# Measurement of global spin alignment of $\phi$ and $K^*$ vector mesons at RHIC

Subhash Singha

Institute of Modern Physics Chinese Academy of Sciences, Lanzhou

## Abstract

In non-zero impact parameter heavy-ion collisions, a large initial orbital angular momentum (OAM) can be present. Such a large OAM can induce a non-vanishing polarization for hadrons with non-zero spin. The global spin alignment of vector mesons is quantified by the $00^{th}$ element of the spin density matrix ($\rho_{00}$) with respect to the quantization axis, i.e. normal to the reaction plane. It can offer information on the spin-orbital interactions of the QCD medium.

In this talk, we will present the transverse momentum ($p_T$) and collision centrality dependence of $\rho_{00}$ for $\phi$ and $K^*$ vector mesons using RHIC Beam Energy Scan (BES) Au+Au collisions at $\sqrt{s_{NN}}$ = 11.5 - 200 GeV, and isobar collisions (Ru+Ru and Zr+Zr) at $\sqrt{s_{NN}}$ = 200 GeV. At RHIC BES energies, the $\rho_{00}$ of $\phi$ meson is unexpectedly large, while that of $K^{*0}$ is largely consistent with non-polarization baseline. The magnitude of $\phi$ meson $\rho_{00}$ can not be explained by conventional mechanisms but may be attributed to the influence of a vector meson strong force field. The measurement of the global spin alignment can potentially reveal information about the strong force field as well as the spin dynamics of the QCD medium. Moreover, the comparison of $\rho_{00}$ between Au+Au and isobar species can provide information on the system size dependence of $\rho_{00}$.