



UNIVERSITÀ
DEGLI STUDI DI TRIESTE



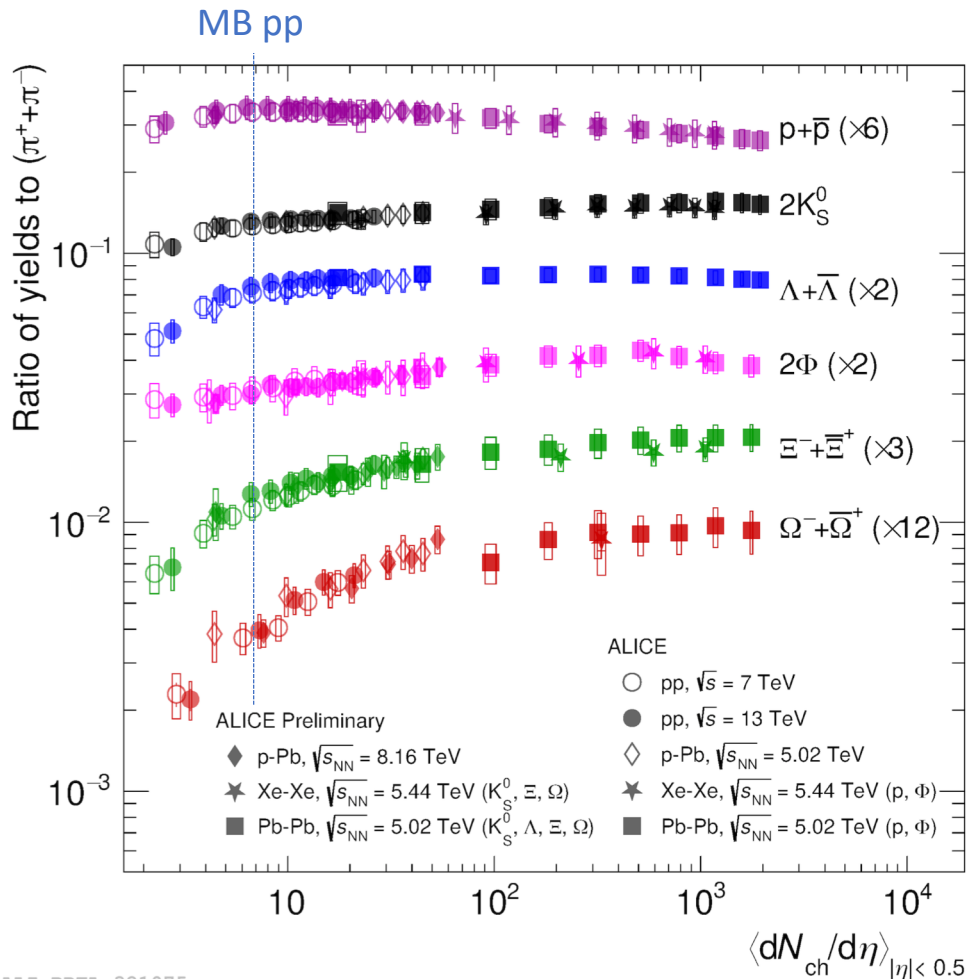
Strange-hadron correlation studies to investigate strangeness enhancement in pp collisions with the ALICE detector

Chiara De Martin

University and INFN - Trieste

XXXII International seminar of Nuclear and Subnuclear Physics “Francesco Romano”

Physics motivation



Strangeness enhancement:

The ratio between (multi-)strange hadron yields and pion yields is enhanced in heavy-ion collisions with respect to minimum bias pp collisions

- Smooth evolution with the multiplicity of charged particles across different collision systems (pp, p-Pb, Pb-Pb)
- No dependence on the collision energy at the LHC
- The enhancement is larger for particles with larger strangeness content ($\Omega > \Xi > K_S^0$)

Is strangeness enhancement related to soft particle production or to hard processes, such as jets?

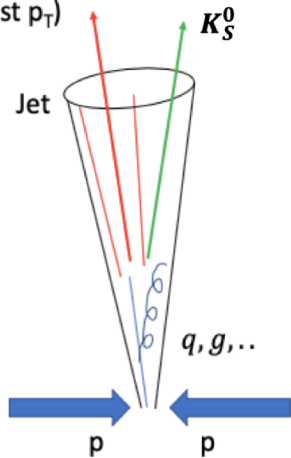
ALICE Collaboration, Nature Phys 13, 535–539 (2017)

ALICE Collaboration, Eur.Phys.J.C 80, 167 (2020)

Correlations of high- p_T charged hadrons with strange particles

The angular correlation method:

Leading particle $\cong$ jet axis
(highest p_T)



1. Selection of the **trigger particle** ($\sim$ jet axis): the charged primary particle with the highest p_T and $p_T > 3$ GeV/c

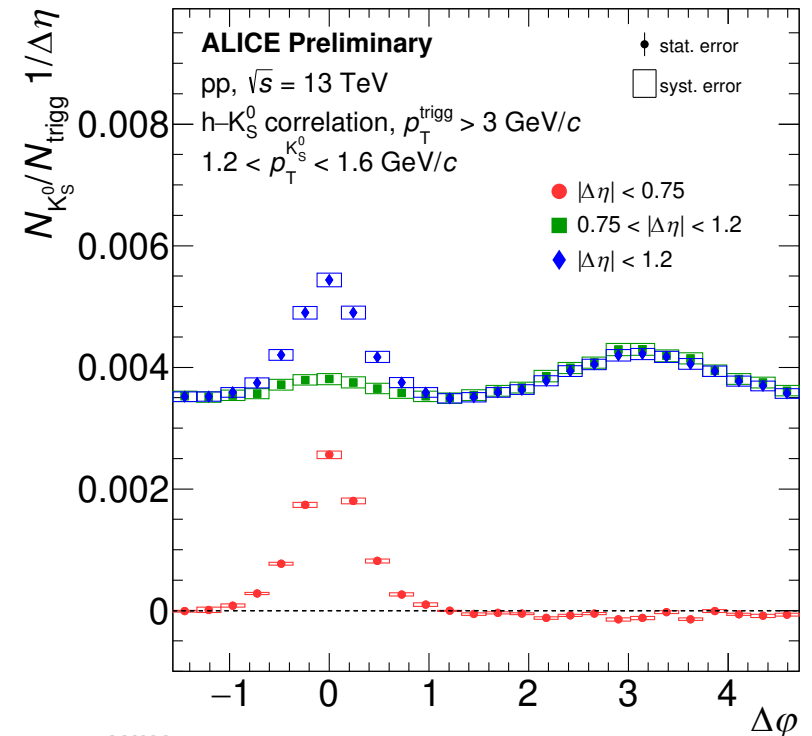
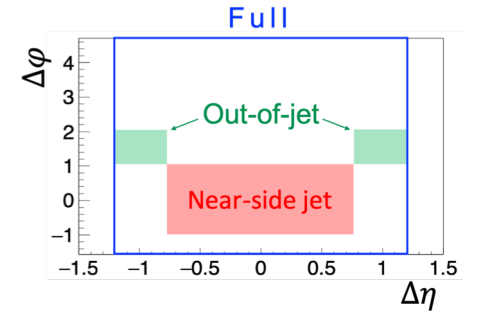
2. Identification of strange hadrons (**associated particles**)

3. Angular correlation between trigger and associated particles is calculated

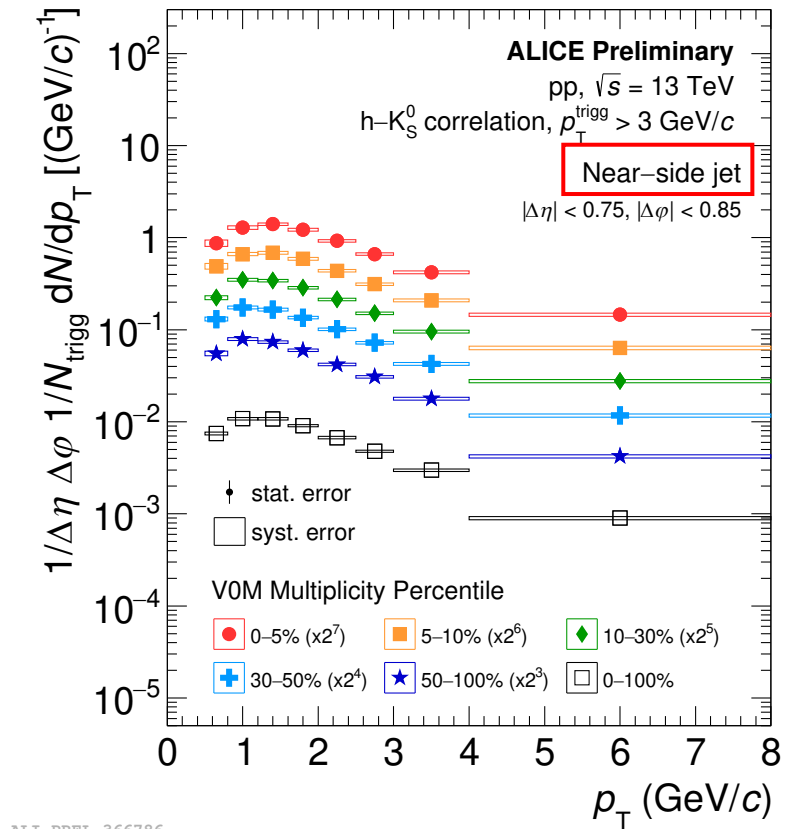
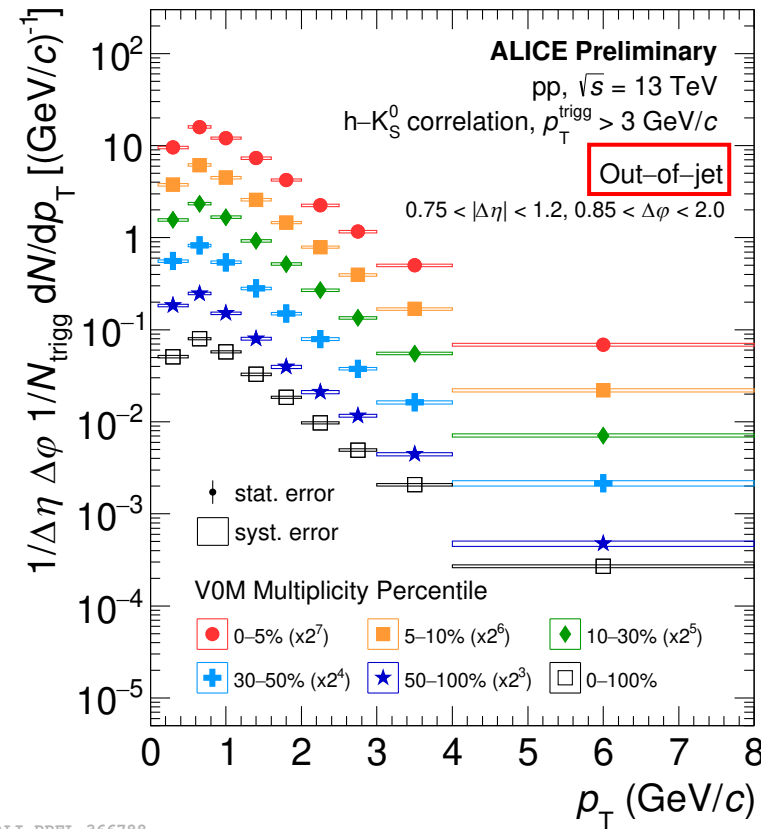
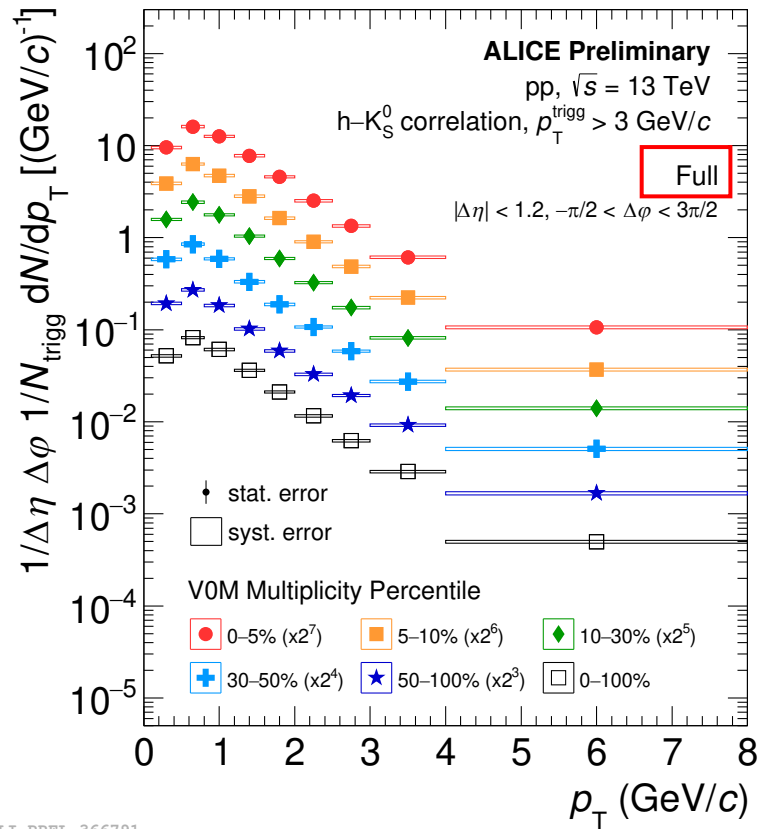
$$\Delta\phi = \phi_{Trigg} - \phi_{Assoc}$$

$$\Delta\eta = \eta_{Trigg} - \eta_{Assoc}$$

ϕ : azimuthal angle
 $\eta = -\ln(\tan(\theta/2))$
 θ : polar angle

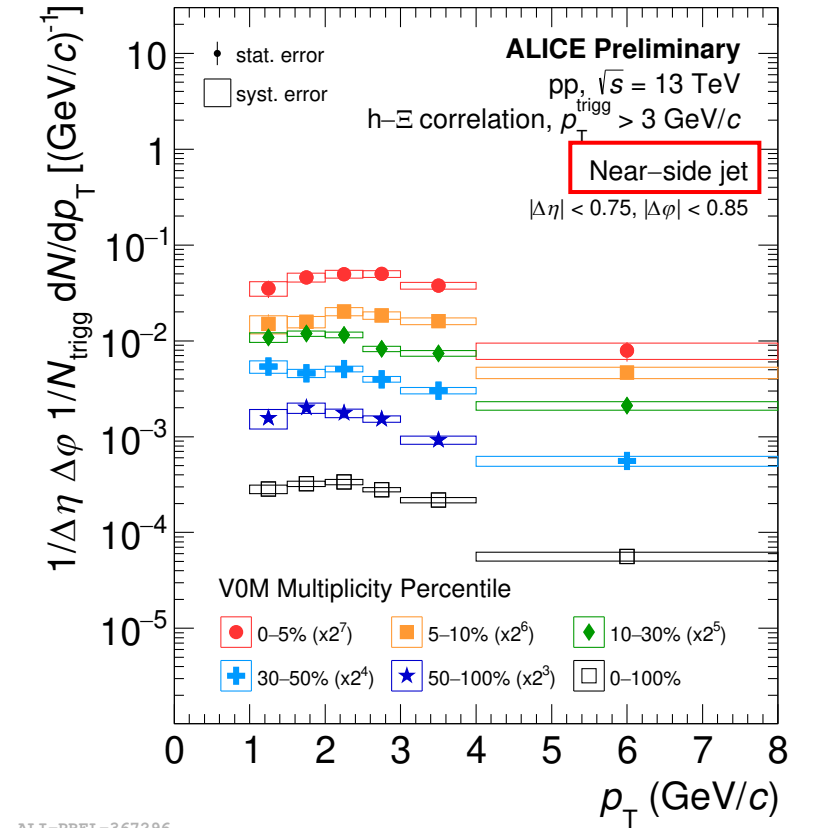
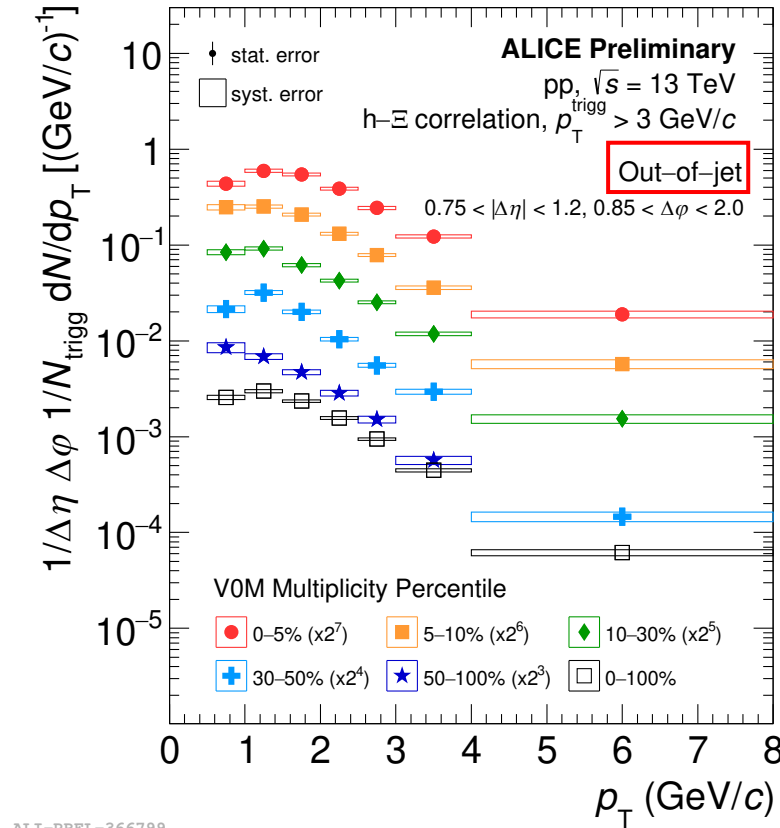
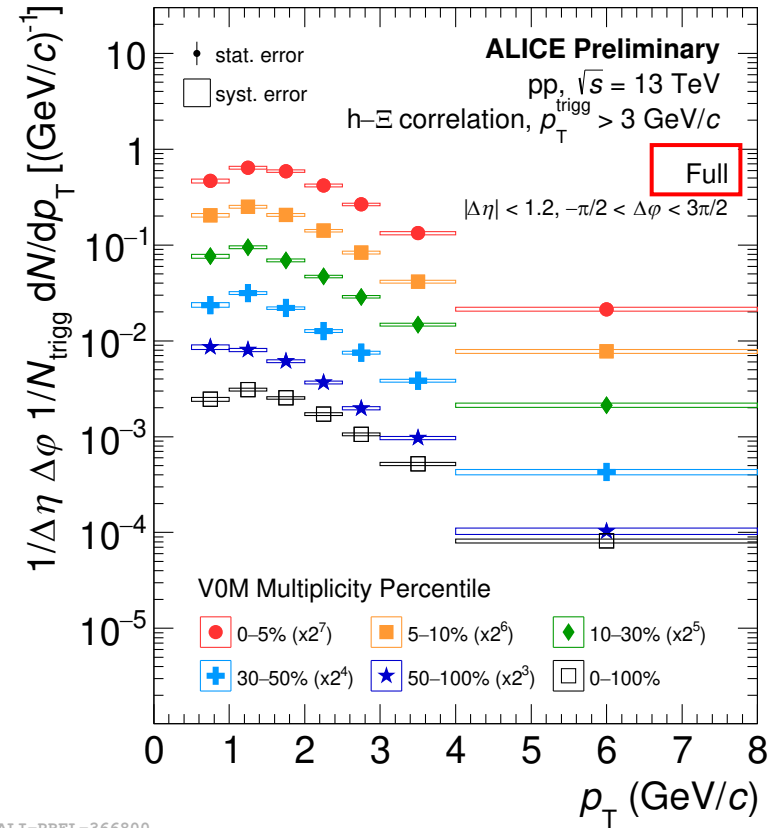


Near-side jet, out-of-jet and full p_T spectra of K_S^0



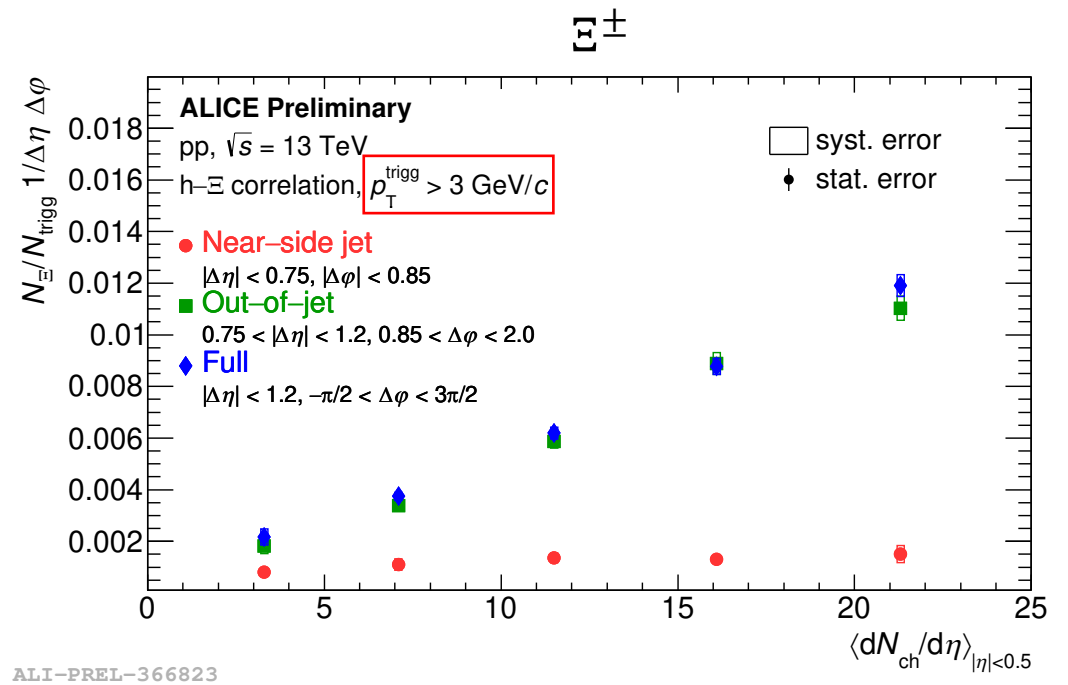
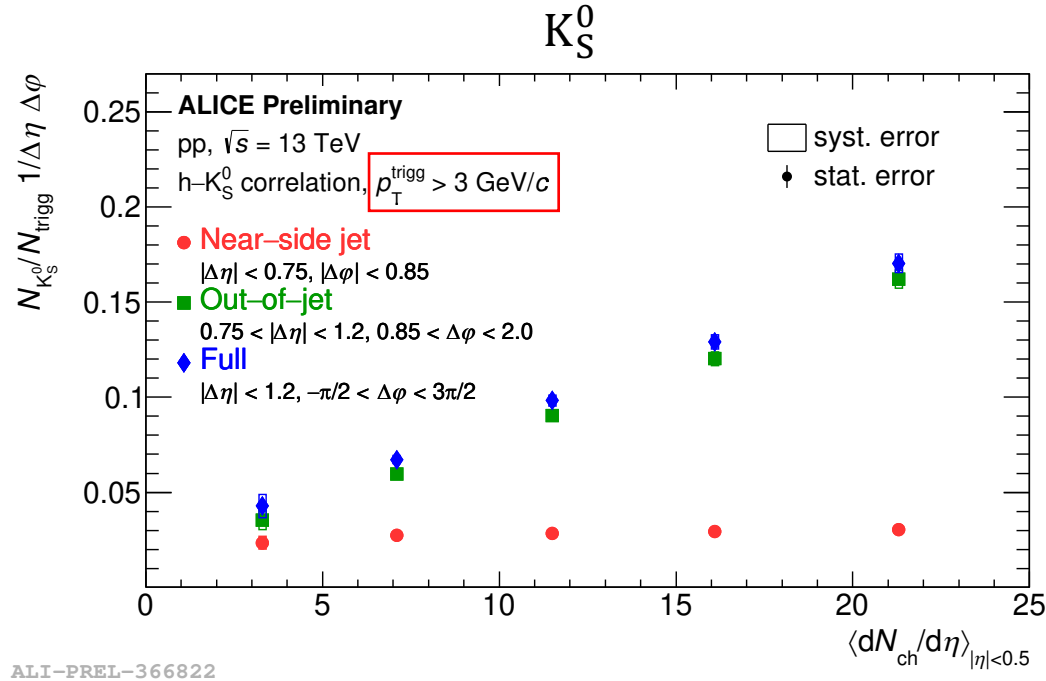
Spectra of K_S^0 produced in jets are harder than spectra of K_S^0 produced out of jets

Near-side jet, out-of-jet and full p_T spectra of $\Xi^\pm$



Spectra of $\Xi^\pm$ produced in jets are harder than spectra of $\Xi^\pm$ produced out of jets

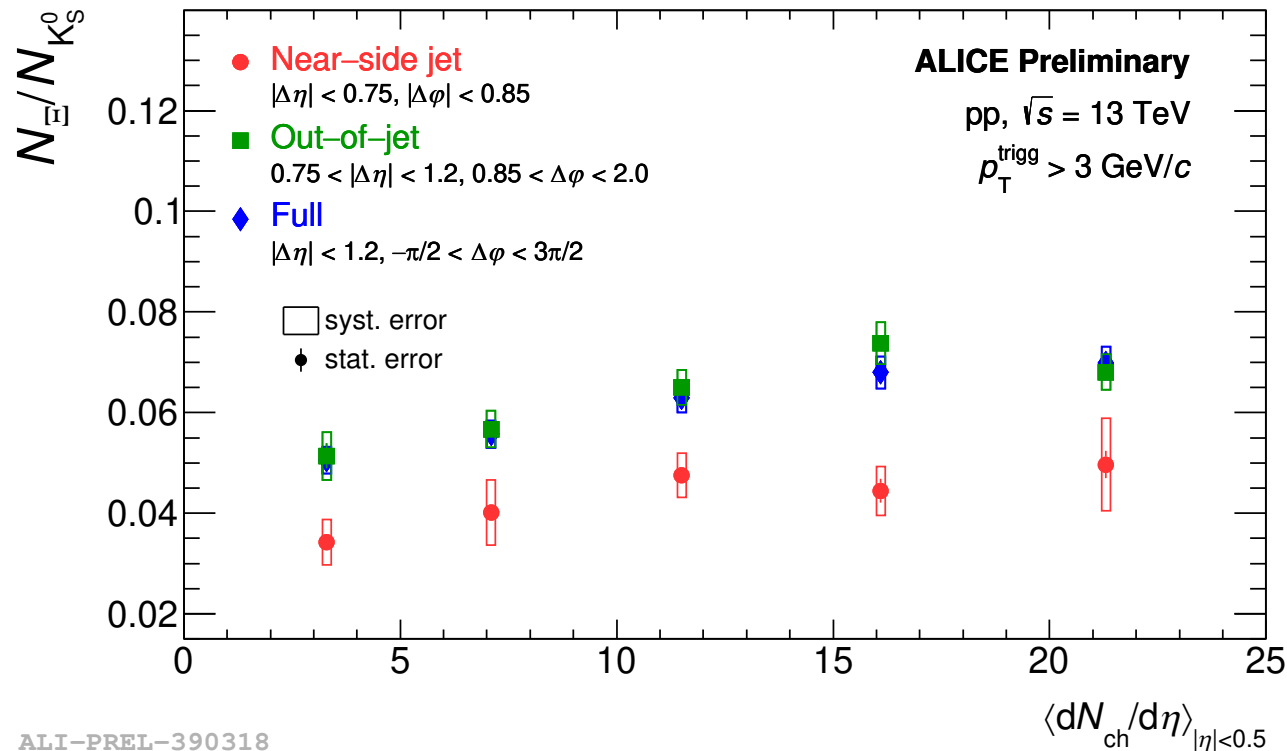
Near-side jet, out-of-jet and full yields of strange hadrons vs multiplicity



- Both the **full** yield and the **out-of-jet** yield increase with the multiplicity
- Very mild to no-evolution with multiplicity of the **near-side-jet** yield

→ The contribution of **out-of-jet** production relative to **near-side jet** production increases with multiplicity

Strangeness enhancement in jets and out of jets



- The strangeness enhancement in the ratio of **full** yields is due to the larger strangeness content of Ξ ($|S| = 2$) with respect to K_S^0 ($|S| = 1$)
- The **out-of-jet** Ξ/K_S^0 yield ratio increases with the multiplicity
- The **near-side jet** Ξ/K_S^0 yield ratio shows a hint of increase with multiplicity

Soft (out of jet) processes are the dominant contribution to the Ξ/K_S^0 full yield ratio