

# Process of Analysis

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# Invisible decay ---- Jpsi2invi

- How many invisible particles can be produced?
  - measure **number** of invisible particles
- How many invisible particles can be produced in given mother particles?
  - calculate invisible decay branching fraction
  - calculate invisible decay branching **ratio** to a certain decay channel
    - give a more clear picture to let us understand the branching fraction
    - reduce part of the systematic error

$$\frac{B(J/\Psi \rightarrow \text{invisible})}{B(J/\Psi \rightarrow \mu^+ \mu^-)} = \frac{N_{\text{invi}} / (\epsilon_{\text{invi}} \times N_{\text{tot}})}{N_{\mu\mu} / (\epsilon_{\mu\mu} \times N_{\text{tot}})} = \frac{N_{\text{invi}} / \epsilon_{\text{invi}}}{N_{\mu\mu} / \epsilon_{\mu\mu}}$$

# Invisible decay ---- $J_{\psi} \rightarrow 2 \text{invi}$

- How to get the number of invisible particles?
  - number of **all** particles that decay from  $J_{\psi}$ 
    - $J_{\psi}$  decays to invisible
  - number of all **known** particles that decay from  $J_{\psi}$ 
    - $J_{\psi}$  decays to main contributions of background
      - continuum background
        - con3650
      - peaking background
        - $J_{\psi}$  decays to  $e e$
        - $J_{\psi}$  decays to  $n n$
        - $J_{\psi}$  decays to  $p p$
        - $J_{\psi}$  decays to  $\mu \mu$
        - others

# Invisible decay ---- $J_{\psi^2 \text{invi}}$

- Why do some visible particles after decaying belong to invisible (especially for ee pp nn)?
  - efficiency
- How to get the number of peaking background?
  - for ee pp nn mumu
    - get number of  $J_{\psi^2 \text{anything}}$
    - branching fraction from PDG
    - efficiency
  - for others
    - mc topology

# Invisible decay ---- $J_{\psi^2 \text{invi}}$

- What conclusion can we reach?
  - based on the invisible decay particle number, convolute the statistical likelihood, then set confidence level at 90%, getting a upper limit
    - it means which area the final true result should lie on at 90% confidence level
    - the smaller, the better
- What conclusion do we expect?
  - a plus result with small statistical uncertainty

# Invisible decay ---- Chic2invi

- Which decay channels should be chosen?
  - signal channel: chic->gam+invisible
  - one alternative compared channel: chic->gam+gam
- What's the main contribution to background?
  - stack background channels

Thanks!