Analysis Status

Inclusive $b \rightarrow J/\psi X$, $J/\psi \rightarrow \mu\ \mu$

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Outline

- Summer08 full simulation production status
- Data samples
- EvtGen status
- To do list

Summer08 FullSim Production: status

A. Starodumov

Paul Scherrer Institute, Switzerland

BPhys Meeting
January 27 2009, CERN

Resp.	Sample	Evt	RAW	RECO	AOD
Z. Chang	/JPsi/Summer08_IDEAL_V9	2M	done	11/12-24/2	tbd
	/Psi2S/Summer08_IDEAL_V9	0.3M	tbd	tbd	tbd
	/Psi2S_1S/Summer08_IDEAL_V9	0.2M	tbd	tbd	tbd
	/Upsilon1S/Summer08_IDEAL_V9	0.5M	done	tbd	tbd
	/Upsilon2S/Summer08_IDEAL_V9	0.2M	done	tbd	tbd
	/Upsilon2S_1S/Summer08_IDEAL_V9	0.1M	done	tbd	tbd
	/Upsilon3S/Summer08_IDEAL_V9	0.2M	done	tbd	tbd
S. Dambach	/BtoJpsiMuMu/Summer08_IDEAL_V9	2M	done	done	28/10-25/01
M. Ralich	/QCD_BCtoMu_Pt20/Summer08_IDEAL_V9	10M	done	done	5/12-9/03
	/QCD_BCtoMu_Pt30to50/Summer08_IDEAL_V9	6.5M	done	done	done
	/QCD_BCtoMu_Pt50to80/Summer08_IDEAL_V9	2.5M	done	done	tbd
	/QCD_BCtoMu_Pt80to120/Summer08_IDEAL_V9	0.5M	tbd	tbd	tbd
	/QCD_BCtoMu_Pt120to170/Summer08_IDEAL_V9	0.3M	done	done	tbd
	/QCD_BCtoMu_Pt170/Summer08_IDEAL_V9	0.3M	tbd	tbd	tbd
	/InclusiveBBmu_Pt20/Summer08_IDEAL_V9	5M	done	done	done

CMSSW_2_1_12
CMSSW_2_2_3, _5

pp@10TeV

CMS Summer08 M.C. data samples

b2J/psi

- **/BtoJpsiMuMu/Summer08_IDEAL_V11_redigi_v1/GEN-SIM-RECO** — CMSSW_2_2_1
- **/BtoJpsiMuMu/Summer08_IDEAL_V9_v2/GEN-SIM-RECO** — CMSSW_2_1_7

Created 14 Nov 2008, 2434076 events, 381 files, 5 block(s), 643.2GB, located at 5 sites

T2_US_Purdue : dcache.rcac.purdue.edu	2434076	381	643.2GB
T2_CH_CSCS : storage01.lcg.cscs.ch			
No SiteDB name : cmsdca2.fnal.gov			
T1_DE_FZK : gridka-dCache.fzk.de			
T2_CN_Beijing : srm.ihep.ac.cn			

p-J/psi

QCD

- **/JPsi/Summer08_IDEAL_V9_v1/GEN-SIM-RECO** — CMSSW_2_1_8

Created 11 Dec 2008, 1122884 events, 220 files, 5 block(s), 234.4GB, located at 3 sites

No SiteDB name : f-dpm001.grid.sinica.edu.tw	224713	44	46.9GB
T1_TW_ASGC : srm.grid.sinica.edu.tw	449166	88	93.7GB
No SiteDB name : lxfs07.jinr.ru			

- **/InclusivePPmuX/Summer08_IDEAL_V11_redigi_test2/GEN-SIM-RAW** — CMSSW_2_2_1

Created 13 Jan 2009, 414945 events, 400 files, 4 block(s), 397.0GB, located at 1 site

T1_ES_PIC : srmcms.pic.es	414945	400	397.0GB

- **/InclusivePPmuX/Summer08_IDEAL_V9_v4/GEN-SIM-RECO** — CMSSW_2_1_8

Created 17 Nov 2008, 5232662 events, 1315 files, 33 block(s), 1.5TB, located at 3 sites

T1_ES_PIC : srmcms.pic.es	5232662	1315	1.5TB
No SiteDB name : f-dpm001.grid.sinica.edu.tw			
T2_EE_Estonia : io.hep.kbfi.ee			

EvtGen

Two main tools & one feature

- Detailed decay tables for decays of Upsilon states and lighter particles: B,D mesons & Charmonium)
- Tools for simulation of kinamatics based on amplitudes to calculate the total probability: a modular framework to assemble amplitudes

- CP Violating Decays: Angular correlations and time dependence

Code Developmnets since 2003

- Mass generation improved; 2003 version used Breit-Wigner lineshape for all resonances. Now includes much more information about phase space and partial waves when calculating the lineshape.

- Addition of new decay models:
  - Semileptonic B and D decays
  - Three-body 'Dalitz' decays for B and D decays

- Many code fixes
  - HelAmp and PartWave models
  - SSDCP

Decay Table Updates

- There has been several significant updates to the decay table:

  - Major updates in 2004 from BABAR
  - Updates from CLEO-c and CDF (around 2004-5)
  - Smaller updates from BABAR in 2006
  - CLEO-c made a major tuning of charm and
  - charmonium decays in 2007. These changes are so far not merged into the BABAR version.

    CDF also has updates that are not yet merged.

- most of the interest here would be in the improved tuning of the lepton spectra and particle multiplicities.

LHCb's EvtGen EvtGenLHC

- The main modification is to be able to generate incoherent B mixing.
- Only to B was inside EvtGen for Bs mixing (ie B mixing treated as a B → Bbar decay)

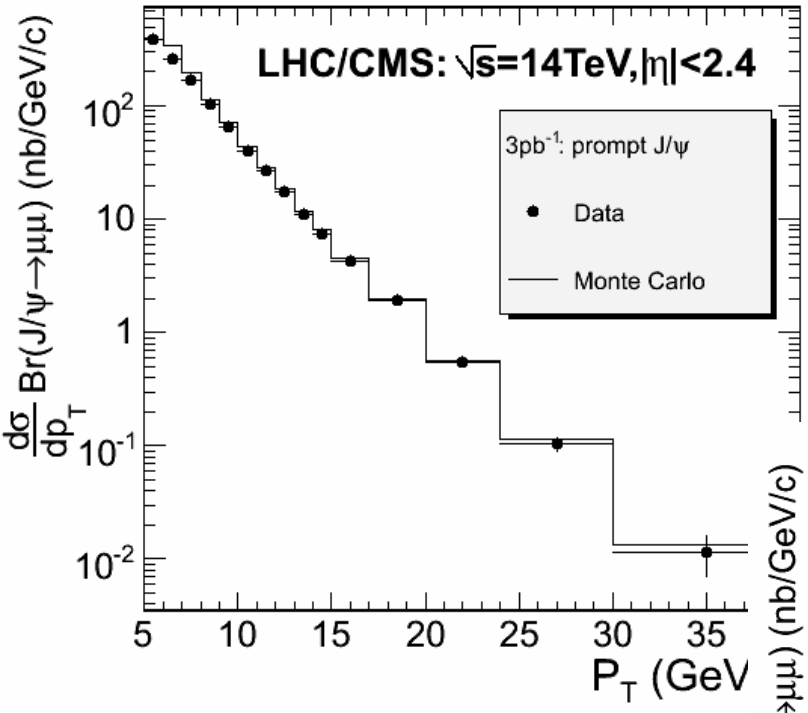
- It is very difficult/impossible to generate correctly CP violation forincoherent B production in a generic way. This is why we generate CP violation only for specific signal samples, not for generic samples, and why part is probably not useful outside LHCb.

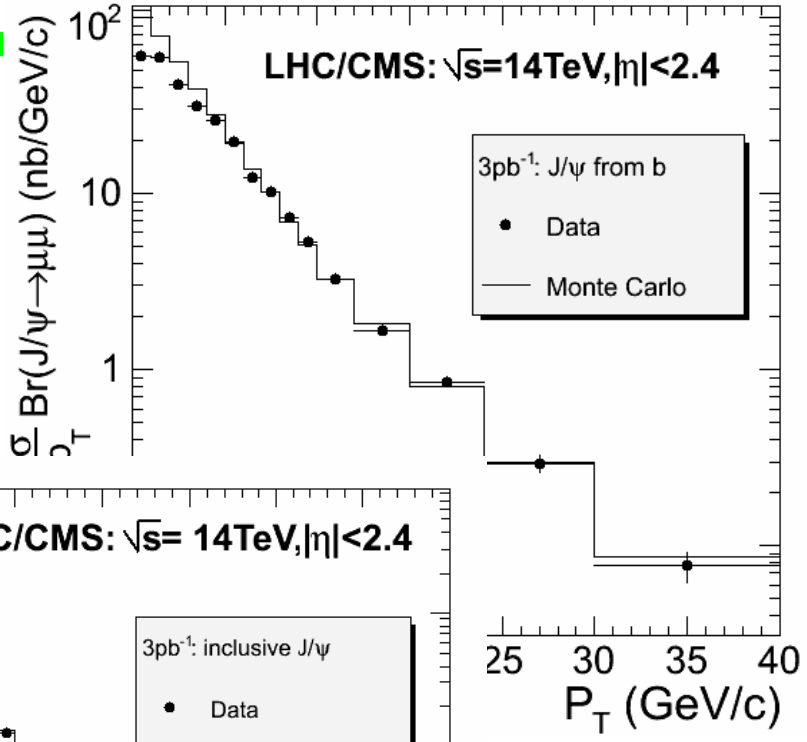
- Some new decay models have been
  - developped in LHCb:
  - Bs → J/ψ φ (Correct time dependant angular distributions, G. Raven, T. Du Pree, NIKHEF)
  - Λb → Λ ω/ρ (Taking into account ω/ρ mixing, E. Conte, Clermont-Ferrand)
  - B → D K (γ angle in D Dalitz plot)
  - B → K* μ μ (Under development, W. Reece, Imperial College, would like to use GSL functions to perform precise numerical integrations: add extra dependance to EvtGen)

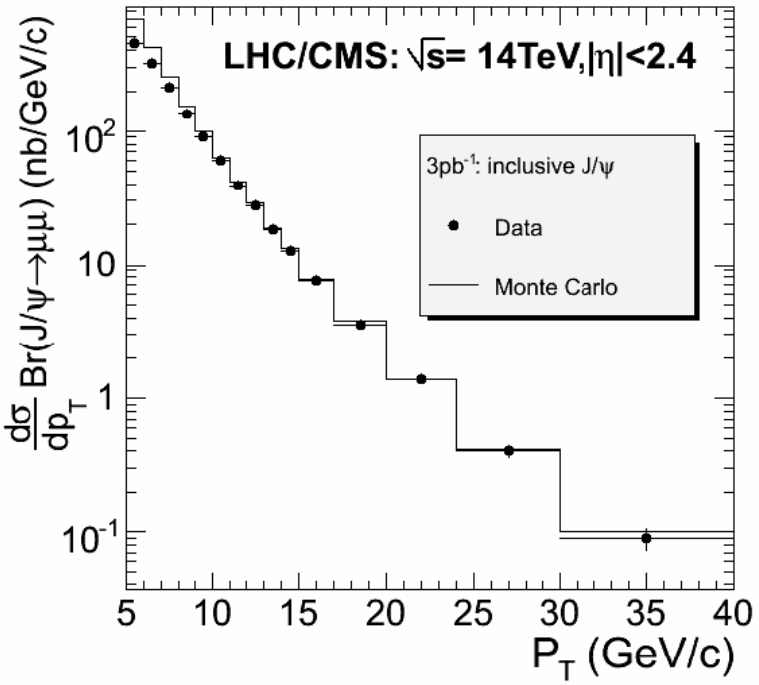
- to use the latest developments of EvtGen
- Interface to Pythia6 will be changed to Pythia8

3pb-1: M.C. vs “Data” CSA07

jpsi differential production Cross section



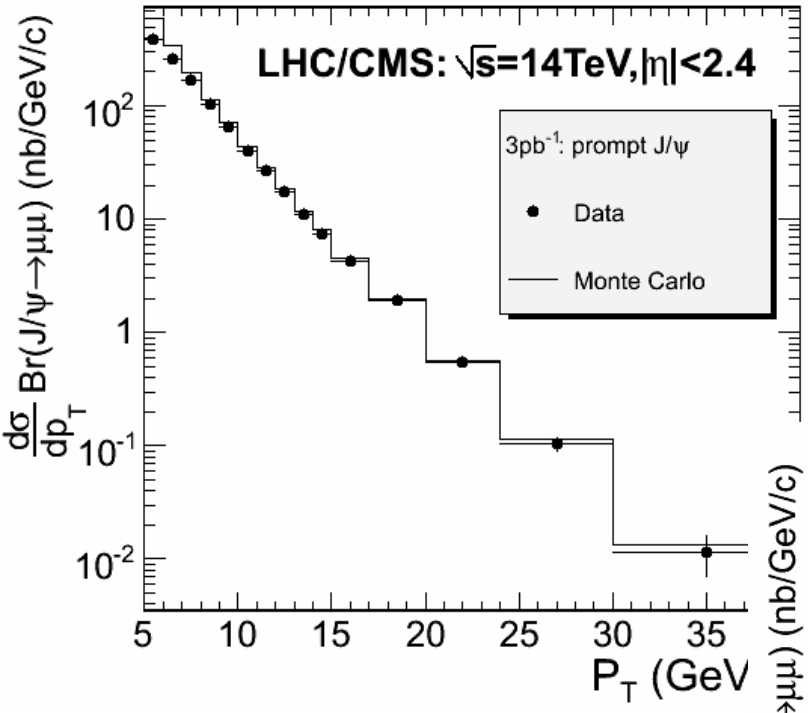


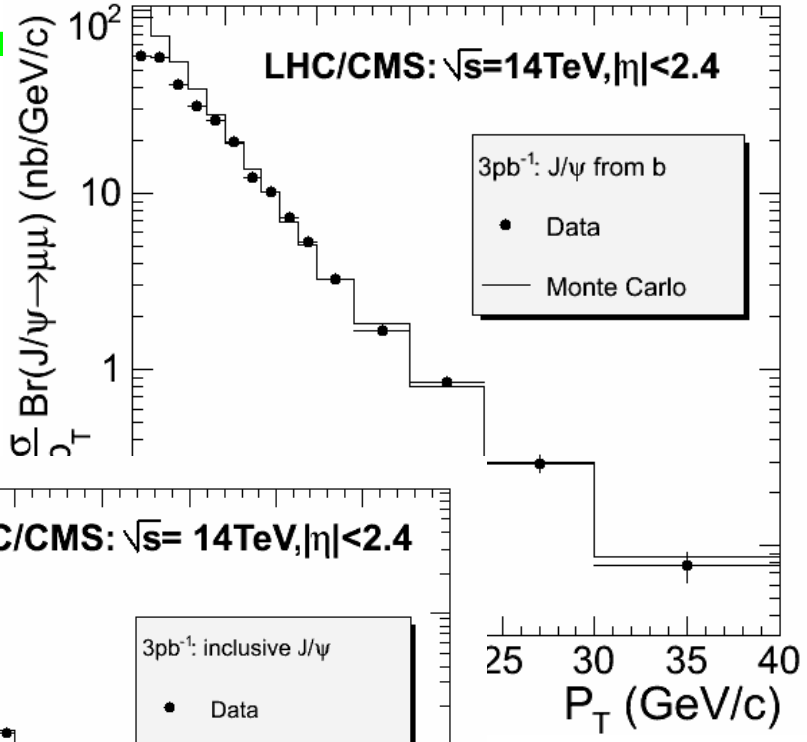


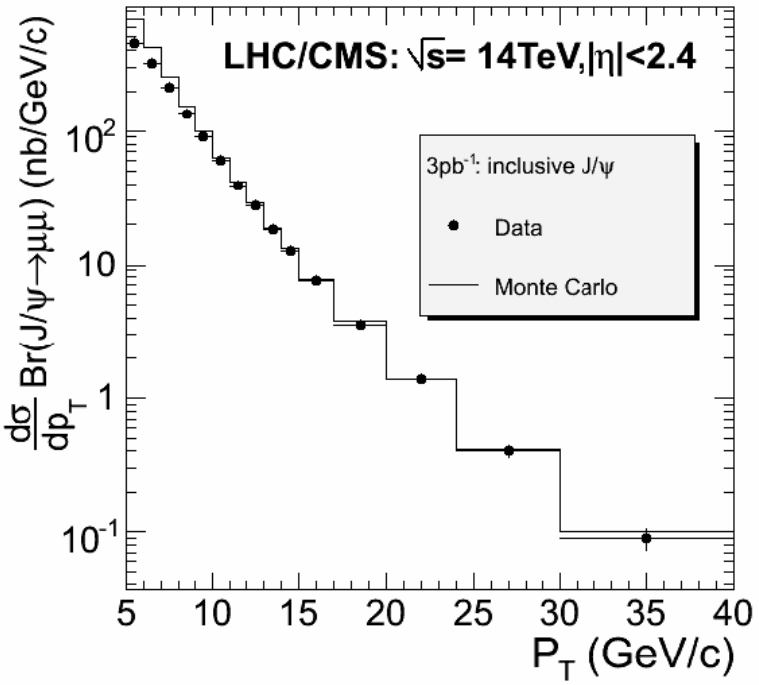
3pb-1: M.C. vs “Data”

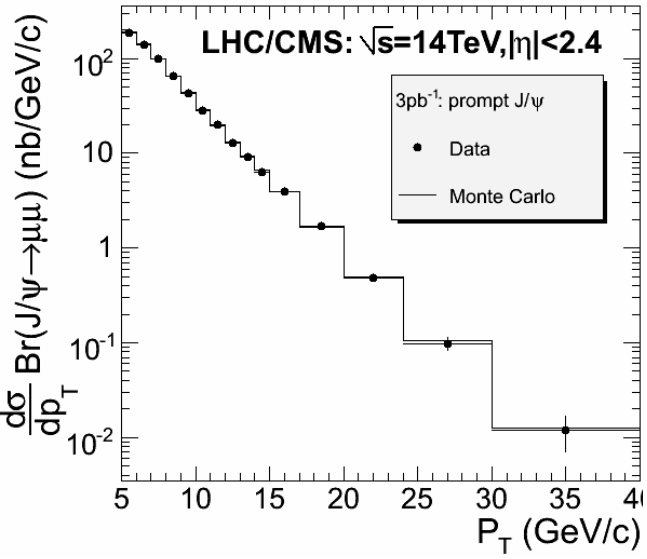
Old

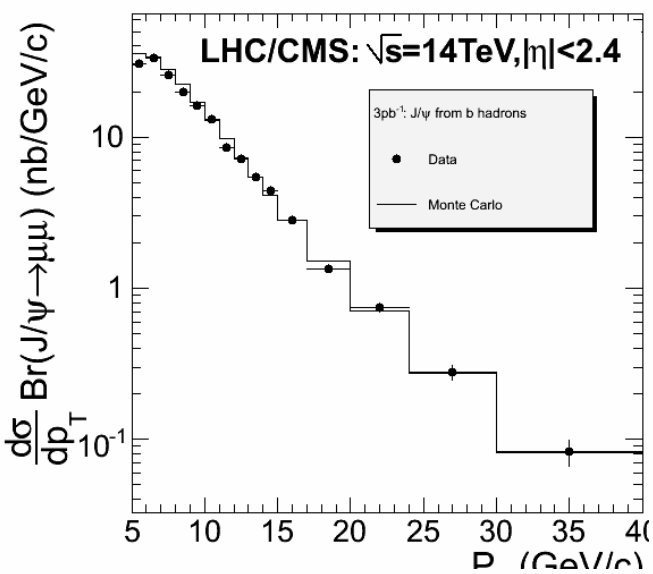
jpsi differential production Cross section

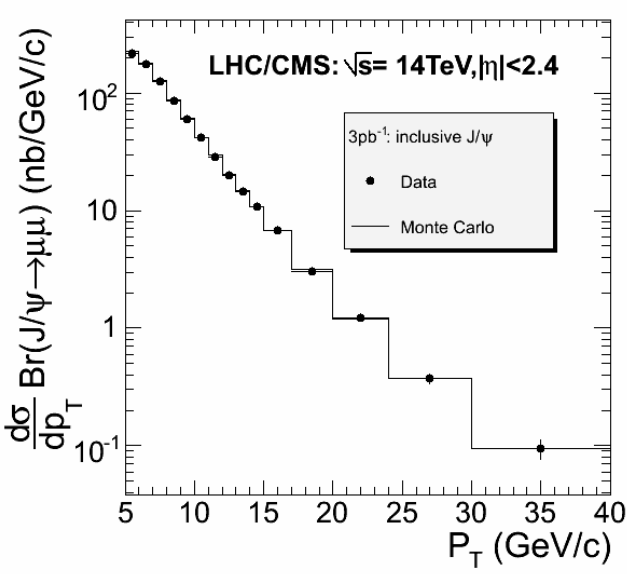







LHC/CMS: √s=14TeV,|η|<2.4
3pb⁻¹: prompt J/ψ
Data
Monte Carlo
dσ/dp_T Br(J/ψ→μμ) (nb/GeV/c)
P_T (GeV/c)


LHC/CMS: √s=14TeV,|η|<2.4
3pb⁻¹: J/ψ from b hadrons
Data
Monte Carlo
dσ/dp_T Br(J/ψ→μμ) (nb/GeV/c)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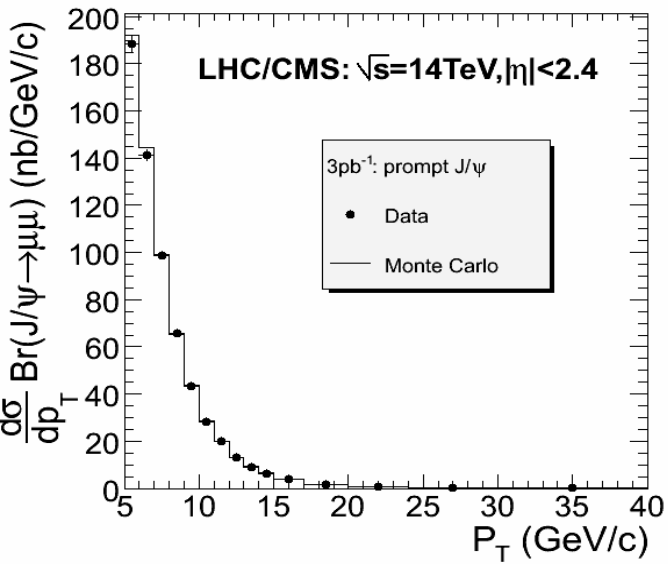
Data
Monte Carlo
dσ/dp_T Br(J/ψ→μμ) (nb/GeV/c)
P_T (GeV/c)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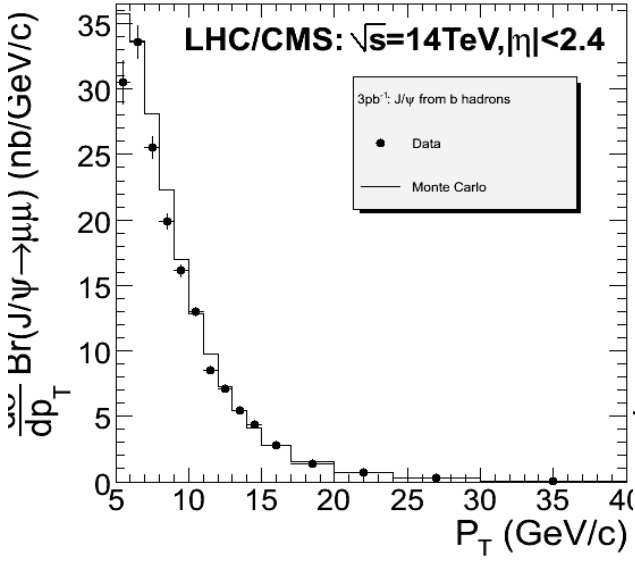
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Monte Carlo
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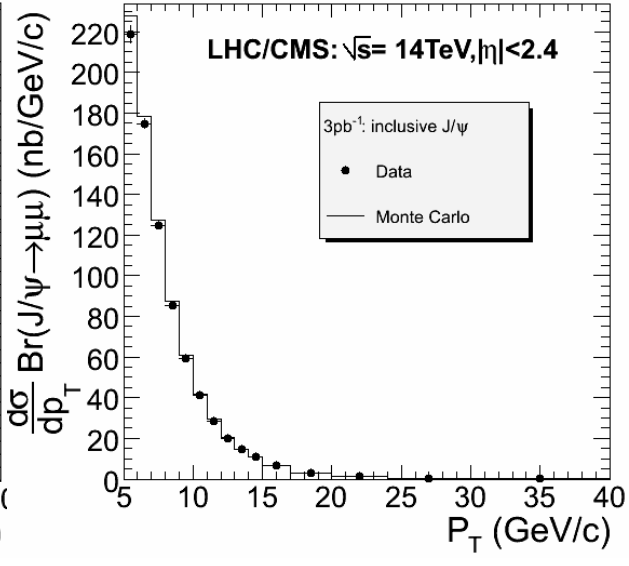
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Monte Carlo
dσ/dp_T Br(J/ψ→μμ) (nb/GeV/c)
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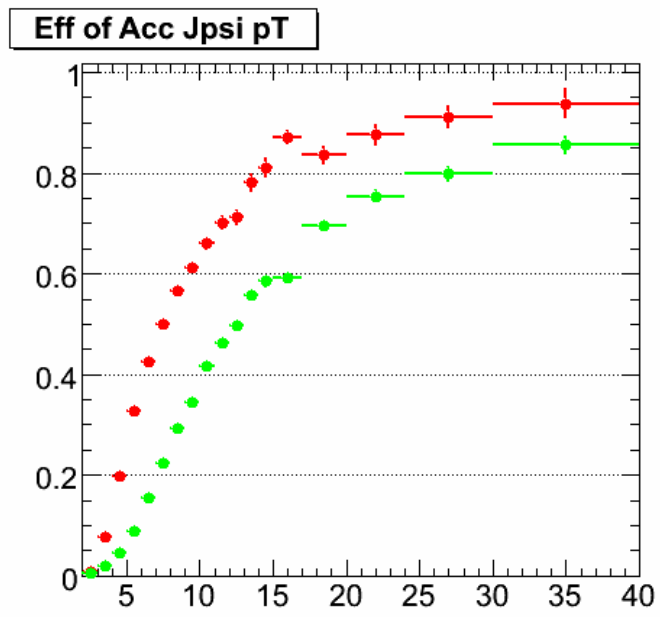
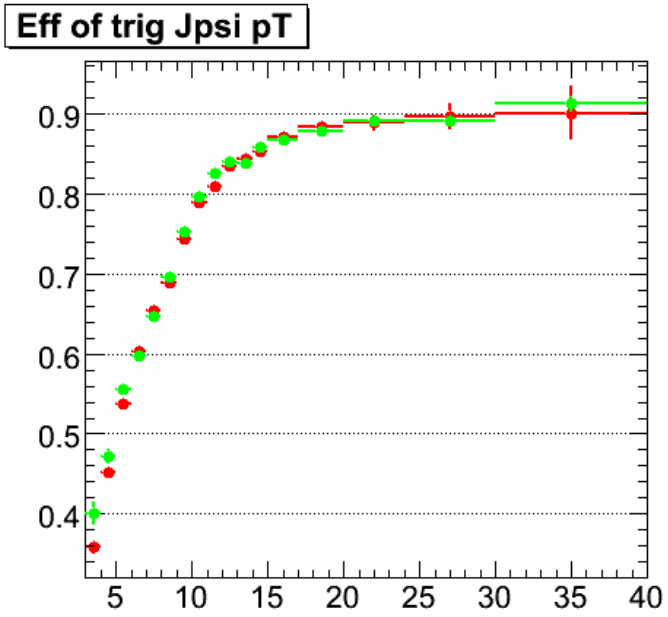
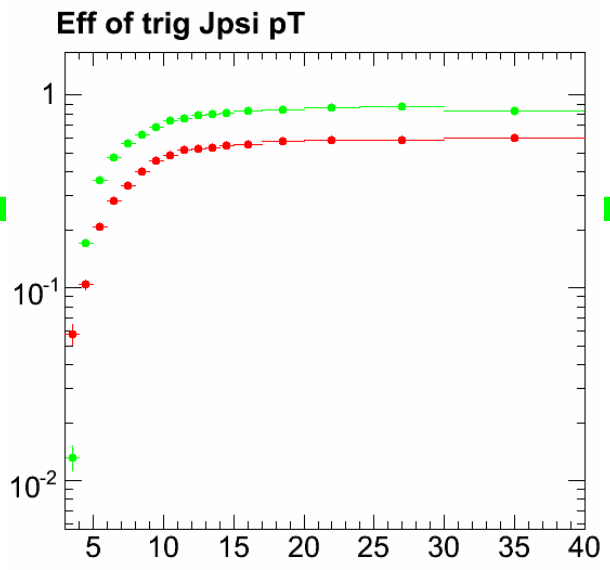
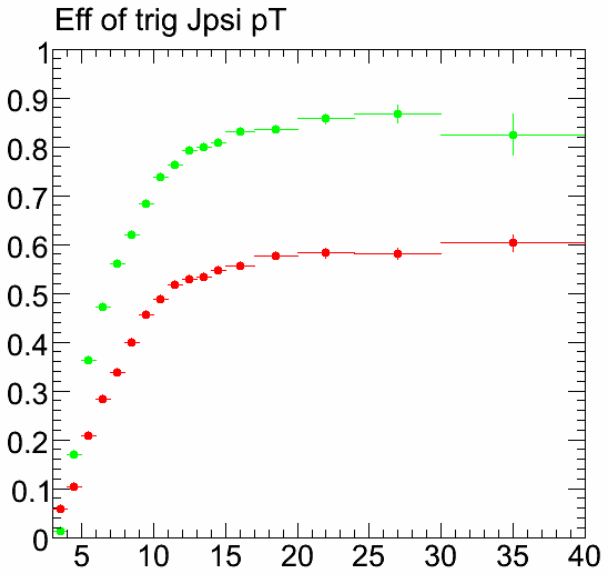
Acceptance & Trigger

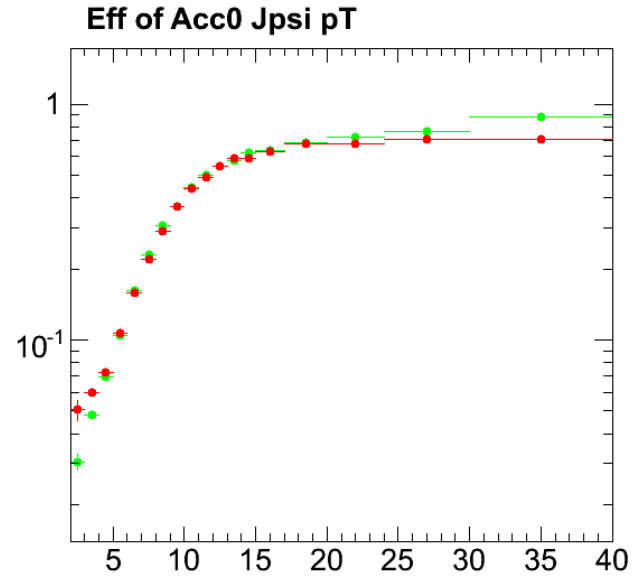




New


Eff of trig Jpsi pT
1
10^{-1}
10^{-2}
5 10 15 20 25 30 35 40


Eff of trig Jpsi pT
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
5 10 15 20 25 30 35 40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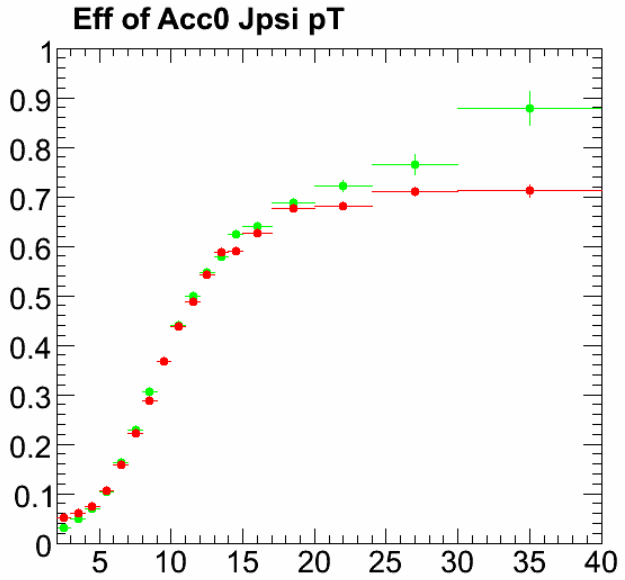
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0.3
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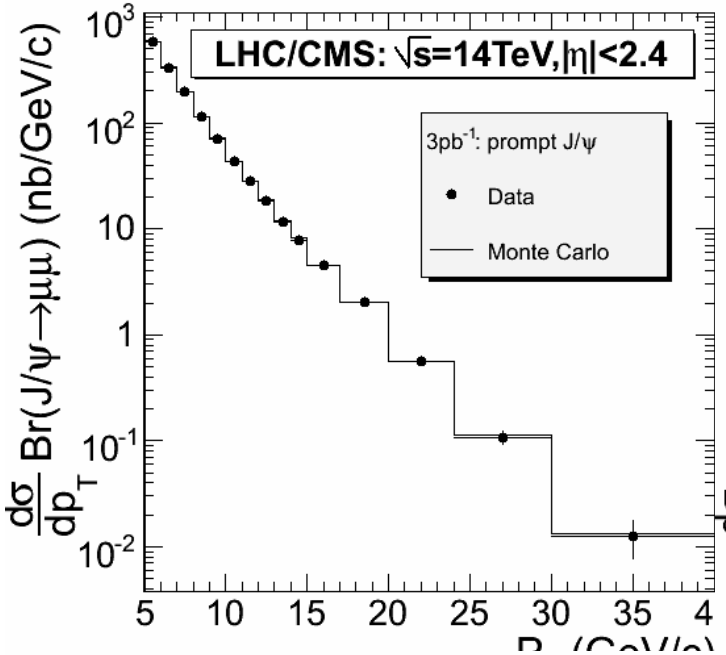
New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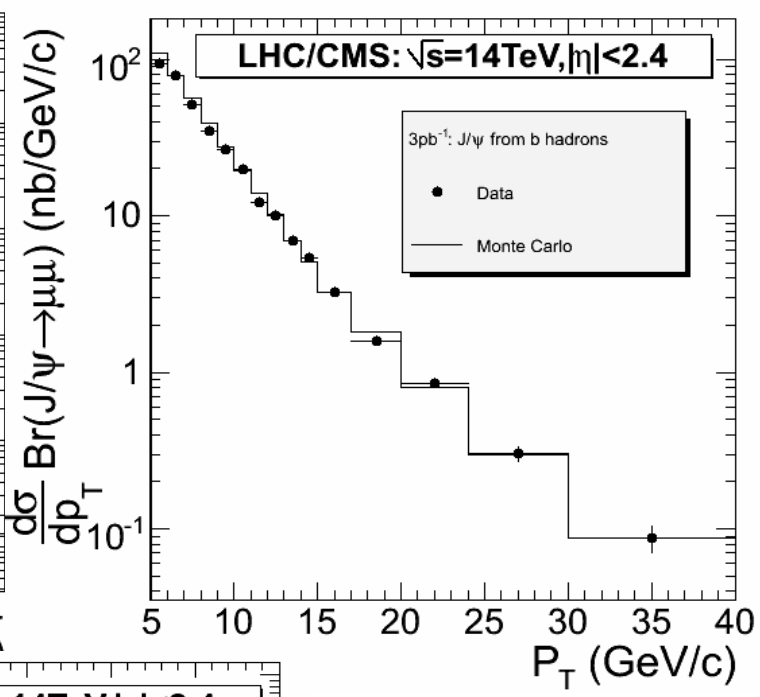
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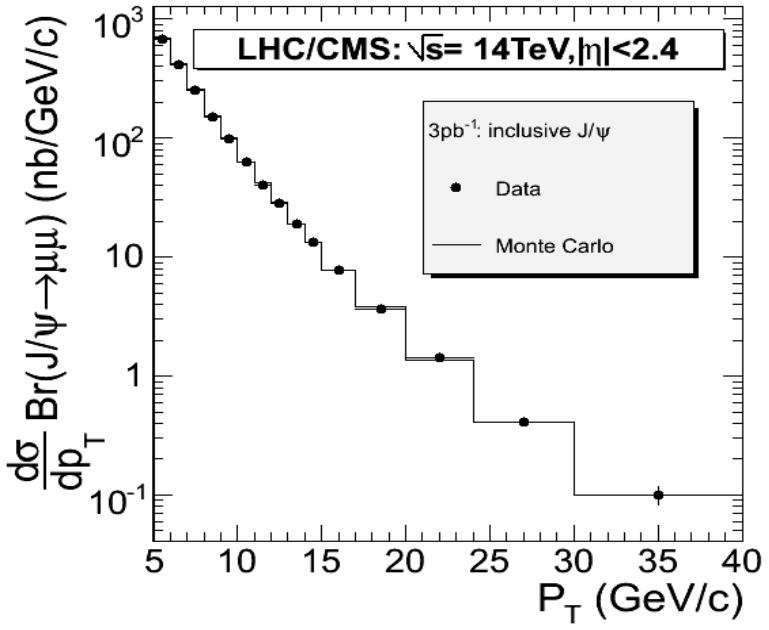
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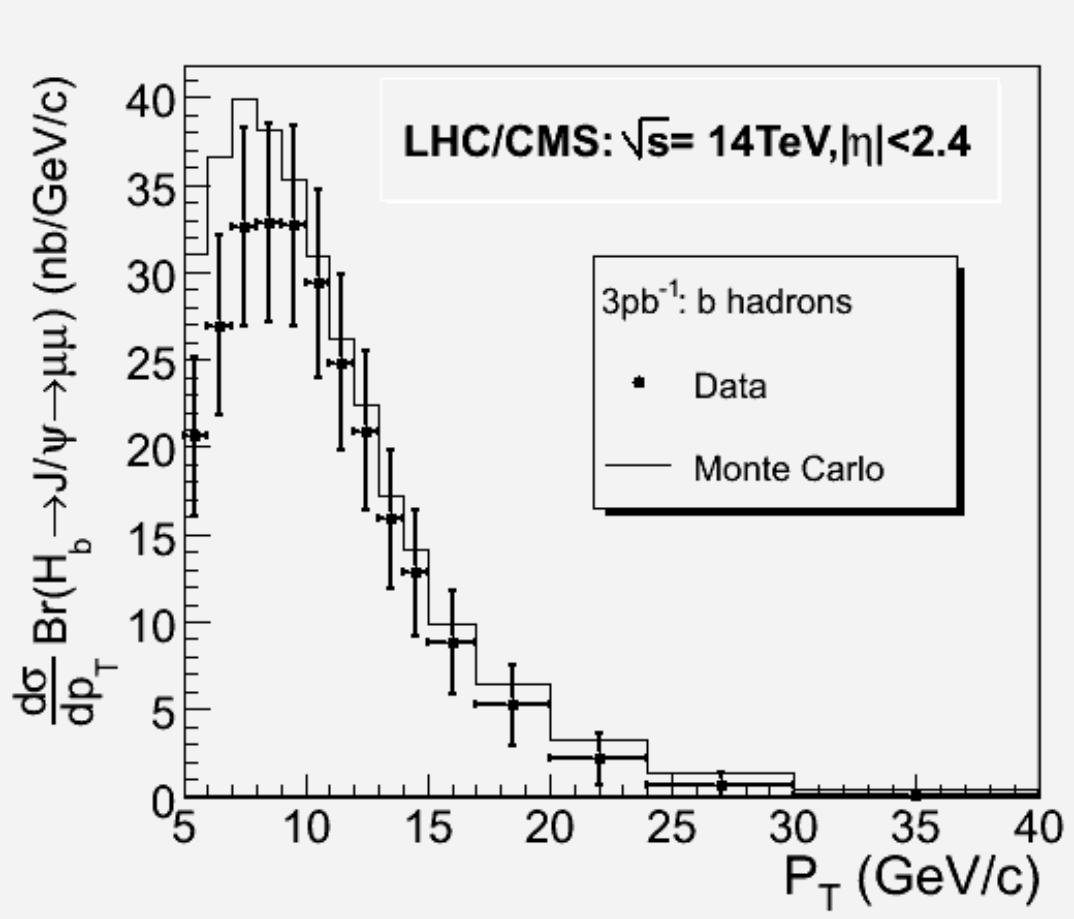
P_T (GeV/c)

3pb-1: M.C. vs "Data"

CSA07

inclusive b differential production Cross section



To do List

- Solve the unfolding problem of CSA07 data anal
- Start CMSSW_2_1_12 anal on Summer08 data
  - Efficiency: Accept., Trig & reco. M.C. & T.P.
  - Comprehensive anal method
    - Ctau efficiency
    - Scale factor
    - Unfolding method
- Prepare PAS and Note draft.

backups