BUP2021
Upsilon in p+Au

Marzia Rosati

Iowa State University

BUP 2021 Assumptions

- Assume the 28 weeks run plan for 2023,2024,2025
  - Au+Au recorded luminosity 20.8 nb^{-1} (140 10^9 MB events)
  - p+Au sampled luminosity 0.11 pb^{-1} (190 10^9 events)
  - pp sampled luminosity 62 pb^{-1} (2400 10^9 events)

- Assume the 20 weeks run plan for 2023,2024,2025
  - Au+Au recorded luminosity 11.7 nb^{-1} (in 2023 1.7 nb^{-1})
  - p+Au sampled luminosity 0
  - pp sampled luminosity 62 pb^{-1}

Estimate of Y production in pp and p+Au

- Using measured PHENIX cross section

pp total cross section	42mb	4.20E-02			
PHENIX Y BR ds/dy (|y|<0.5)	108pb	1.08E-10			
sigmatot/ [ds/dy]	2.74				
Br x sigmatot renormalized	296pb	2.96E-10			
1/Nev_pp BR dN/dy_pp					
(|y|<0.5 PHENIX meas)	2.57E-09				
1/Nev_pp * N_Upsilon_pp*BR	7.04E-09				
		Y(1S)		Y(2S)	Y(3S)
normalised yield ratio		0.72		0.18	0.1

Estimated Acceptance and Reconstruction Efficiency

- Using same numbers as in the proposal so the new numbers consistent with existing plots

Y Acceptance (2 electrons within CEMC)	31.5%
tracking eff pp	91%
eid eff pp	95%
pair reco eff in pp	75%
tracking eff AuAu	87%
eid eff AuAu	90%
pair reco eff in AuAu	61%

Upsilons in pp (28 weeks)

pp 2400B sampled events	2.40E+12			
Nupsilon in 2400B events pp	1.69E+04			
Nupsilon in 2400B events pp within CEMC	5.32E+03	3.83E+03	9.57E+02	5.32E+02
		Y(1s)	Y(2s)	Y(3s)
Nupsilon in 2400B events pp reco	3.98E+03	2.86E+03	7.16E+02	3.98E+02

Upsilon in p+Au (28 weeks)

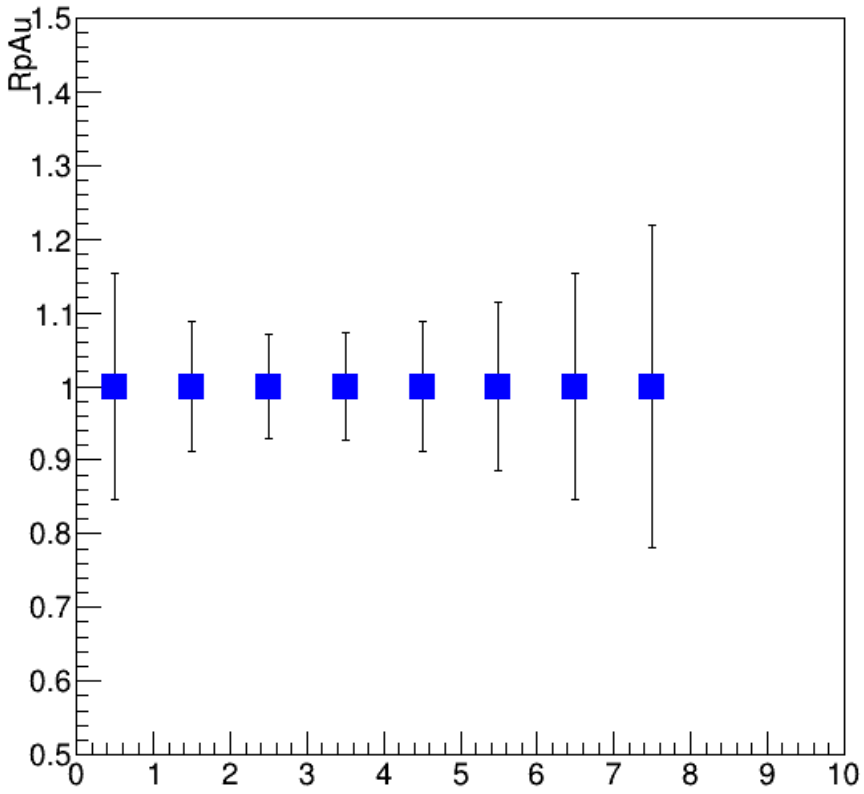
Ncoll p+Au MB (0-100%)	4.7	1		
Ncoll p+Au MB (0-84%)	5.2	0.84		
pAu 200B MB sampled events	2.00E+11			
Nupsilon in 200B events pAu MI	7.32E+03			
		Y(1s)	**Y(2s)**	**Y(3s)**
Nupsilon in 200B events pAu MB within CEMC	2.31E+03	1.66E+03	4.15E+02	2.31E+02
Nupsilon in 200B events pAu MB reco	**1.72E+03**	**1.24E+03**	**3.10E+02**	**1.72E+02**

Upsilon in p+Au vs Centrality (28 weeks)

Ncoll p+Au 0-20%	8.2	0.2
Ncoll p+Au 20-40%	6.1	0.2
Ncoll p+Au 40-60%	4.4	0.2
Ncoll p+Au 60-84%	2.6	0.24

Centrality dependence		Y(1s)	Y(2s)	Y(3s)
Nupsilon in 200B MB events pAu 0-20% reco	6.47E+02	4.66E+02	8.38E+01	8.38E+00
Nupsilon in 200B MB events pAu 20-40% reco	4.81E+02	3.46E+02	6.24E+01	6.24E+00
Nupsilon in 200B MB events pAu 40-60% reco	3.47E+02	2.50E+02	4.50E+01	4.50E+00
Nupsilon in 200B MB events pAu 60-84% reco	2.46E+02	1.77E+02	3.19E+01	3.19E+00

RpAu vs PT



RpAu vs Ncoll