

Comparison of $J/\psi \rightarrow l^+l^-$ efficiency in SP5 and in data-r12

Shuwei YE

@ UT-Dallas

BaBar MC Workshop, July 12, 2004

- **J/ψ selection**
- **PID killing**
- **Efficiency of J/ψ from B decays**
- **Efficiency of J/ψ in continuum**
- **Efficiency of J/ψ in ISR $\psi(2S)$**



Data/MC samples and release

Data: Run 1+2+3-r12 (GoodRun of 25Nov03)

MC: SP5

Release: On top of analysis-14a (12.5.2-physics-1a)

- BetaPid V00-01-73
- BetaMicro FY-ana14a-2-08Mar2004
- BetaCoreTools FY-ana14a-05Mar2004
- BetaTools V00-11-17-04
- CompositionSequences DC-10-13-03-01
- CompositionTools DC-10-13-03



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Inclusive J/ψ selection

Composition: **JPsiDefaultMass** (merged list of
“JPsiDefaultMassEE” and “JPsiDefaultMassMuMu”)

JPsiDefaultMassEE: eBremRecoELNC eBremReco

JPsiDefaultMassMuMu: muMicroVeryLoose ChargedTracks

Tagbits : JpsiELoose || JpsiMuLoose
neLoose>1 || nmuLoose>1

At least 2 loose electrons or 2 loose muons (**MicroSelector**)

2 tight electrons (eSelectorsMap) for $J/\psi \rightarrow e^+e^-$

1 loose/tight muon (muSelectorsMap) for $J/\psi \rightarrow \mu^+\mu^-$



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PID Killing

setenv BtaPidKilling

sourceFoundFile BetaMicro/BetaMicroPidKilling.tcl

Turn off TagFilter

Write out all events regardless passing the criteria

Store pidmaps in the ntuple

Apply PID in the ntuple

Pidtables:

- ❖ **/nfs/farm/babar/AWG11/PID/tables/2000-r12/**
- ❖ **/nfs/farm/babar/AWG11/PID/tables/2001-r12/**
- ❖ **/nfs/farm/babar/AWG11/PID/tables/2002-r12/**
- ❖ **/nfs/farm/babar/AWG11/PID/tables/200x-r12/**



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Efficiency of J/ψ from B decays

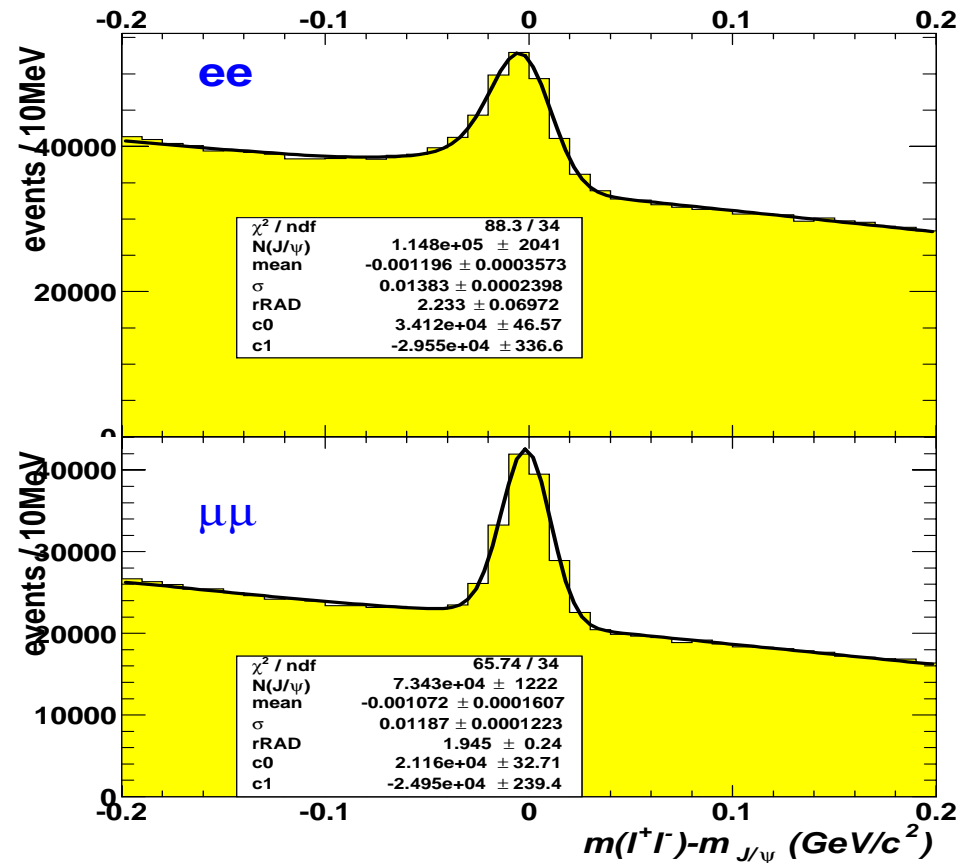
$B \rightarrow J/\psi X$, $J/\psi \rightarrow l^+ l^-$, $\mathcal{L} = 112.5 \text{ fb}^{-1}$ (Run I+II+III, OnPeak)
 $p^*(J/\psi) < 2 \text{ GeV}/c$

$J/\psi \rightarrow$	e^+e^-	$\mu^+\mu^-$
Eff.(%)	69.7	34.3
N(Observed)	1.15 $\times 10^5$	7.34 $\times 10^4$
N(expected)	1.12 $\times 10^5$	5.48 $\times 10^4$

pidtables: 200x-r12

e^+e^- agrees well ✓

$\mu^+\mu^-$ underestimated eff. ✗



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Efficiency of J/ψ in continuum

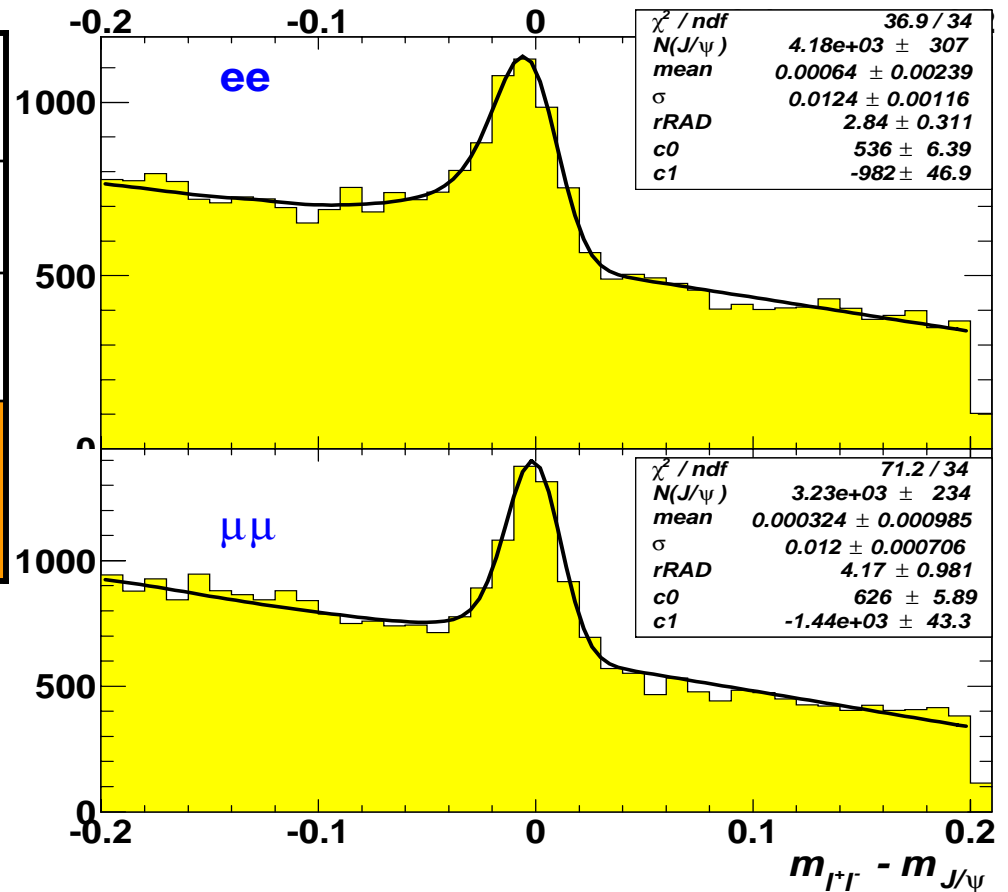
$e^+ e^- \rightarrow J/\psi X, J/\psi \rightarrow l^+ l^-$,

$\mathcal{L} = 124.4 \text{ fb}^{-1}$ (Run I+II+III)

After removing B Decays and ISR events, $n\text{Chg} > 4$

$J/\psi \rightarrow$	e^+e^-	$\mu^+\mu^-$
Efficiency(%)	34.5	16.6
N(Observed)	4180	3230
N(observed)/ Efficiency	1.19×10^4	1.95×10^4

analysis-14a,
pidtables: 200x-r12



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Efficiency of J/ψ in ISR $\psi(2S)$

$e^+ e^- \rightarrow \gamma \psi(2S) (\rightarrow \pi^+ \pi^- J/\psi), J/\psi \rightarrow l^+ l^-, \mathcal{L} = 124.4 \text{ fb}^{-1}$ (Run I+II+III)

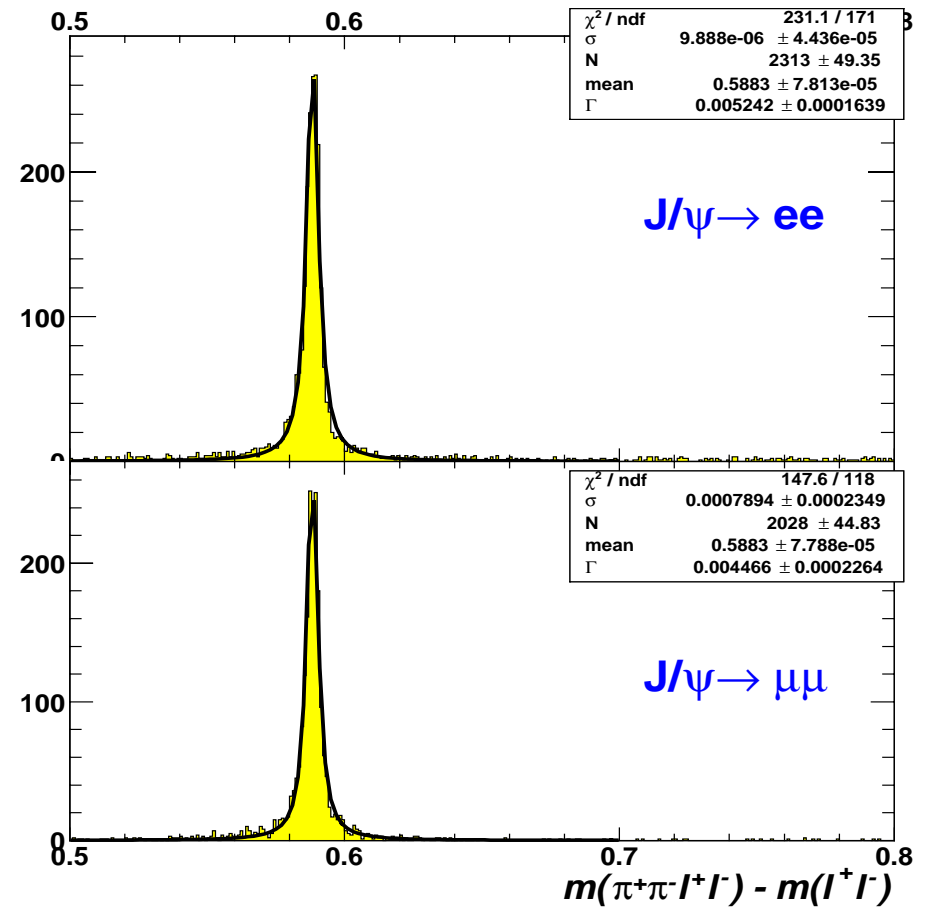
Theoretical cross-section is $13.3 \pm 1.1 \text{ pb}$

$J/\psi \rightarrow$	$e^+ e^-$	$\mu^+ \mu^-$
Eff.(%)	7.80	4.08
N(Observed)	2313	2028
N(expected)	2337	1211

pidtables: 200x-r12

$e^+ e^-$ agrees well ✓

$\mu^+ \mu^-$ underestimated eff. ✗



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Possible Bug in JPsiDefaultMass

CompositionSequences/CompJPsiSequence.tcl :

```
talkto JPsiDefaultAll {  
    outputList      set JPsiDefaultMass  
    nOfInputLists  set 2  
    inputList0     set JPsiDefaultMassEE  
    inputList1     set JPsiDefaultMassMuMu  
    checkType      set false  
    # addClones0   set true  
    # addClones1   set true  
    sameDaughters  set true      (Is this set right ?)  
    verbose        set false  
}
```

This bug exists in all releases !



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