

# New $\Lambda_c$ analysis strategy (for PbPb)

ESD/AOD  $\rightarrow$  PID  $\rightarrow$  KF  $\rightarrow$  (resonances)  $\rightarrow$  pK $\pi$   
only  $\chi^2$  cuts

# Problems (in PbPb)

- High particle abundancies:
  - up to a few 1,000 particles
- Huge combinatorics, e.g. for 2,000 tracks:
  - „+/-/+”:  
 $(2,000)^3 \times 0.5 \times 0.5 \times 0.5 = \text{one billion}$
  - „p/K<sup>-</sup>/π<sup>+</sup>”:  
 $(2,000)^3 \times 0.5 \times 0.5 \times 0.5 \times 0.1 \times 0.1 \times 0.8 = 8 \text{ million}$

# Decay modes

$\Lambda_c^+$ DECAY MODES	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level	$p$ (MeV/c)
<b>Hadronic modes with a <math>p</math>: <math>S = -1</math> final states</b>			
$p\bar{K}^0$	( 2.3 $\pm$ 0.6 ) %		873
$pK^-\pi^+$	[ $\rho$ ] ( 5.0 $\pm$ 1.3 ) %		823
$p\bar{K}^*(892)^0$	[ $\rho$ ] ( 1.6 $\pm$ 0.5 ) %		685
$\Delta(1232)^{++} K^-$	( 8.6 $\pm$ 3.0 ) $\times 10^{-3}$		710
$\Lambda(1520)\pi^+$	[ $\rho$ ] ( 1.8 $\pm$ 0.6 ) %		627
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$\Lambda(1520)\pi^+$	[ $p$ ] ( 1.8 $\pm$ 0.6 ) %	<b><math>\times 22.5\%</math></b>	627
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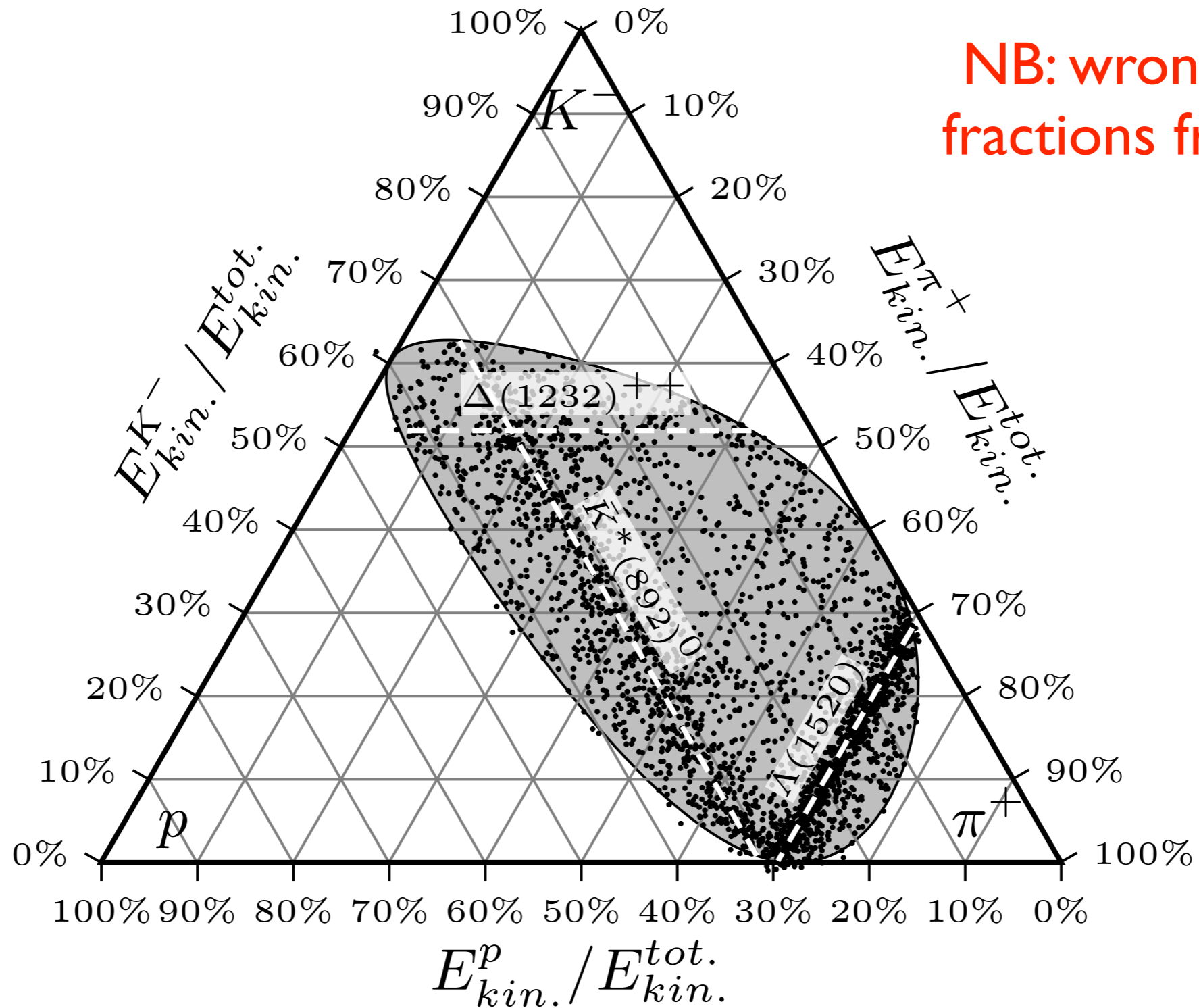
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... this has only recently been fixed in the MC

# Decay Modes II

**NB: wrong decay fractions from MC**

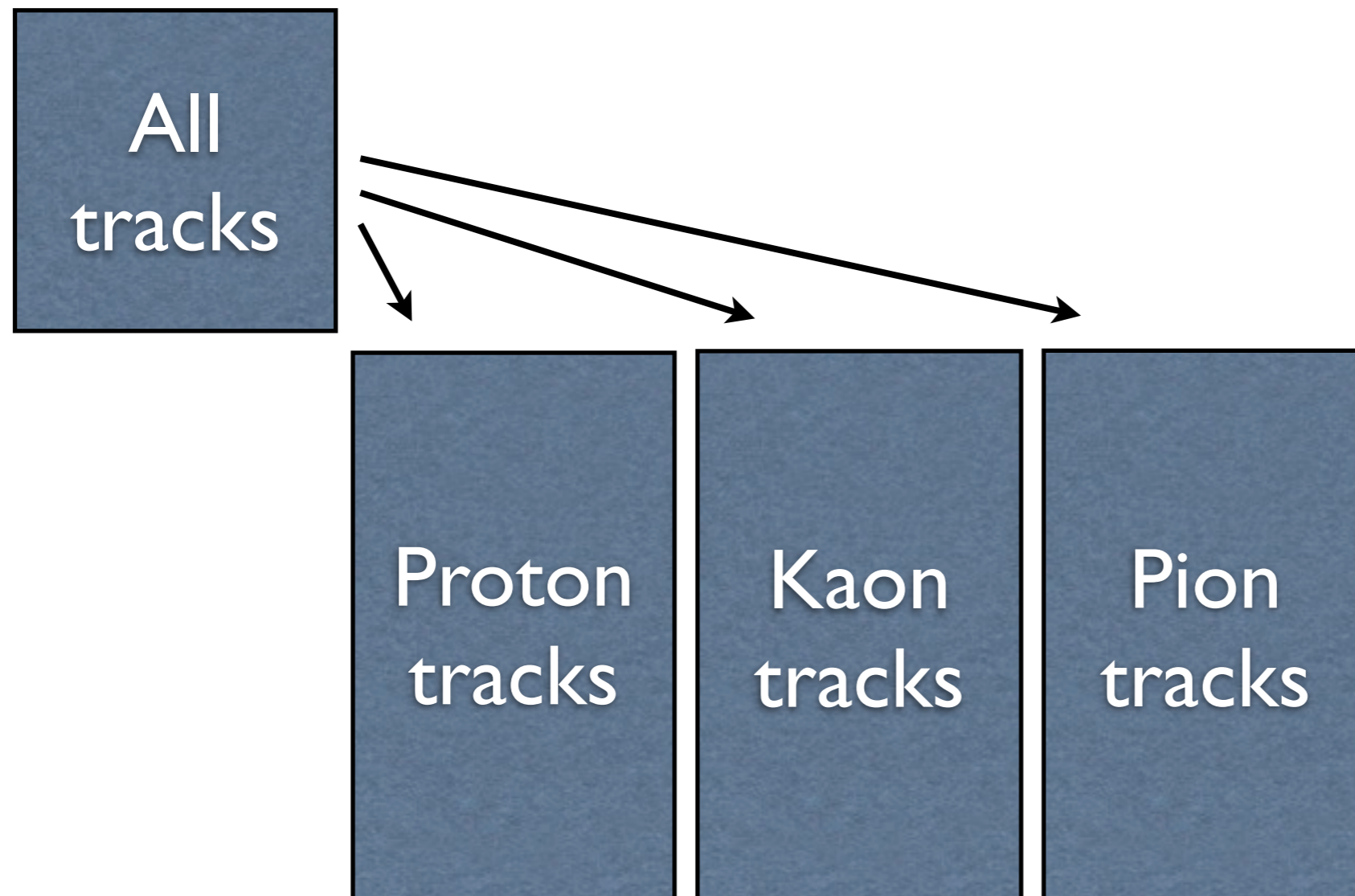


# Resonant decays

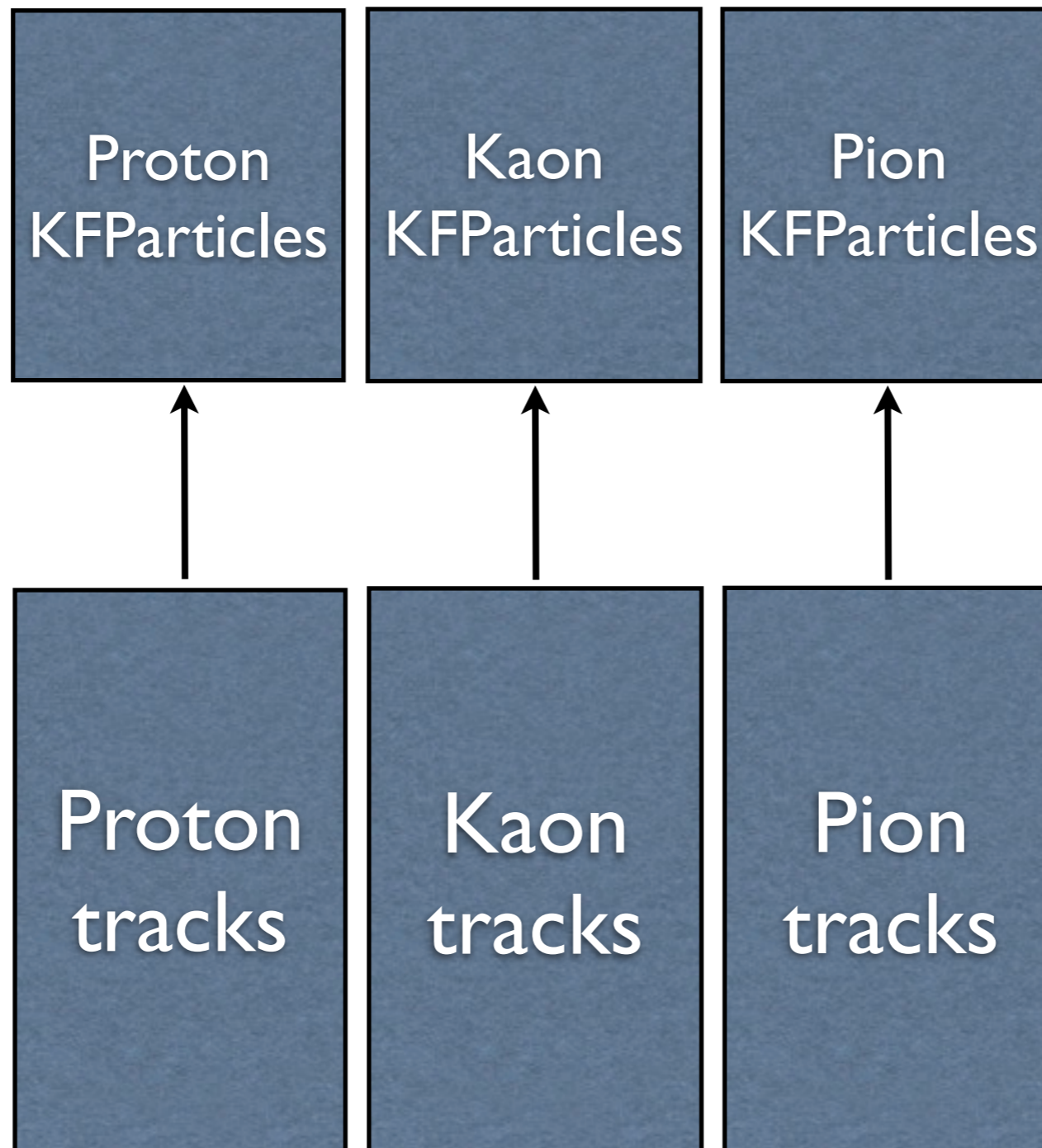
- Advantages:
  - less combinatorics (cut on invariant mass already at 2-prong stage)
  - better signal to background ratio (less phase space)
- Disadvantages:
  - less signal (**but:** this maybe (partly?) cured because one may afford looser cuts )



# I. Fill containers with identified tracks

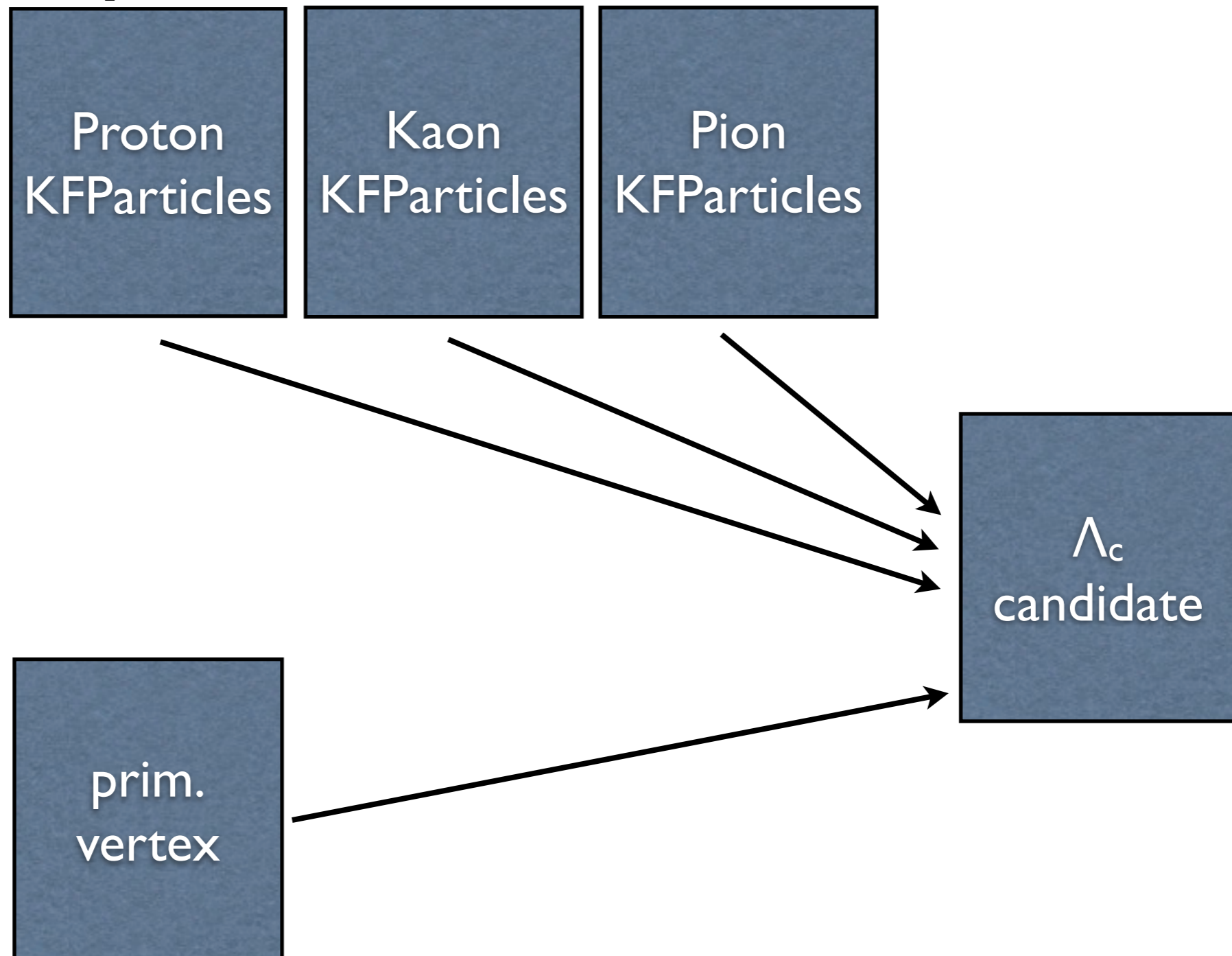


# 2. Create KFParticles for identified tracks



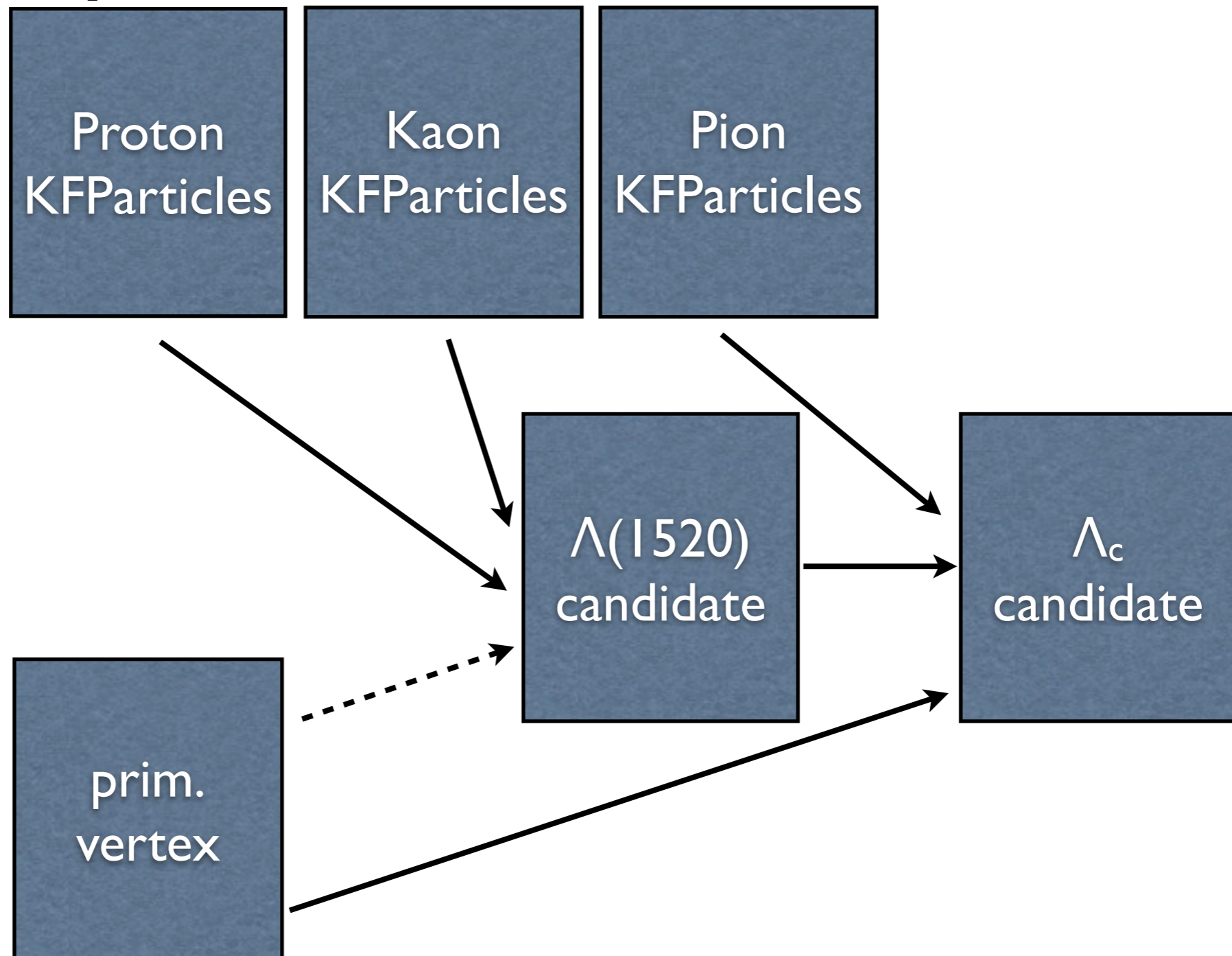
# 3. Make Combinations

## a) non-resonant



# 3. Make Combinations

## b) via Resonance



# Implications for ITS upgrade

- Resonances are most likely much easier to:
  - analyse
  - trigger on

# Status/TODO

- A few bugs had/have to be resolved:
  - AliKF package: setting of production vertex
  - MC: wrong decay ratios
- Task runs regularly at GSI: cuts are to be tuned.
- Study of trigger requirements:
  - with and without PID
  - resonant/non-resonant channels