Energy dependence of $\phi(1020)$ production at midrapidity in pp collisions with ALICE at the LHC







Sushanta Tripathy (On behalf of ALICE collaboration) Indian Institute of Technology Indore, India



Hadronic resonances measurements from ALICE @QM18

Many nice new results on hadronic resonances are presented in 7 posters and 2 parallel talks!



Why ϕ meson in small systems?

> Find out whether there is a dependence of $\phi(1020)$ production on the collision energy

> Search for onset of collective effects in small collision systems

- Effective strangeness of φ(1020) in the description of production mechanism?
 - strangeness canonical suppression
 - strangeness suppression factor, γ_s

Resonance	Particle Mass	Mean lifetime	Decay
	(GeV/c ²)	(fm/c)	Channel
ф(1020)	1.019	~46.4	K+K⁻

p_T spectra

pp, 5.02 TeV





- p_T spectra measured in fine multiplicity bins at two collision energies in pp
- Ratio to minimum bias (INEL>0) increases at low p_T and flattens for high p_T 19/05/18

\mathbf{p}_{T} spectra and Integrated yields



- ▶ High-p_T part of spectra increases as a function of collision energy
 ▶ Bulk production at low-p_T is independent of collision energy
- Event multiplicity drives the particle production, irrespective of collision energy

Particle ratios



- φ(S=0) yield in agreement with thermal model expectation in central Pb-Pb collisions
- But decreases towards smaller multiplicity in contrast to the expectation from strangeness canonical suppression



 Ξ(S=2)/φ(S=0) increases as a function of multiplicity in contrast to expectation from non-equilibrium production as quantified with strangeness suppression factor.

19/05/18 ϕ (S=O) production in small systems remains to be understood! 6

Summary

- Significant increase of the p_T spectra at high-p_T is observed with increase in collision energy.
- No significant collision energy dependence of p_T-integrated resonance yield production is observed for events with similar multiplicity, as observed for other light-flavored hadrons.
- Increasing φ/π and Ξ/φ with charged particle multiplicity in pp collisions suggests that φ production yield scales like for a particle with strangeness between 1 and 2!

Thanks for your attention

19/05/18

Signal Extraction

- The uncorrelated background is estimated using event-mixing technique.
- In different p_T intervals, raw yields are obtained from the combinatorial background subtracted signal distributions.
- φ(1020) peak is fitted with Voigtian function and residual background is fitted with 2nd order polynomial.

$$\frac{\mathrm{d}N}{\mathrm{d}m_{\mathrm{KK}}} = \frac{A\Gamma}{(2\pi)^{3/2}\sigma} \int_{-\infty}^{\infty} \exp\left[-\frac{(m_{\mathrm{KK}} - m')^2}{2\sigma^2}\right] \frac{1}{(m' - M)^2 + \Gamma^2/4} \mathrm{d}m'$$

19/05/18



