SPD S&C meeting,
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Example for short-lived particles reconstruction in SPD experiment

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General schema

1. generation some sample (as example, Minimum Bias events with Pythia8),
   you can use macro XSimuQsl.C for this purpose

2. reconstruction – run track fit and vertex reconstruction tasks,
   use standard macro for this case RecoEventFull.C

3. find decay particle (example of macro for K_s^0 ->pi+pi- decay on the base of KFParticle package),
   use macro findDecayK0.C

V0 finder (some detail)

1. example is done on the base of standard Artur's example ReadRecoData.C

2. some input parameters:

   a) fMinItsHists = 3 - minimum Its hits for track selection
   b) fDaughters[2] = {-211, 211} – decay mode of K_s^0
   or {2212, -211} - decay mode of Λ^0
   c) hardTrackCut = true(false) - hard track selection (tpars->GetIsGood())

   d) fMinChi2PV = 2.0 - minimum chi2 track to PV (primary selection)
   e) fMinChi2Part = 2.0 - minimum chi2 between 2 tracks (primary selection)

   f) fMinChi2PVadd = 30.0 - chi2 track to PV (additional cut)
   g) fMinL/dLcut = 15.0 - L/dL cut (additional cut), L – decay length, dL – error of L

3. primary track selection is done on the base of track selection parameters a), b), c) and after KFparticle array is produced

4. loop inside KFparticle array and determine V0 candidate (pi+pi- pair) parameters (invariant mass, decay length and so on) using PV and track fit parameters

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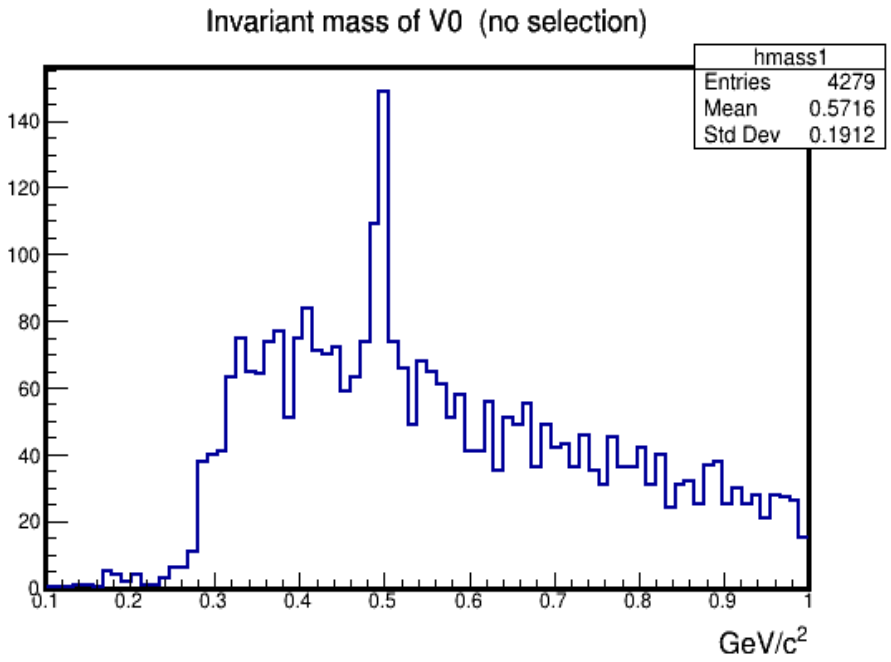
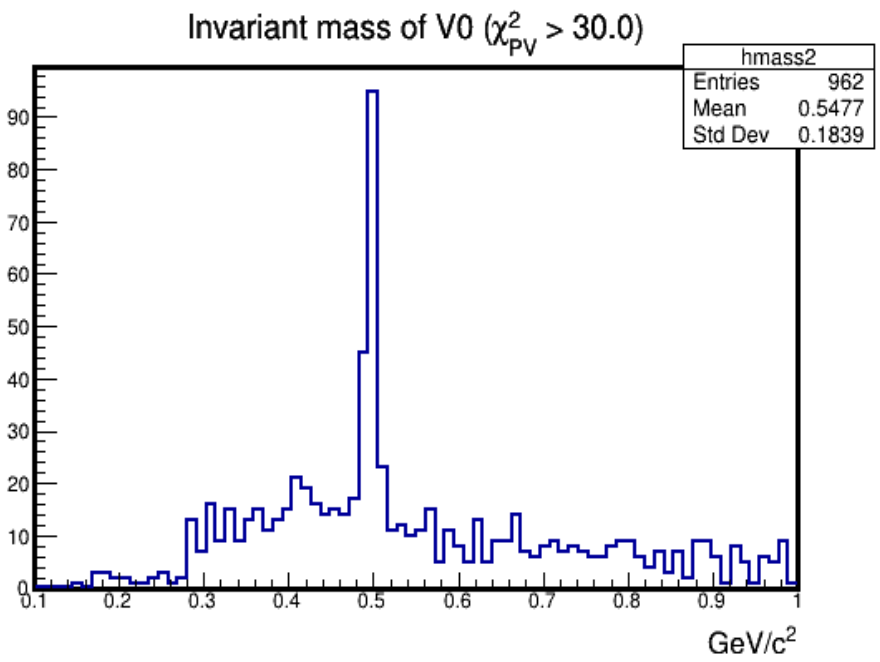
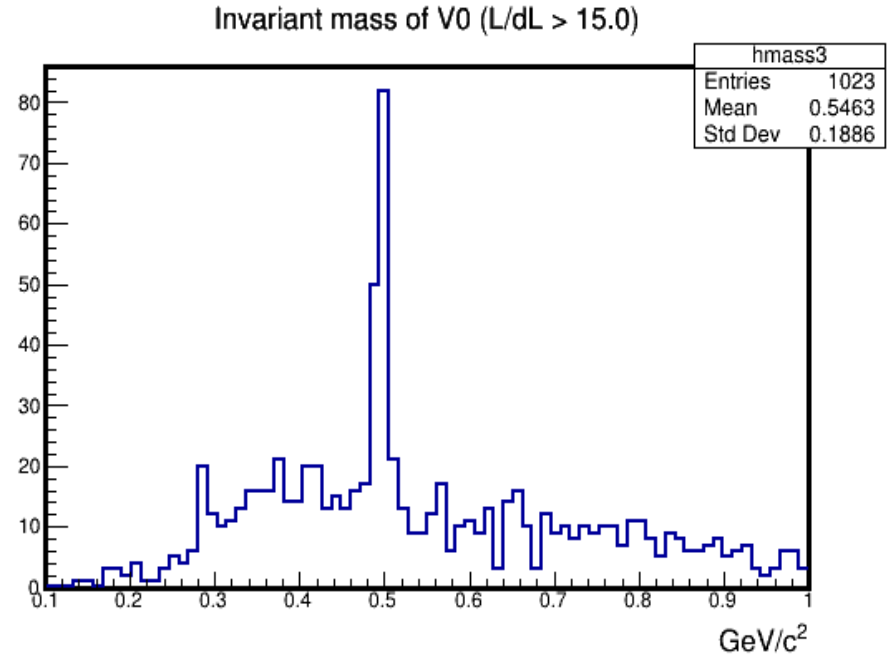
$$\chi^2_{prim} = \Delta\mathbf{r}^T (C_{track} + C_{PV})^{-1} \Delta\mathbf{r},$$

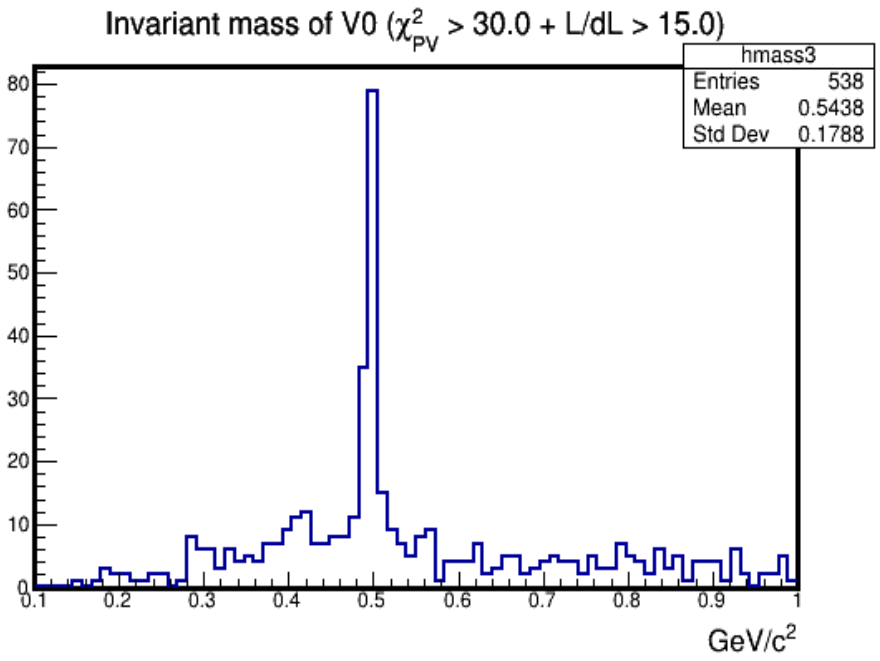
where Δr – distance between track and the primary vertex position, C_{track} is covariance matrix of a track and C_{PV} is a covariance matrix of primary vertex

K^0 -> pi+pi- (MB)

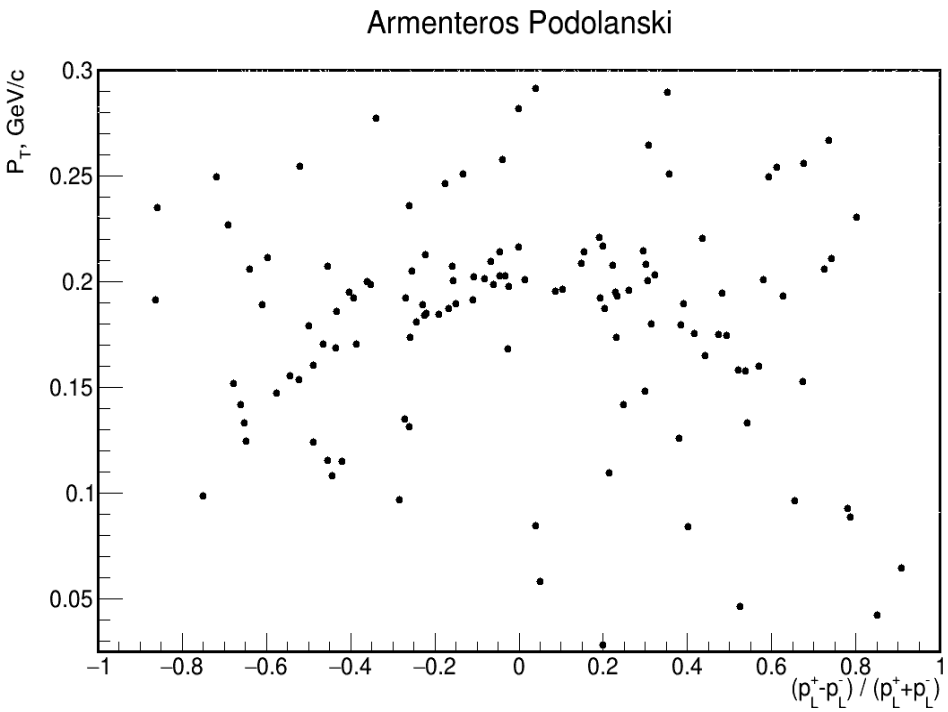

Invariant mass of V0 (no selection)
hmass1
Entries 4279
Mean 0.5716
Std Dev 0.1912
GeV/c²


Invariant mass of V0 (χ^2_{PV} > 30.0)
hmass2
Entries 962
Mean 0.5477
Std Dev 0.1839
GeV/c²


Invariant mass of V0 (L/dL > 15.0)
hmass3
Entries 1023
Mean 0.5463
Std Dev 0.1886
GeV/c²

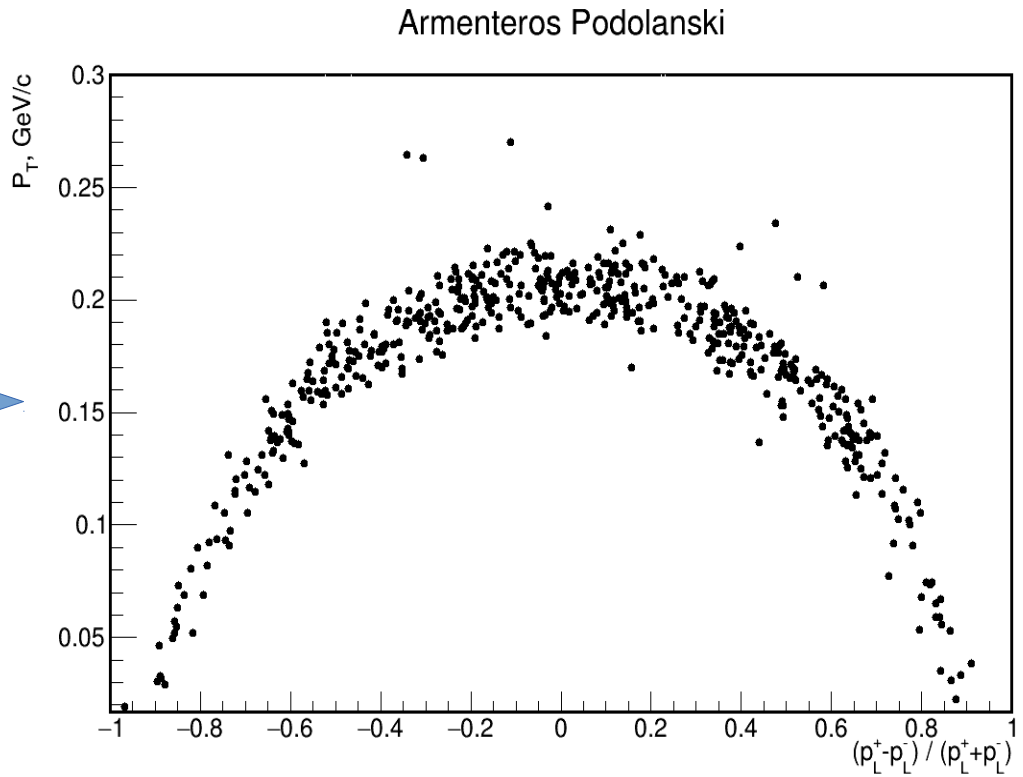

Invariant mass of V0 (χ^2_{PV} > 30.0 + L/dL > 15.0)
hmass3
Entries 538
Mean 0.5438
Std Dev 0.1788
GeV/c²

K^0 -> pi+pi-

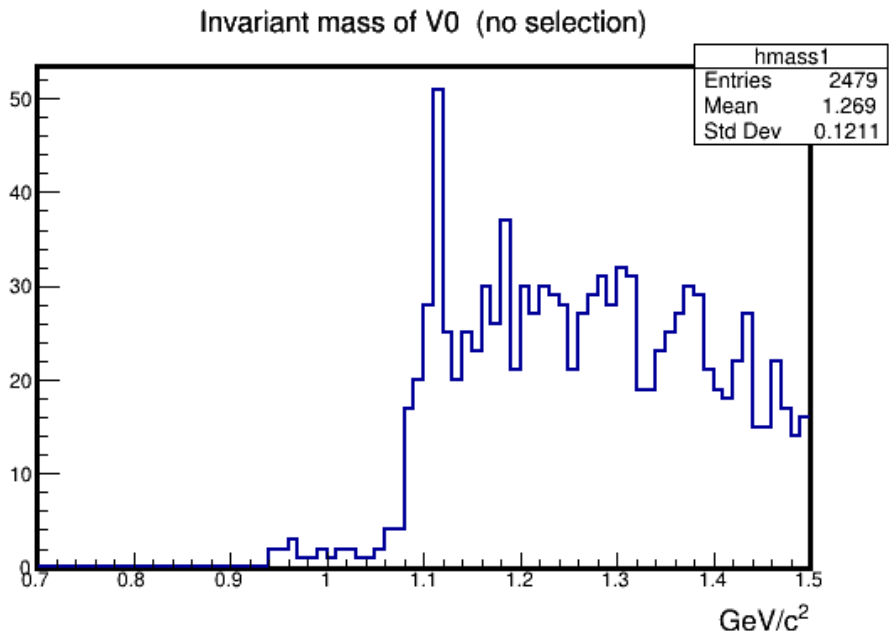


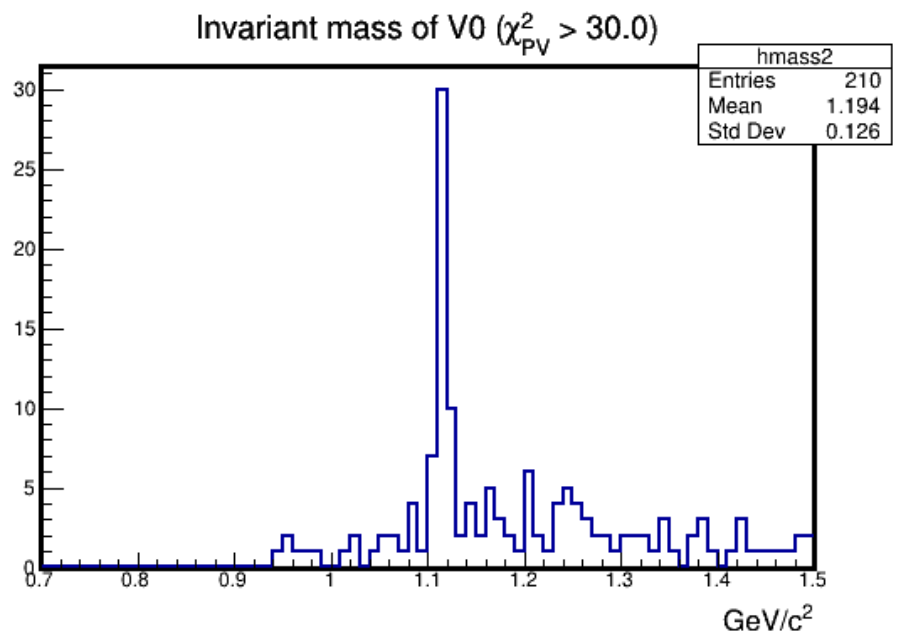
1000 MB events

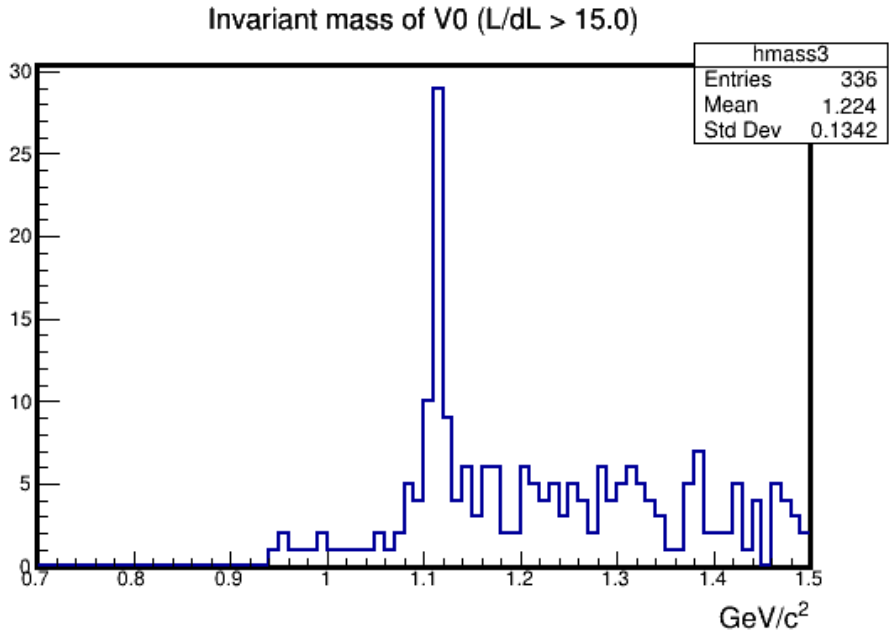
1000 events with 8 muons + K^0

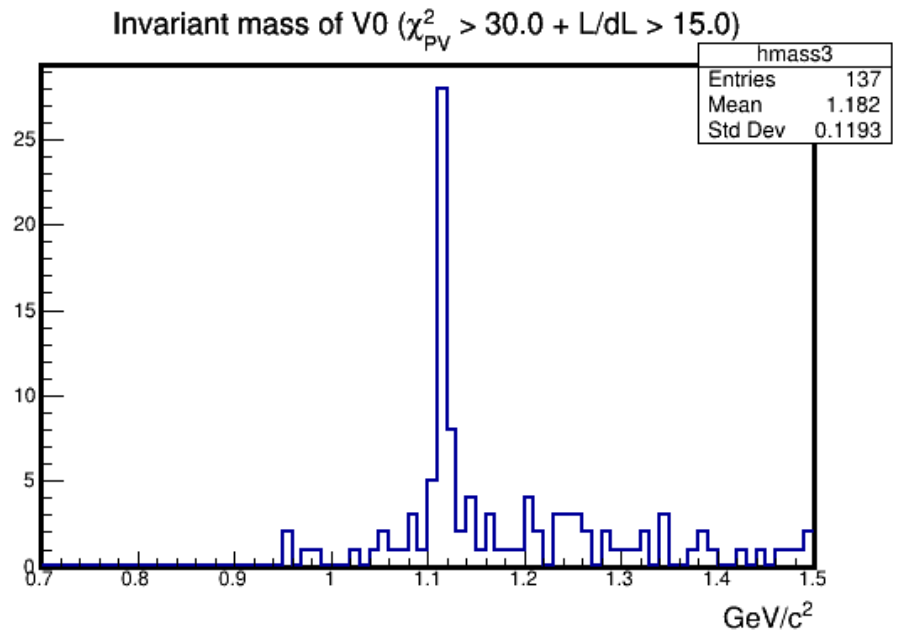


Λ^0 -> p+pi- (MB)

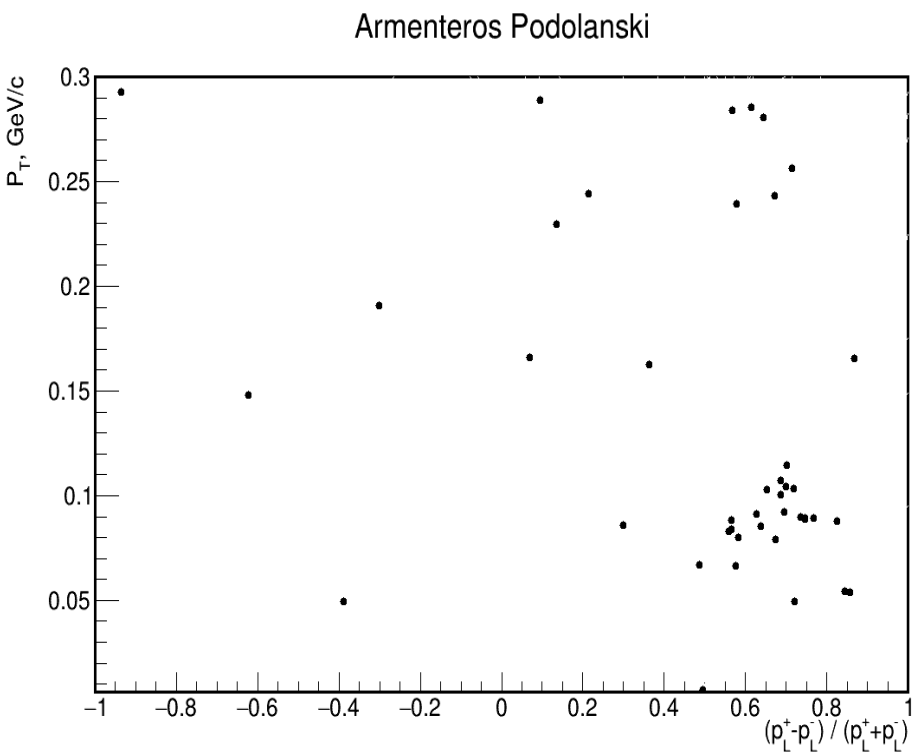


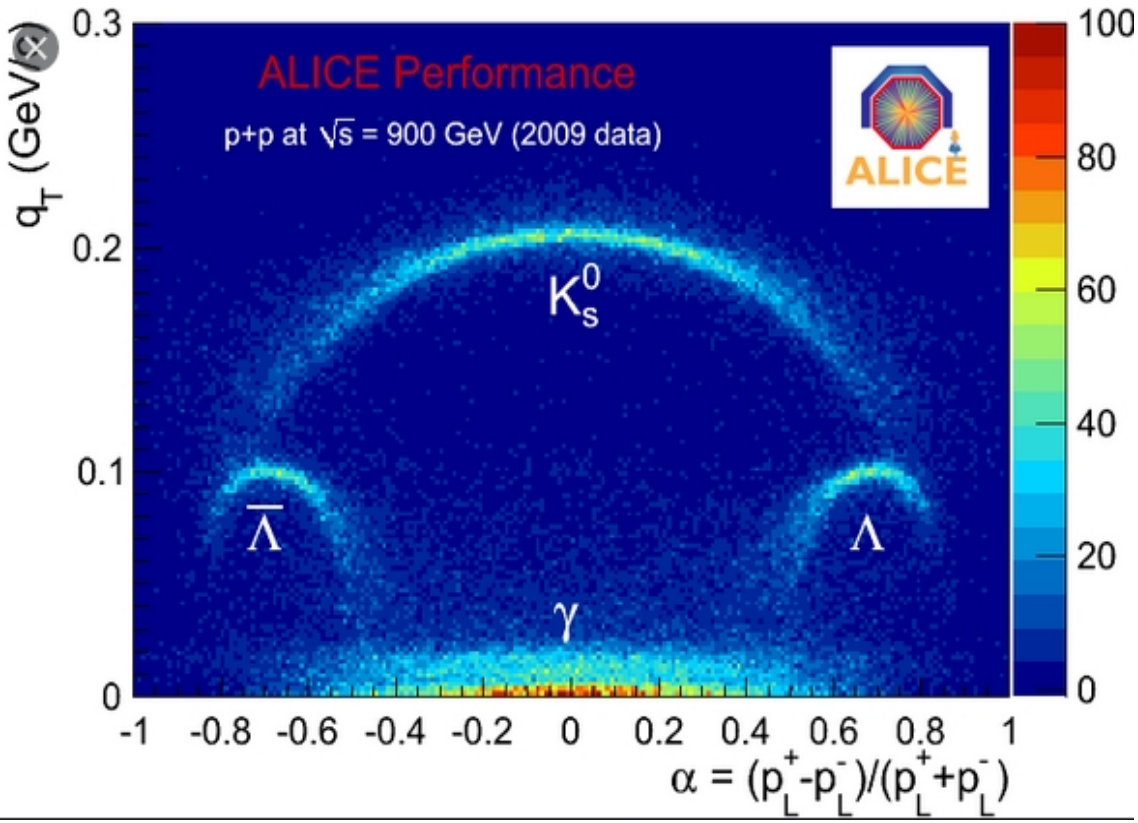






Λ^0-> p+pi-


Armenteros Podolanski
P_T, GeV/c
0.3
0.25
0.2
0.15
0.1
0.05
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
$(p_L^+-p_L^-) / (p_L^+-p_L^-)$


ALICE Performance
p+p at $\sqrt{s}$ = 900 GeV (2009 data)
ALICE
q_T (GeV/c)
K_s^0
$\overline{\Lambda}$
Λ
γ
0.3
0.2
0.1
0
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
$\alpha = (p_L^+-p_L^-)/(p_L^+-p_L^-)$
100
80
60
40
20
0