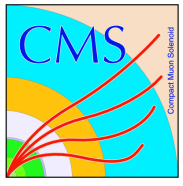
Analysis plan for 2016

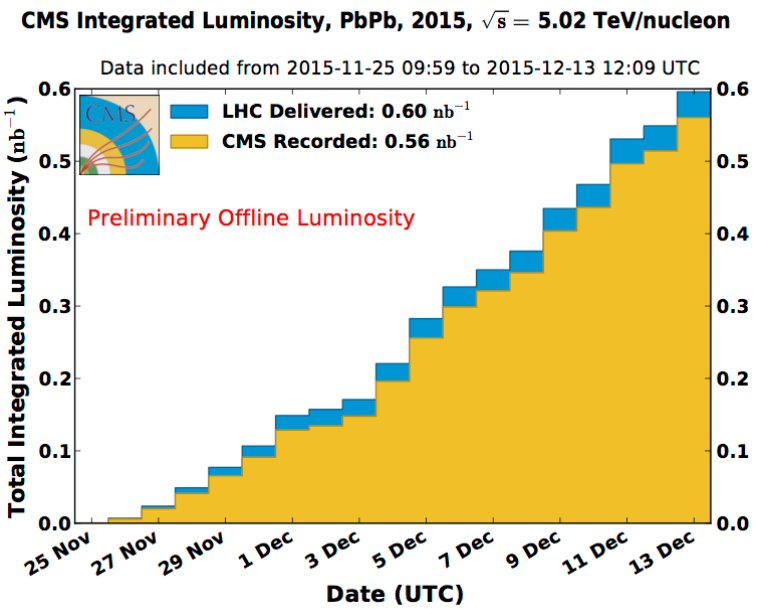
Yongsun Kim

28-Dec-15

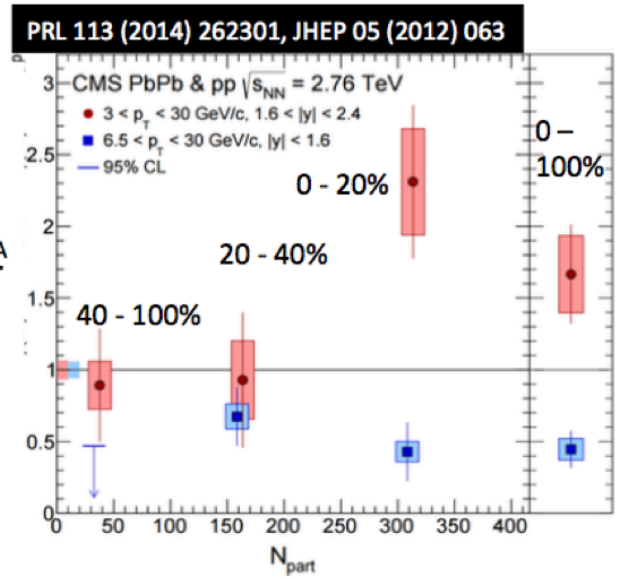


Data accumulation

- PbPb
  - Took x3.7 higher lumi than in 2011
  - L3 di-muon event unprescaled. Good efficiency for di-muon pT > 5 GeV
  - L1 di-muon events were selectively pre-scaled
    - Peripheral (30-100%) un-prescaled
    - Central (0-30%) prescaled by 1.5 ~ 2 in average
    - Why L1? Twice efficient for low pT (< 5GeV/c) J/psi



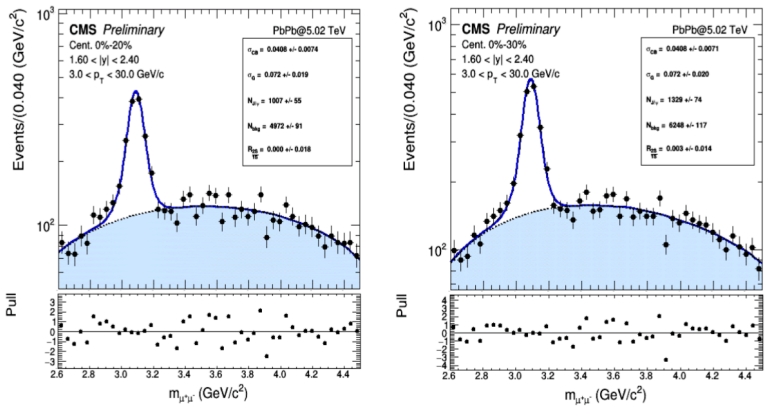
$$\frac{\psi(2S)\ R_{AA}}{J/\psi\ R_{AA}}$$



- pp : 28 pb-1. L1 di-muons are fully collected. x5 higher lumi than in 2011
- Full statistics Reco dataset will be available from around Jan 15th

Preliminary charmonia data

1.6 < |y| < 2.4 && 3.0 < p_T < 30.0 **PbPb**



Bkg function : Chebyechev 2nd order Chebyechev 3rd order

December 15th Trigger Selection: HLT_HIL3DoubleMu0_Cent30_OS_m2p5to4p5_v1

system	centrality	Psi(2S)/Jpsi	
		abs(y)<1.6, pt>6.5GeV/c	1.6<abs(y)<2.4, 3<pt Gev/c
pp		0.0351+-0.0019 (png, pdf)	0.0405+-0.0025 (png, pdf)
PbPb	0-20%	0.0422+-0.0078 (png, pdf)	0.077+-0.029 (png, pdf)
	0-30%	0.0395+-0.0067 (png, pdf)	0.077+-0.029 (png, pdf)
PbPb/pp	0-20%	1.04+-0.20	2.19+-0.83
	2011		
PbPb/pp	0-30%	0.98+-0.18	2.19+-0.44
	2011		

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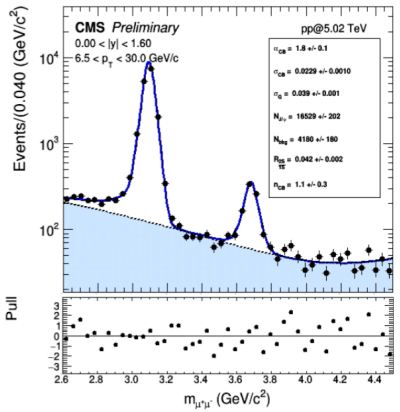
- First di-lepton paper
  - Will be chosen when full RECO statistics are available
  - Probably psi(2S)/psi(1S)…
- HIN-14-009 (pPb J/psi paper)
  - Will add pp reference data to measure R_pPb
  - Biggest challenge is the repetition of all steps from tracker muon algorithm
    - Fit, efficiency, acceptance, T&P, systematics
  - Would be good if either Jaebeom or Beomgon can help this analysis
  - Target conf. : SQM (6/27), ICHEP(8/3) ISMD (8/29)

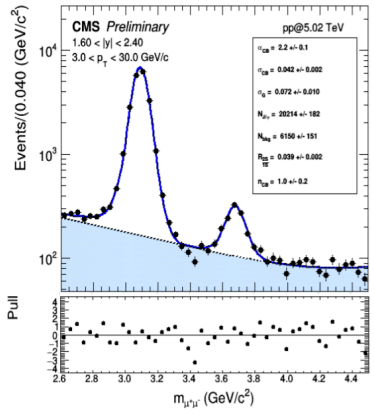
More fits

pp

$0.0 < |y| < 1.6$ && $6.5 < p_T < 30.0$

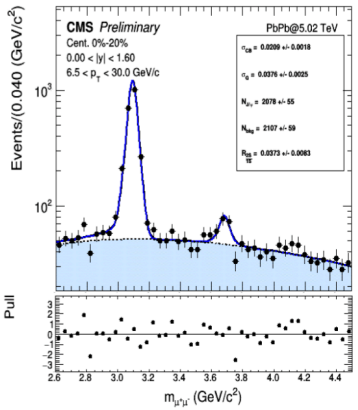


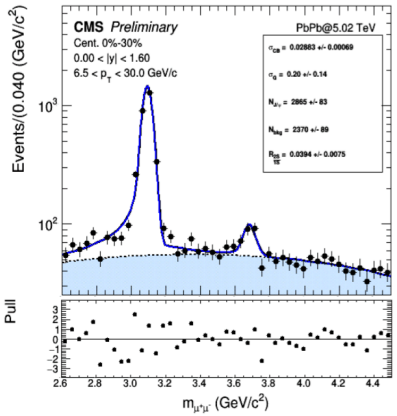
$1.6 < |y| < 2.4$ && $3.0 < p_T < 30.0$



PbPb

$0.0 < |y| < 1.6$ && $6.5 < p_T < 30.0$





Bkg function : Chebyechev 3rd order

Chebyechev 2nd order

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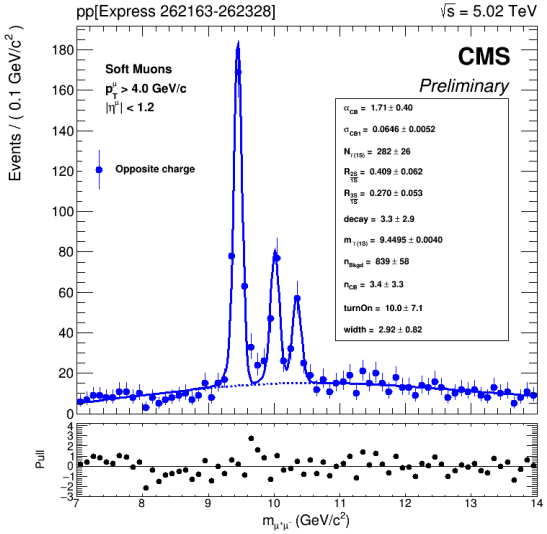
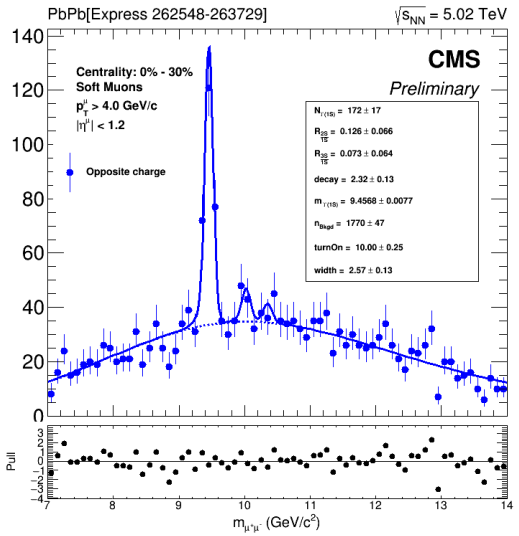
Preliminary bottomonia data





system	centrality	Ups(2S)/Ups(1S)	Ups(3S)/Ups(1S)
		abs(y)<1.2	abs(y)<1.2
pp		0.409 +/- 0.062	0.270 +/- 0.053
PbPb	0-30%	0.126 +/- 0.066	0.073 +/- 0.064
	50-100%	N/A	
PbPb/pp	0-30%	0.308 +/- 0.168	0.270 +/- 0.243
	2011		
PbPb/pp	50-100%	N/A	
	2011		

Full statistics will be available on early January

Instruction for dimuon data analysis

Twiki page for instruction, trigger and dataset location
https://twiki.cern.ch/twiki/bin/view/CMS/DileptonPPAARun2015#How_to_run_onia_skim

PbPb Data

Express Physics:

GlobalTag : 75X_dataRun2_ExpressHI_v2

Run Start	Run End	Dataset	Type	STATUS	Location	Size	Comments
262548	263685	HI Express Stream	Onia Tree	DONE	/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/ExpressStream/OniaTree_262548_263685.root		Glb&&Trk Muons with Soft cuts (no High Purity)
262548	263685	HI Express Stream	Onia Tree	DONE	/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/ExpressStream/OniaTree_262548_263685_noCUT.root		Glb&&Trk Muons with NO Cuts
262548	263728	HI Express Stream	Onia Tree	DONE	/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/ExpressStream/OniaTree_262548_263729.root		Glb&&Trk Muons with Soft cuts (no High Purity)
262548	263728	HI Express Stream	Onia Tree	DONE	/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/ExpressStream/OniaTree_262548_263729_noCUT.root		Glb&&Trk Muons with NO Cuts
262548	263757	HI Express Stream	Onia Tree	DONE	/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/ExpressStream/OniaTree_262548_263757.root		Glb&&Trk Muons with Soft cuts (no High Purity)
262548	263757	HI Express Stream	Onia Tree	DONE	/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/ExpressStream/OniaTree_262548_263757_noCUT.root		Glb&&Trk Muons with NO Cuts

Prompt Validation PbPb: PromptDataPbPbDilepton2015

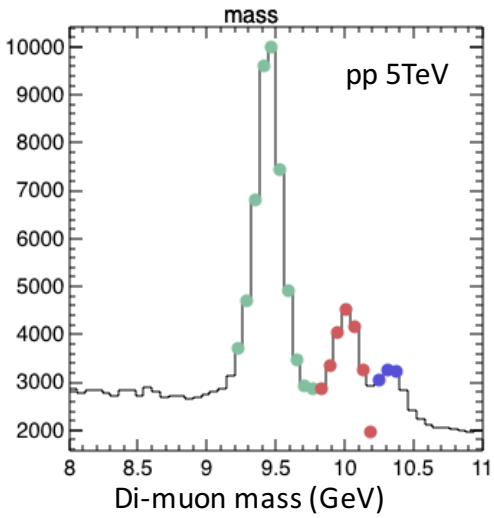
Prompt Reco:

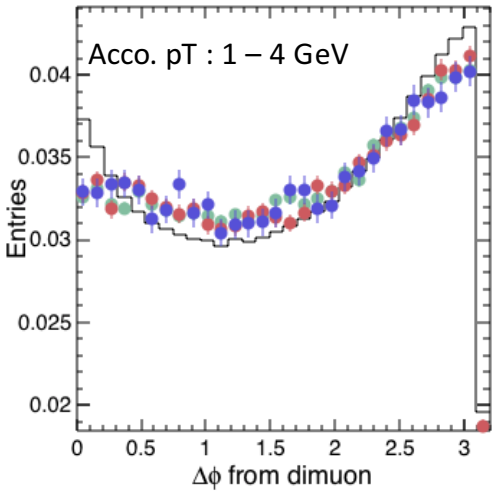
GlobalTag : 75X_dataRun2_PromptHI_v3

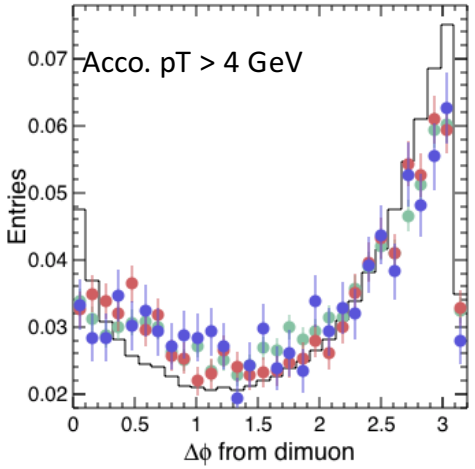
Run Start	Run End	Dataset	Type	STATUS	Location	Size	Comments	cfg file
262548	262735	/HIOniaPeripheral30100/HIRun2015-OniaPeripheral-PromptReco-v1/RECO	Onia Skim	3.8% (#prompt skim / # RAW)	T2_KR_KNU	6GB	GlbTrk muons + eventplane + photon	
262548	262735	/HIOniaPeripheral30100/goni-HIRun2015-OniaPeripheral-PromptReco-v1_Run_262548_262735_OniaSKIM_20151207-b3ea8c77e11a26f93c0cbd81cff45010/USER	Onia Tree		/store/group/phys_heavyions/dileptons/Data2015/PbPb502TeV/TTrees/PromptReco/OniaTree_Peripheral30100_PromptReco_262548_262735.root	506MB	GlbTrk muons + eventplane + photon	

Quarkonia – hadron correlation

- Onia + track + converted photon analyzers merged
  - Under development. To be added in the official analyzer
- What kind of analyes can we do with this?
  - e.g. Y(nS) – hadron correlation







  - B, D, X(3872) reconstruction based on J/psi + tracks
  - $Chi_{b/c}$ reconstruction based on J/psi (Upsilon) + photon
    - Photons are low pT photons (< 5GeV) converted to di-electrons
    - Can coordinate with Kansas group for calibration/validation for this new object

Contribution of individuals

- Songkyo
  - J/psi R_{pA} (with aid from another student)
- Kisoo
  - Contribute on D meson fast track paper
  - B meson R_{AA}, event plane correlation
- Yeonju
  - Preliminary gamma-jet correlation for Z-jet cross-check
  - Photon R_{AA} and v_2 at 5TeV
- Jaebeom
  - Heavy Ion tracking contact person
  - Involved with physics analysis in parallel
- Beomgon
  - J/psi, psi(2s), upsilon in UPC
- Futher analysis topics
  - R_{pA} of Y(nS), psi(2S)
  - v2 of Y(nS), psi(2S)
- Should think about EPR service works for 2016

Muon workshop with SNU group

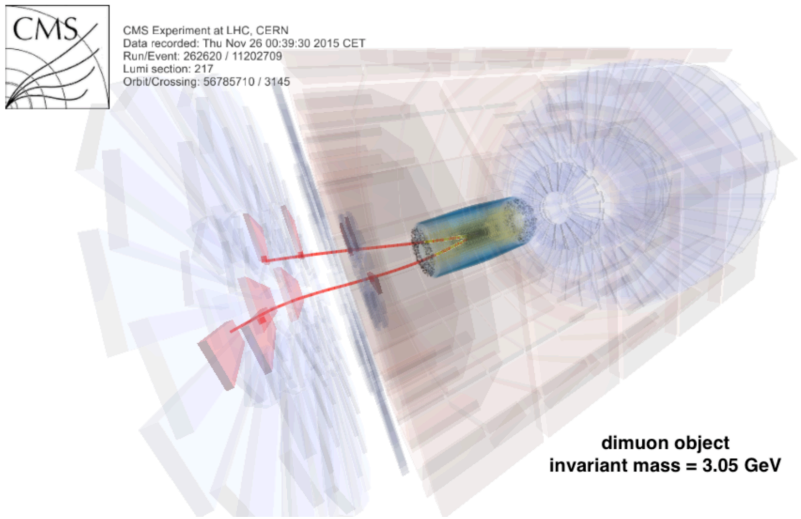
- Hong group + Yoo group
  - Plus other KU/SNU colleagues available

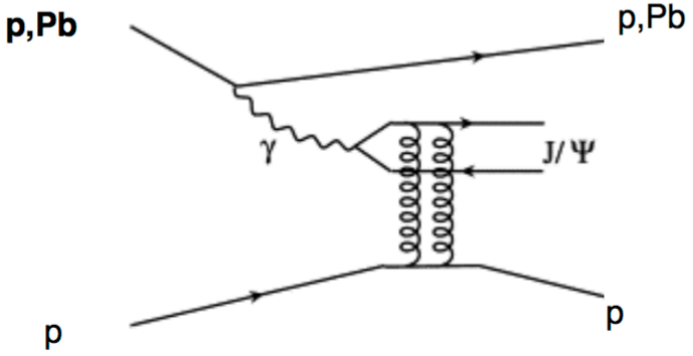
- Cross institute workshop for muon analysis in Korea-CMS collaboration
- Jan 8th 2016 (Friday) 10am – 3:45pm. (Lunch from 11:30 – 1:00)
- Preliminary agenga :
  - Kyeongpil Lee: T&P + DY differential cross section in pp (30+15m)
  - Kyungwook Nam: Background estimation in dimuon channel in pp(30+15m)

    - Lunch break -
  - Yongsun Kim : Summary of Quarkonia physics in PbPb collisions (20m)
  - Yongsun Kim : Trigger in CMS heavy ion program (10m)
  - Songkyo Lee : J/psi in pPb at 5TeV (30m)
  - Kisoo Lee : Prospect of B/D in PbPb at 5TeV (20m)
  - Beomgon Kim : Prospect of UPC J/psi and upsilon in Run II (20m)
  - Yeonju Go : Prospect of photon analysis in Run II (20m)

BACKUP

J/psi and Upsilons in UPC





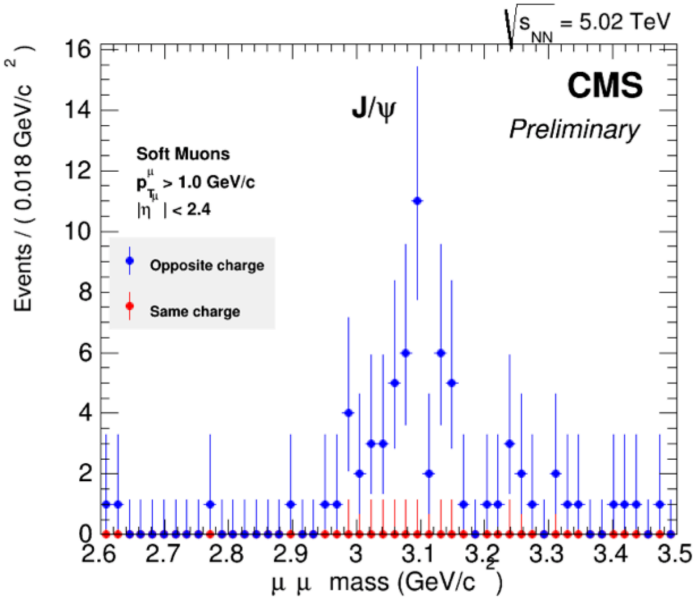
4 dedicated triggers :

HLT_HIUPCL1SingleMuOpenNotHF2_v1

HLT_HIUPCL1DoubleMuOpenNotHF2_v1

HLT_HIUPCL1DoubleEG2NotHF2_v1

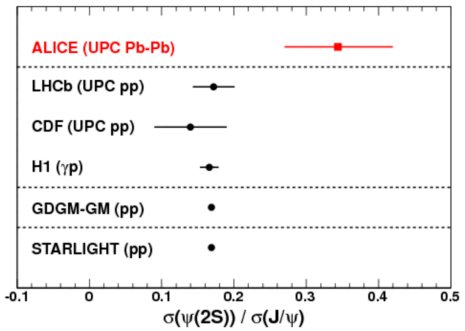
HLT_HIUPCL1SingleEG5NotHF2_v1



UPC J/psi (not full stat.)

- 6 papers published from ALICE from Run I data
- Only 1 paper from CMS so far

- *Coherent J/ψ photoproduction in ultra-peripheral Pb-Pb collisions at sNN=2.76 TeV* Phys.Lett. B718 (2013) 1273-1283
- *Charmonium and e+e− pair photoproduction at mid-rapidity in ultra-peripheral Pb-Pb collisions at sNN√=2.76 TeV* Eur.Phys.J. C73 (2013) 11, 2617
- *Exclusive J/ψ photoproduction off protons in ultra-peripheral p-Pb collisions at sNN√=5.02 TeV* Phys.Rev.Lett. 113 (2014) 23, 232504
- *Coherent ρ0 photoproduction in ultra-peripheral Pb-Pb collisions at sNN =2.76 TeV* JHEP 1509 (2015) 095
- *Coherent ψ(2S) photo-production in ultra-peripheral Pb Pb collisions at sNN = 2.76 TeV* Phys.Lett. B751 (2015) 358-370
- *Measurement of an excess in the yield of J/ψ at very low pT in Pb-Pb collisions at sNN= 2.76 TeV* - Submitted to PRL



CMS can study this ratio at forward rapidity… competing with ALICE …

- What can be done by CMS exclusively?
  - Upsilon in mid-rapidty down to 0 GeV
  - (High statistics) neutral rho meson in mid-rapidity using conversion photon

#Run 263322

New PDs : HLT_HIL1DoubleMu0 brothers