 19.6, 27, 39, 62.4$  and 200 GeV from STAR. Light nuclei and hadrons are identified using the time projection chamber and time-of-flight detector systems of STAR. The mass number and constituent quark scaling of nuclei  $v_2$  will be presented. Light nuclei  $v_2$  will be compared to those from  $p(\bar{p})$  and to a coalescence model calculation using the phase space distributions of produced nucleons in a transport model. The centrality dependence of  $\Delta v_2$  for identified hadron will be shown and compared to model calculations.

We further discuss NCQ scaling and mass ordering of multi-strange hadron  $v_2$  at the top energy Au+Au collisions at RHIC.

### On behalf of collaboration:

STAR

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**Session Classification:** Collective dynamics

**Track Classification:** Collective Dynamics