

Measurement of light vector mesons by PHENIX experiment at RHIC

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The PHENIX experiment at RHIC has carried out systematic measurements of ϕ and ω mesons in $p+p$, $d+Au$, $Cu+Cu$ and $Au+Au$ collisions at $\sqrt{s_{NN}} = 200$ GeV. Consistent results have been obtained using leptonic and hadronic decay modes as well as different analysis techniques.

In $p+p$ collisions, the transverse momentum distributions of ω and ϕ , as well as all other mesons measured by PHENIX, are well described by the Tsallis distribution functional form. Combining the e^+e^- and hadronic ($\omega \rightarrow \pi^0\gamma$, $\pi^0\pi^+\pi^-$, $\phi \rightarrow K^+K^-$) decay channels, ω and ϕ have been measured over a p_T range of 0 - 13.5 GeV/c and 0 - 7 GeV/c respectively. New results obtained using hadronic and dielectron channels of ω and ϕ mesons in $d+Au$ collisions extend the p_T coverage to 0.25 - 13 GeV/c and 0 - 7 GeV/c respectively, and reveal a moderate enhancement at intermediate p_T and a hint of suppression at $p_T > 8$ GeV/c. Both observations are consistent with previous results for π^0 , $\pi^+ + \pi^-$, K_s and $K^+ + K^-$.

The nuclear modification factor of ω in $Cu+Cu$ and $Au+Au$ collisions measured over a p_T range of 4 - 12 GeV/c, shows that ω has a similar suppression pattern as that of π^0 and η , strengthening the observation that mesons with different masses have similar behavior but different from the one of baryons. However, ϕ in $Cu+Cu$ and $Au+Au$ collisions, measured from 1 - 7 GeV/c, shows a suppression, that is smaller than that of the π^0 and η in the intermediate p_T range (2 - 5 GeV/c), whereas at higher p_T , within the large experimental uncertainties, the amount of suppression appears similar to that of the light mesons. Results of ϕ production at $\sqrt{s_{NN}} = 62.4$ GeV show a similar behavior but with larger uncertainties. This talk will review the most recent results obtained for light vector mesons in different collision systems and energies.

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