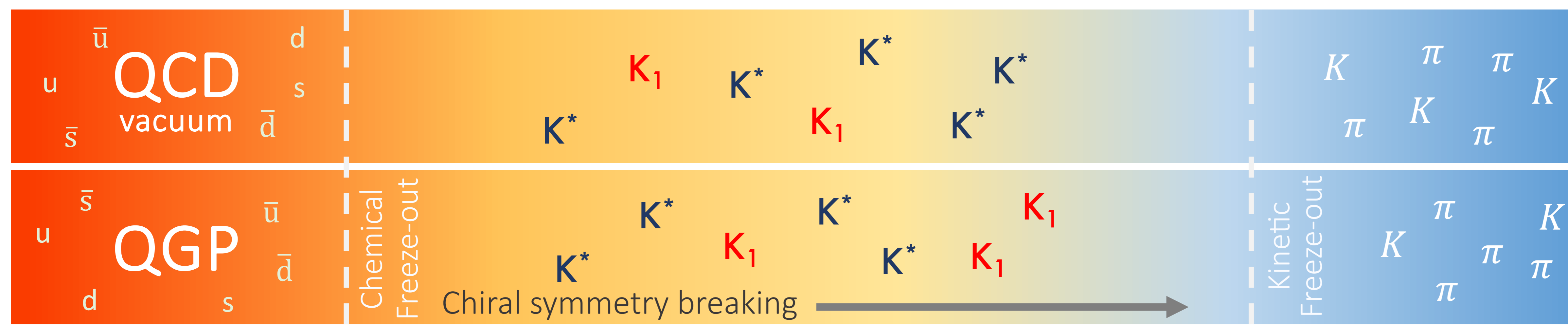


CHIRAL SYMMETRY RESTORATION^[1]

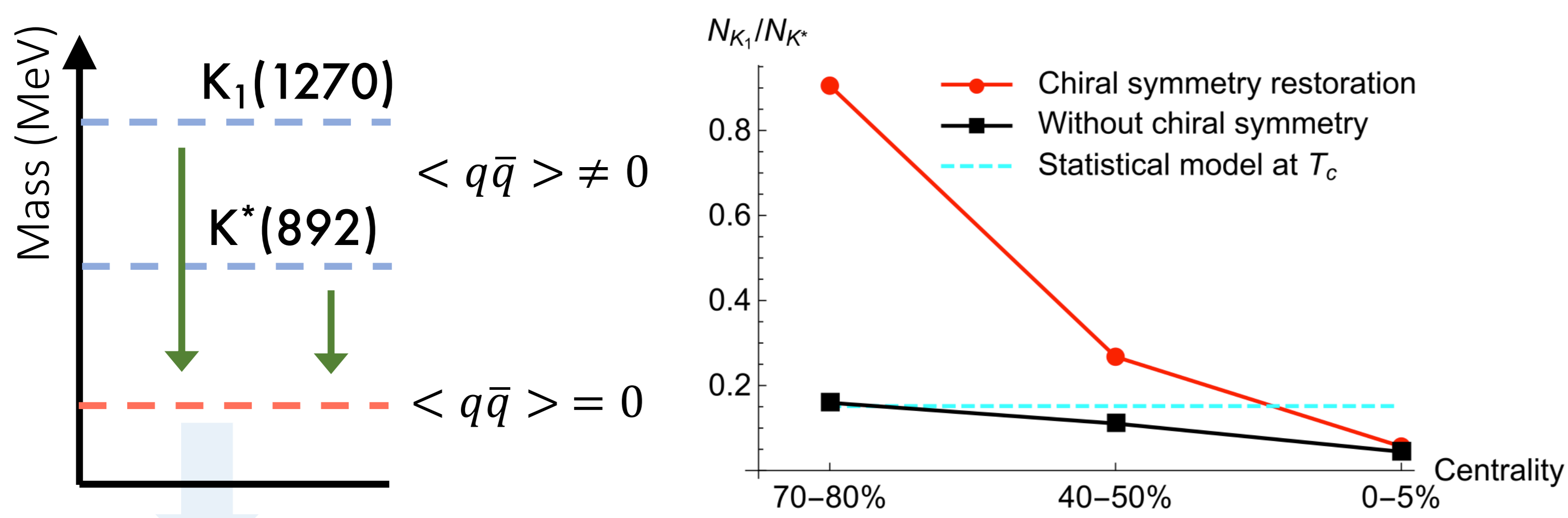


Chiral symmetry can be restored in high temperature and density. Then chiral partners will have much closer mass therefore equal number of particles according to thermal description will be produced.

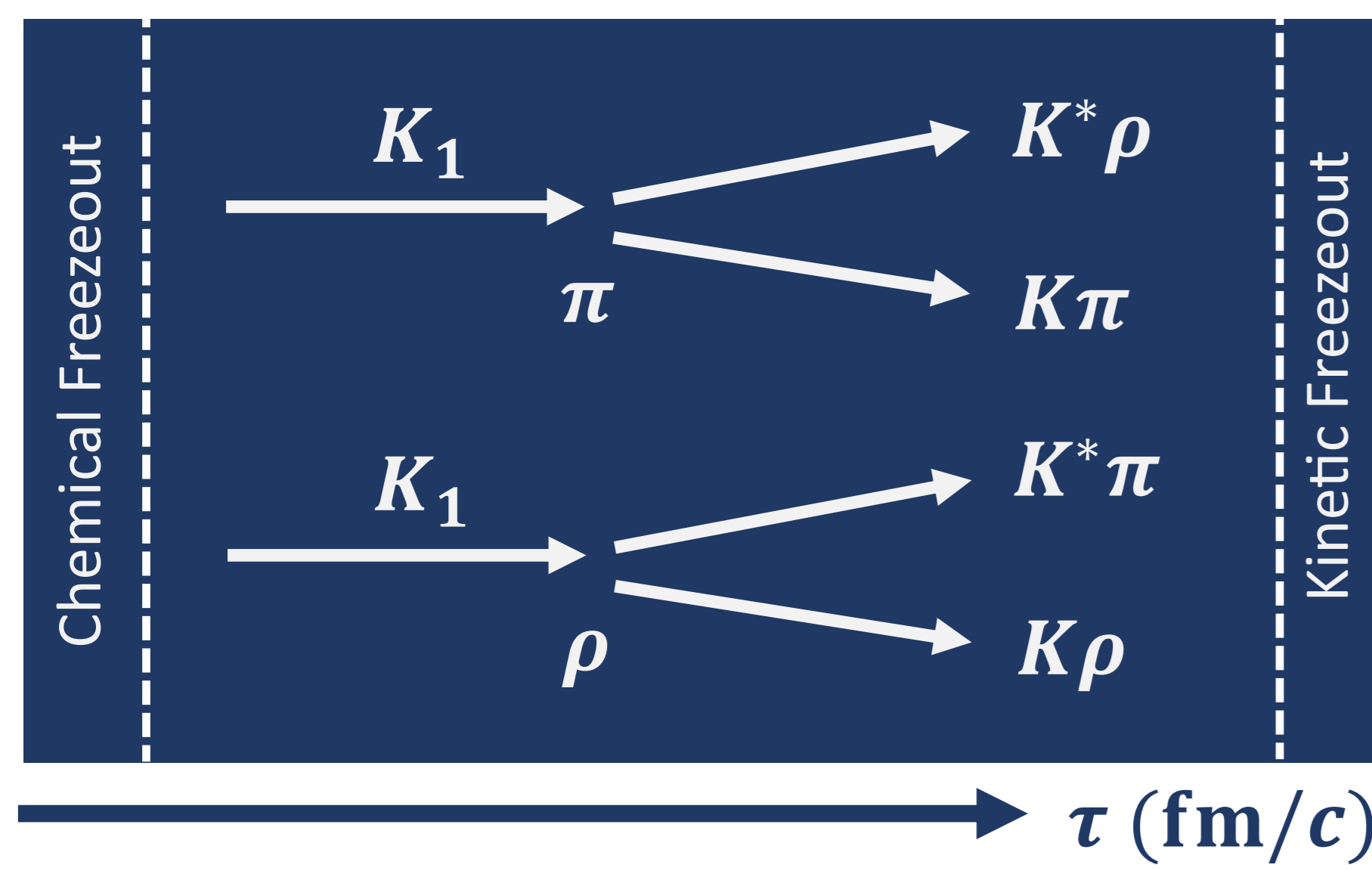
▲ Abundances of hadrons are determined.

QCD chiral crossover is about 156.5 ± 1.5 MeV (around critical temperature of QGP)^[2]

OBSERVABLE^[1]



Similar yield of $K_1(1270)$ and $K^*(892)$ is produced if masses get similar. $\rightarrow K_1/K^*$ ratio is ideal to study of CSR.



Both K_1 and K^* undergo hadronic interaction. Inelastic interactions of K_1 during hadronic phase with light hadrons decrease N_{K_1} , possibly increasing N_{K^*} .

Chiral symmetry restoration can be investigated in various collision systems.

$K_1(1270)$

Mass: 1253 ± 7 MeV/ c^2

Decay Channels in Interest:

$$K_1^\pm \rightarrow \rho^0 K^\pm (\sim 14.4\%)$$

$$K_1^\pm \rightarrow K^{*0} \pi^\pm (\sim 10.9\%)$$

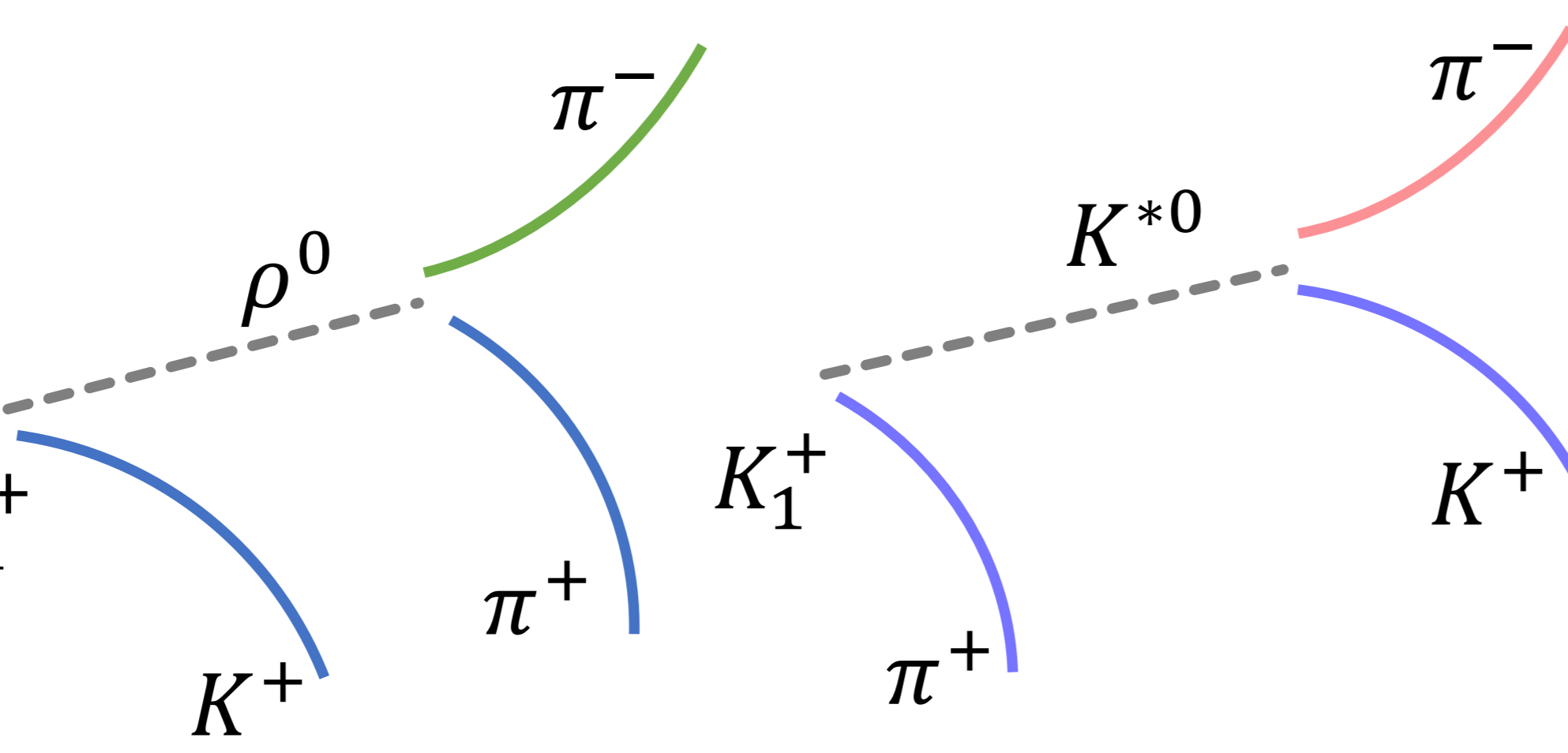
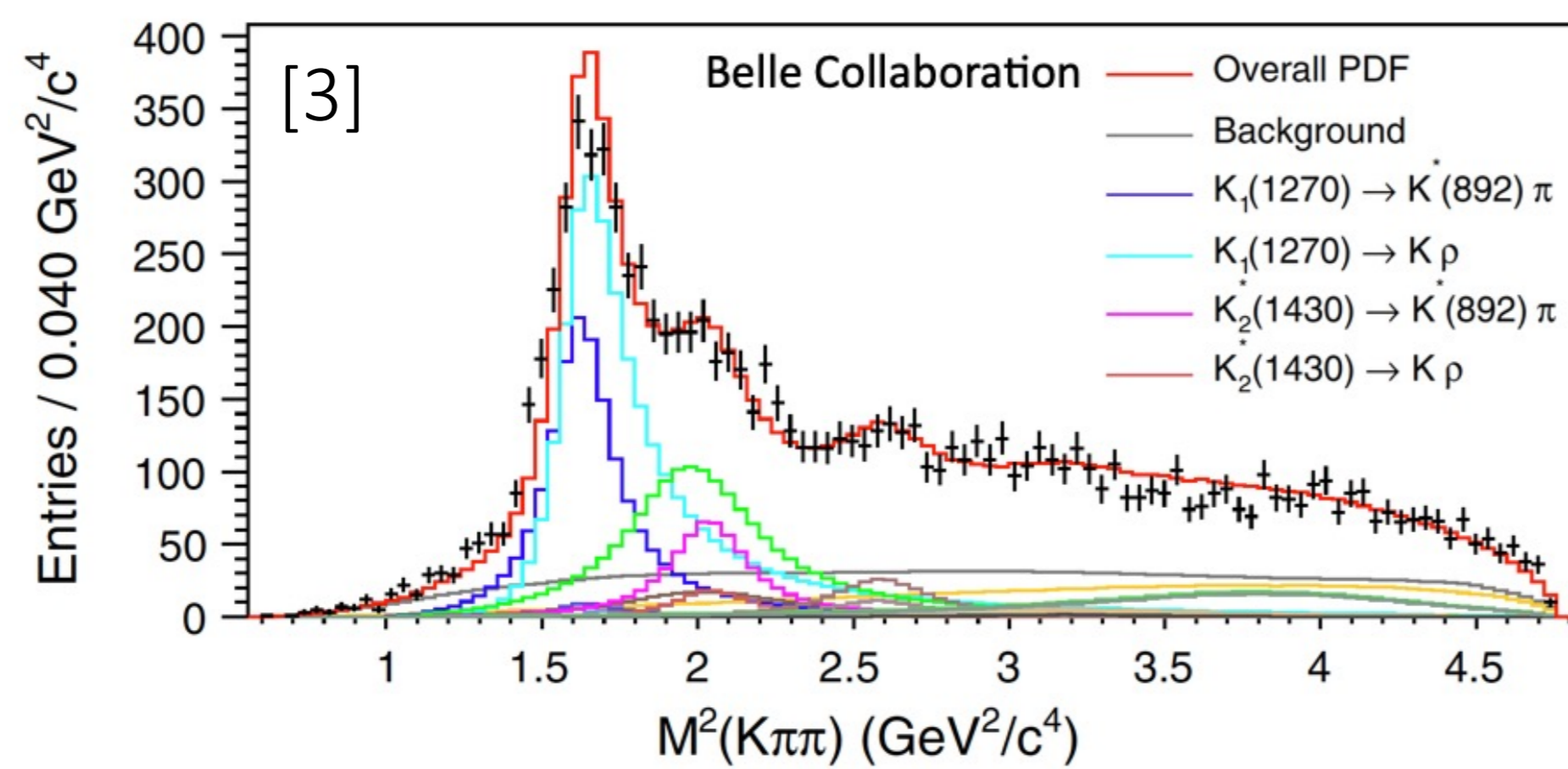
Width: 90 ± 20 MeV/ c^2

Lifetime:

$\rho^0 \approx 1.3$ fm/ c

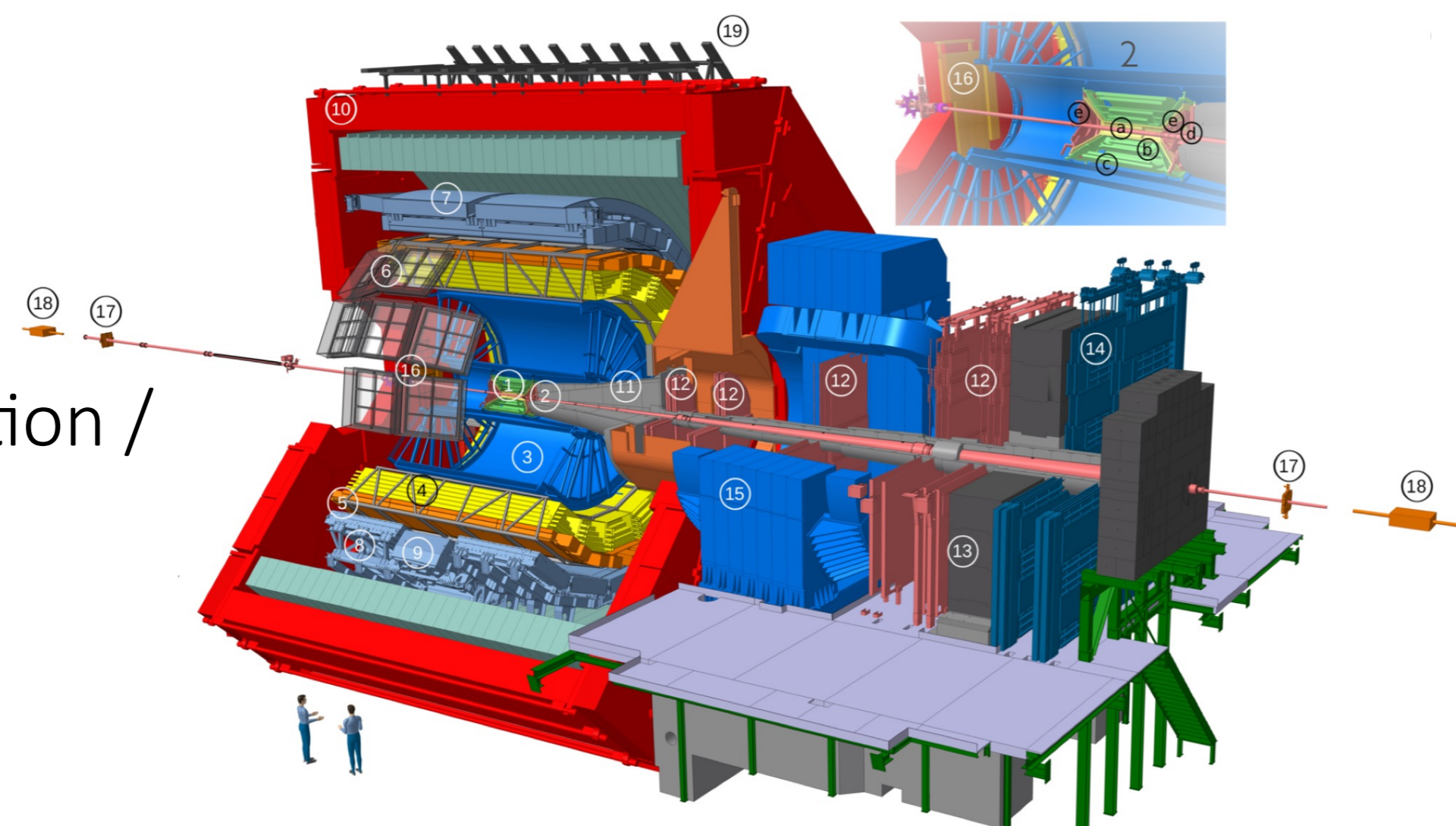
$K_1 \approx 2$ fm/ c

$K^{*0} \approx 4$ fm/ c

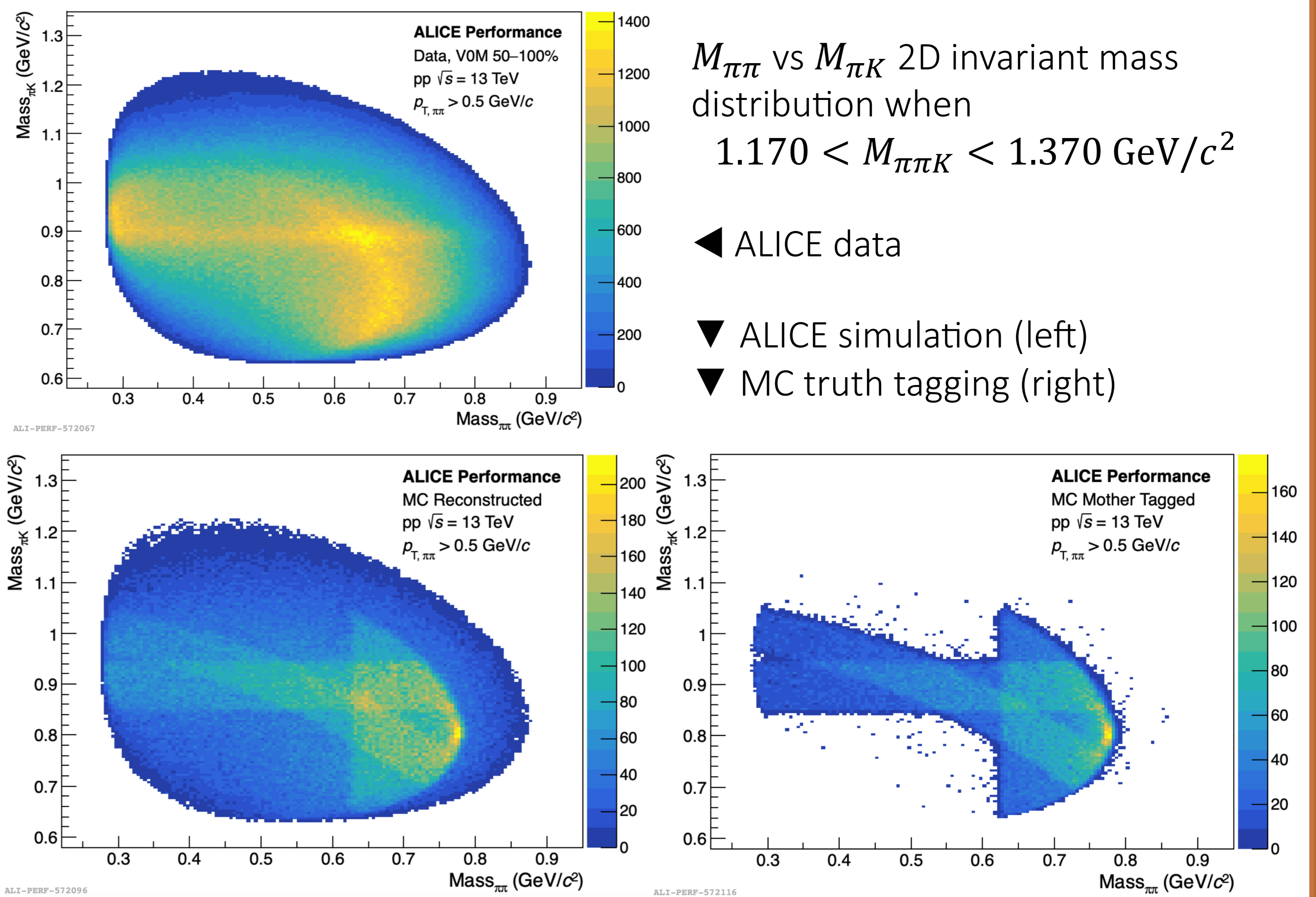


ALICE Detector

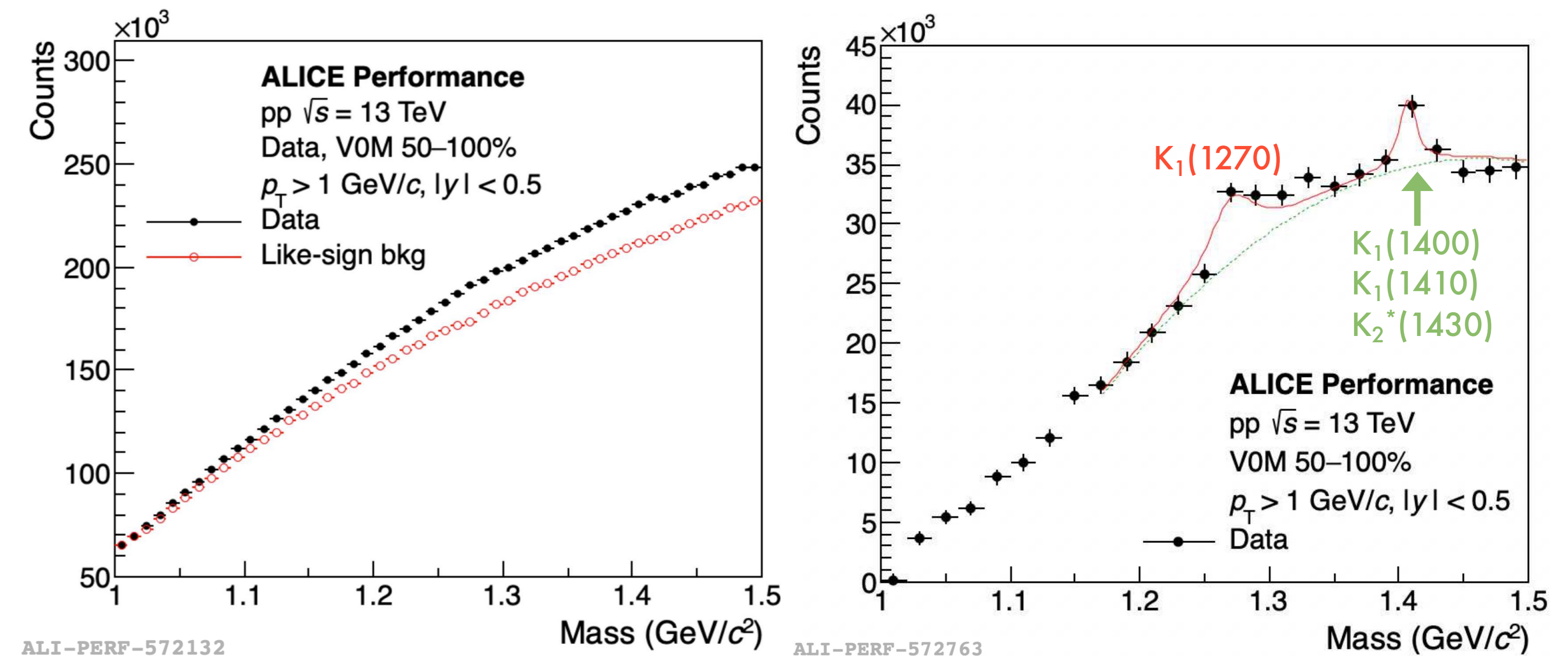
- ITS – Tracking / Vertexing
- VO – Multiplicity Determination / Trigger
- TPC – Tracking / PID
- TOF – PID



2D INVARIANT MASS DISTRIBUTION



SIGNAL EXTRACTION



Signal: $\pi^\pm \pi^\mp K^\pm$ pairs

Background:

$$\pi^\pm \pi^\pm K^\mp, \pi^\pm \pi^\pm K^\pm$$

pairs from same events

Fit Function: Breit-Wigner + quadratic fn.

The signal peak is seen at 1270 MeV/ c^2 in data.

PLAN

- Further selection criteria variation study is needed to measure K_1 in higher multiplicity.
- This analysis will be extended to Run 3 data with better statistics.
- Final goal is to see multiplicity dependent K_1/K^* ratio in various collisions systems.

REFERENCES:

[1] Phys. Lett. B 819 (2021) 136388, [2] Phys. Lett. B 795 (2019) 15–21, [3] Phys. Rev. D 83, 032005 (2011)