CuCu analysis

Track cuts study : north

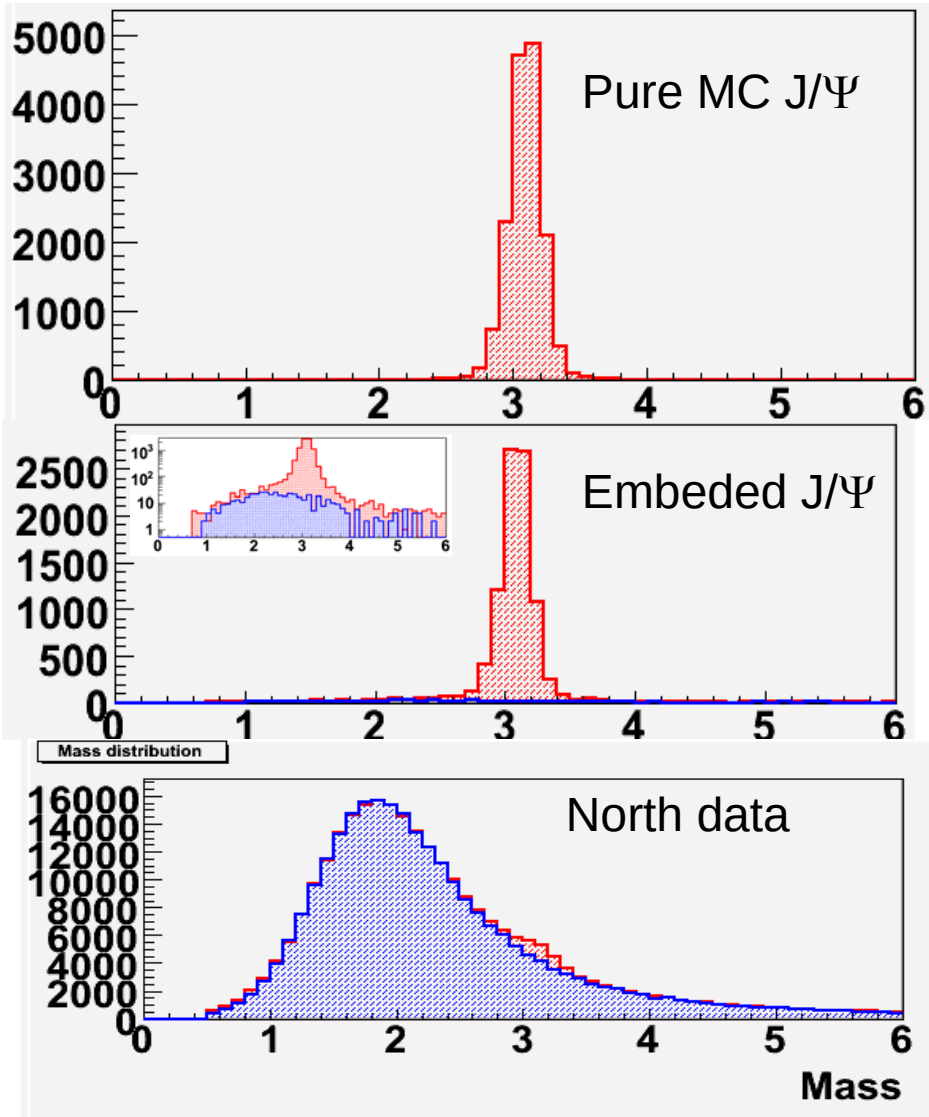
chi2, vtxchi2, DG0, DDG0

Track cuts study for CuCu

- **Studying north data :**
  - Use the same method as for south.
- **Method :**
  1. Baseline : apply, by default, standard event (BBCz,…) and muID cuts on all.
  2. Find the cut hierarchy
  3. Then study vtxchi2, DDG0, DG0, chi2 cuts following cut hierarchy.

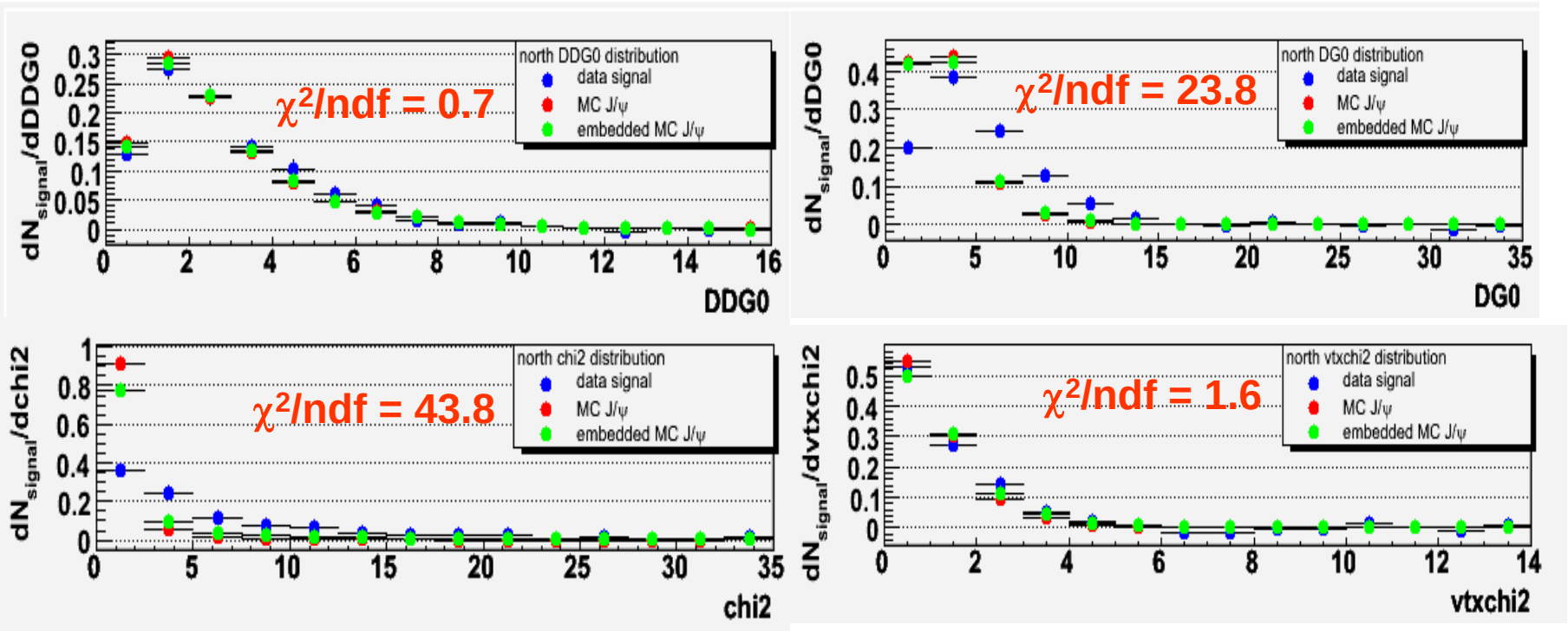
Baseline

- **These are the default cuts**
  - **Will be applied on all data and MC samples.**
  - **Cuts :**
    - Abs(BBCz) < 35cm
    - 1.2 < abs(Y) < 2.2
    - Muon Pz > 0 (north)
    - l2MuIDprimitiveOK
  - **Samples**
    - **Pure MC J/Ψ = 15484**
    - **Embeded J/Ψ**
      - Signal = 8488
      - Signal/bkg = 54
    - **Data**
      - Signal = 5410
      - Signal/bkg = 0.12



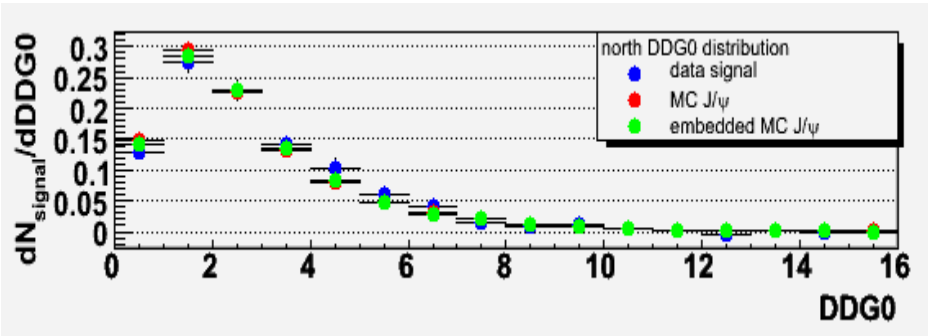
Cut hierarchy

- Determine the order to apply the cuts
  - Compute χ^2 of data signal and embeded J/Ψ for each variable
  - Will apply cuts on the best χ^2 variable first, then the second one, etc…



Will apply cuts in the following order : DDG0 → vtxchi2 → DG0 → chi2

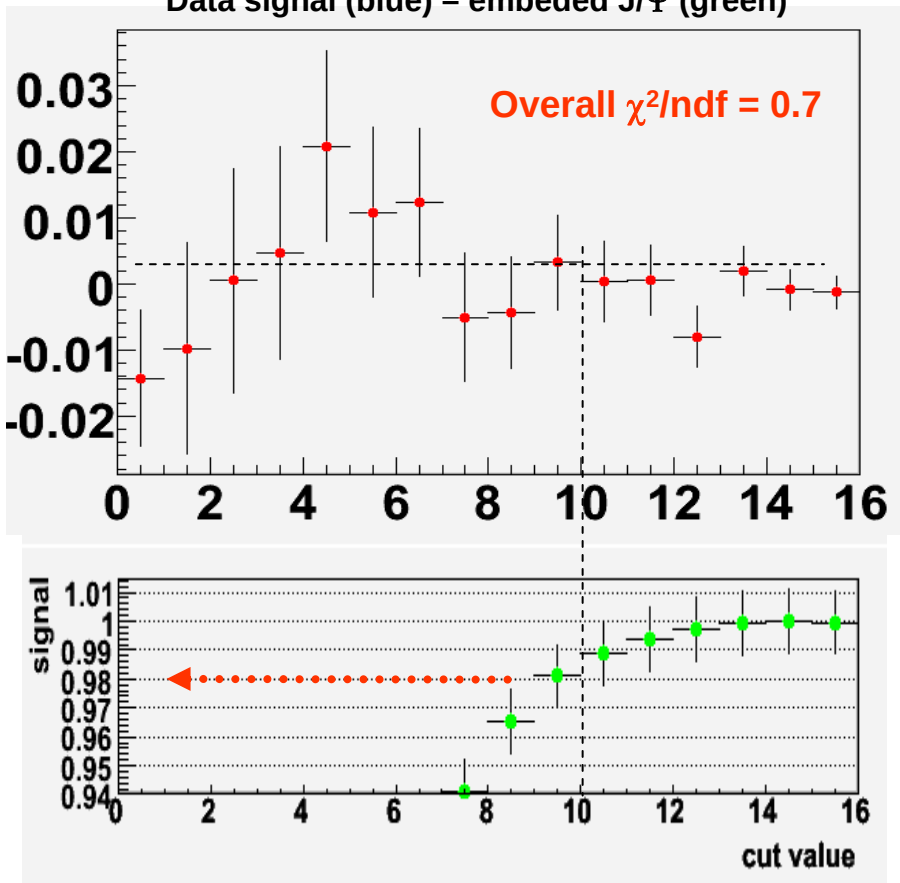
Studying DDG0 cut



1. Compare data signal and embeded J/Ψ.
   1. Plot data - embedded (upper right)
   2. Define the range where one can apply the cut (here everywhere)
2. Define the cut value
   1. Keep > 95% → DDG0 < 9
   2. Keep > 97% → DDG0 < 10
   3. Keep > 99% → DDG0 < 12

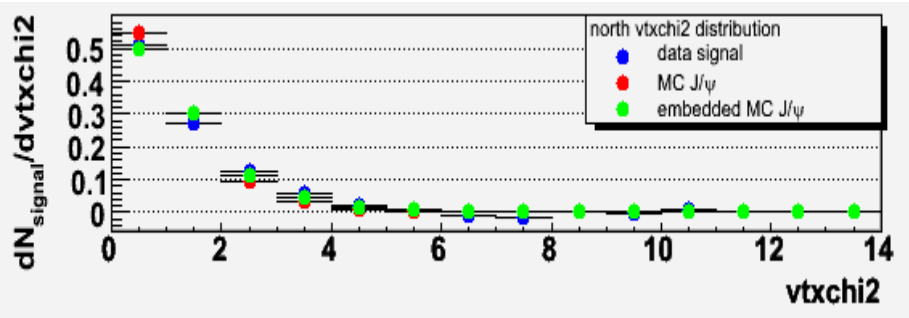
request DDG0 < 10
Keep > 97% of embeded J/Ψ

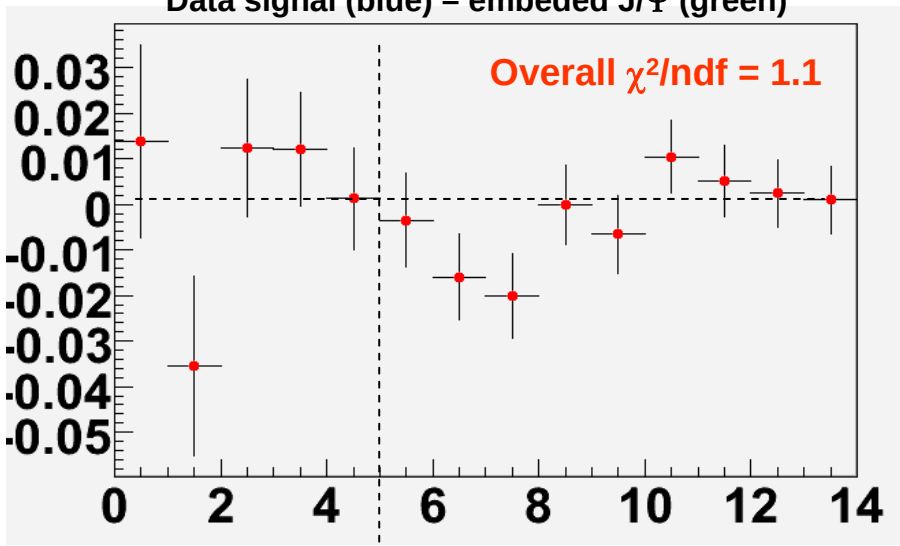
Data signal (blue) – embeded J/Ψ (green)

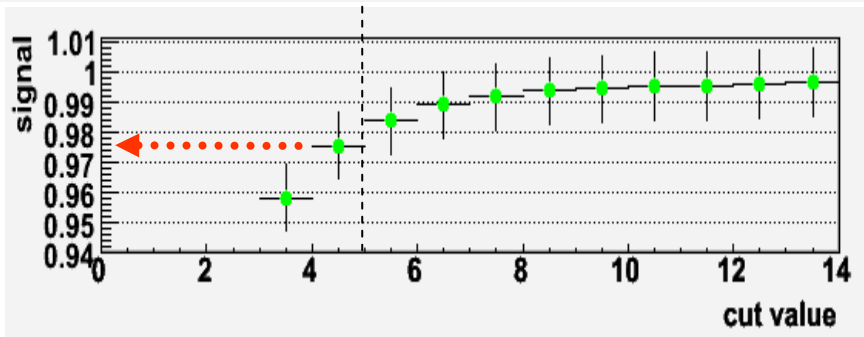


Studying vtxchi2 cut

DDG0 < 10 applied





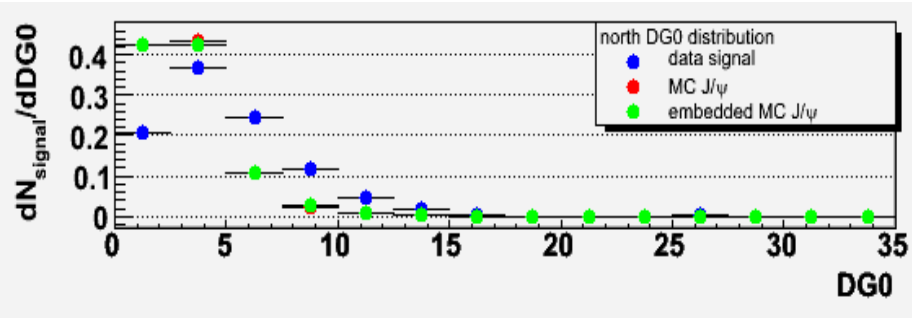


1. Compare data signal and embeded J/Ψ.
   1. Plot data - embedded (upper right)
   2. Define the range where one can apply the cut (here everywhere)
2. Define the cut value
   1. Keep > 95% → vtxchi2 < 4
   2. Keep > 97% → vtxchi2 < 5
   3. Keep > 99% → vtxchi2 < 8

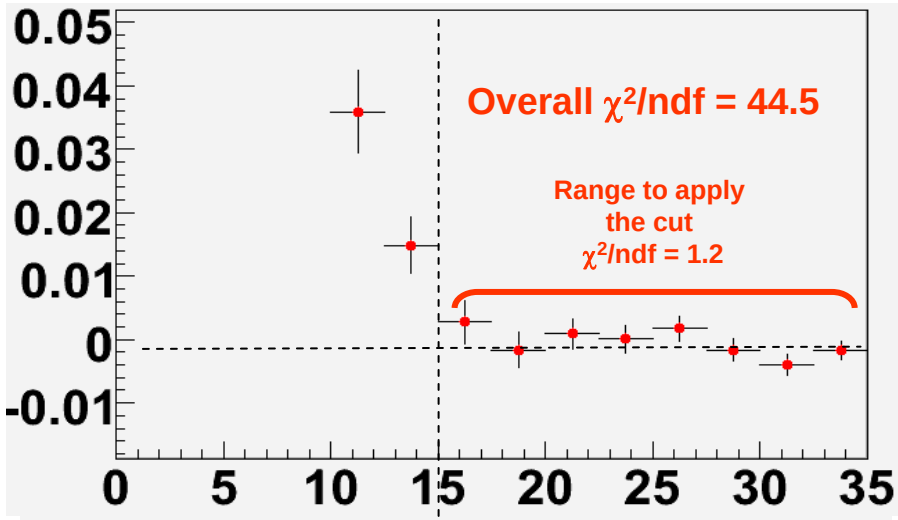
request vtxchi2 < 5
Keep > 97% of embeded J/Ψ

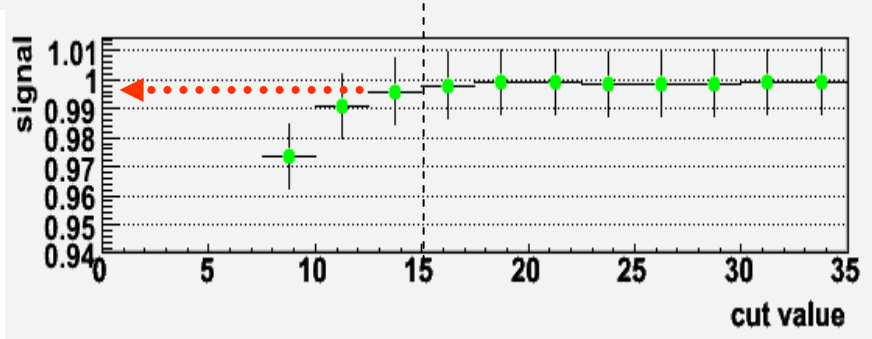
Studying DG0 cut

DDG0 < 10 applied
vtxchi2 < 5 applied



Data signal (blue) – embeded J/Ψ (green)

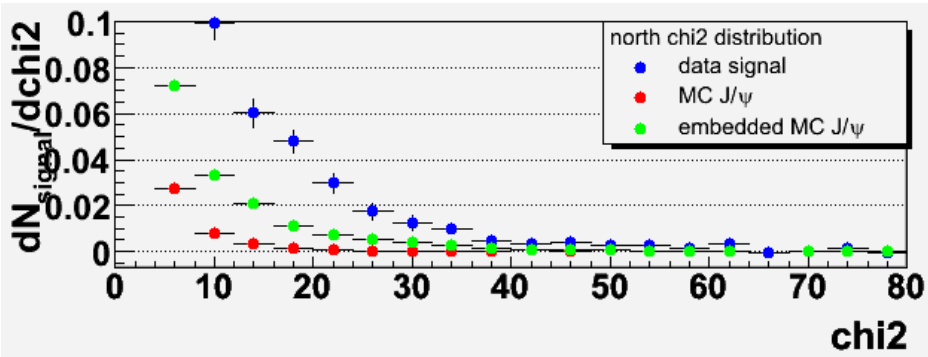




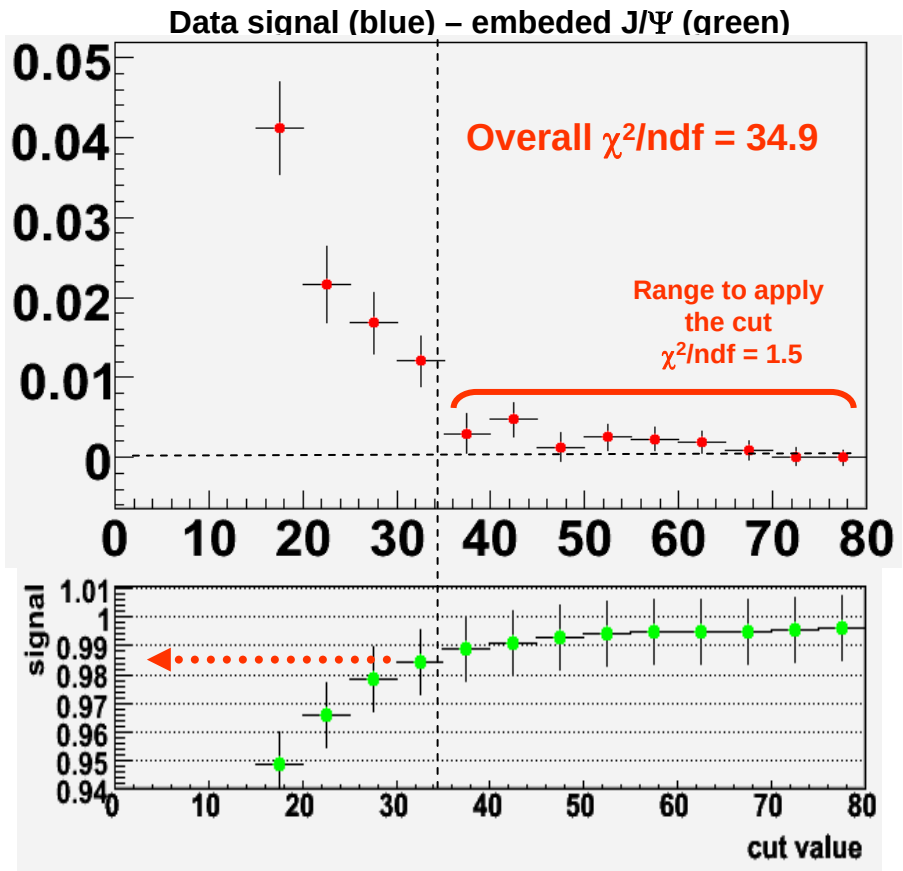
1. Compare data signal and embeded J/Ψ.
   1. Plot data - embedded (upper right)
   2. Define the range where one can apply the cut (here 15 — 35)
2. Define the cut value
   1. Cut at the edge → keep > 99.5%

request DG0 < 15
Keep > 99.5% of embeded J/Ψ

Studying chi2 cut



DDG0 < 10 applied
vtxchi2 < 5 applied
DG0 < 15 applied

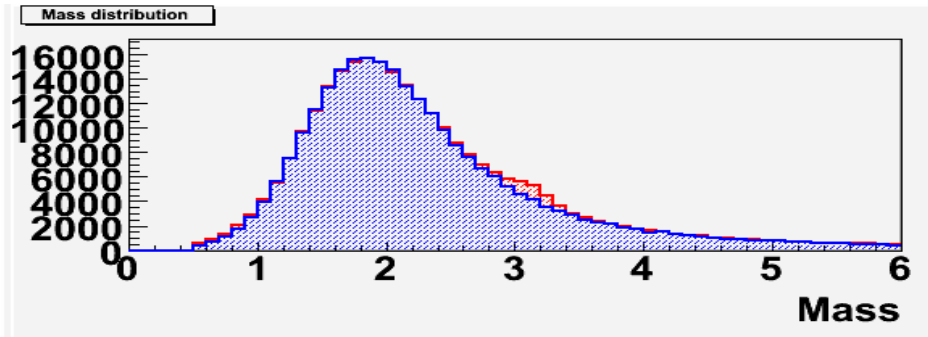


1. Compare data signal and embeded J/Ψ.
   1. Plot data - embedded (upper right)
   2. Define the range where one can apply the cut (here 35 – 80)
2. Define the cut value
   1. Cut at the edge → keep > 98.5%

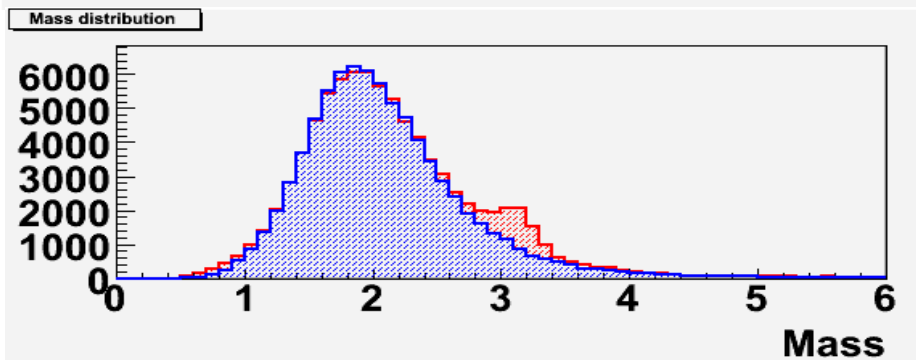
request chi2 < 35
Keep > 98.5% of embeded J/Ψ

Summary

- **Have been looking at track cuts for north CuCu**
- **According to this study, best « track » cuts are :**
  Vtxchi2 < 5 / DDG0 < 10 / DG0 < 15 / Chi2 < 35
- **Without these cuts** →
  - Signal = 5410
  - signal/bkg = 12%



- **With these cuts** →
  - Signal = 5063 (-7%)
  - signal/bkg = 45%



- **Overall summary for CuCu data**
  - **For north data : vtxchi2 < 5 / DDG0 < 10 / DG0 < 15 / chi2 < 35**
  - **For south data : vtxchi2 < 5 / DDG0 < 9 / DG0 < 25 / chi2 < 25**