BUP2021
Upsilon in Au+Au
(20 weeks scenario)

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

- 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 and p+Au	91%
eid eff pp and p+Au	95%
pair reco eff in pp and p+Au	75%
tracking eff AuAu	87%
eid eff AuAu	90%
pair reco eff in AuAu	61%

Upsilons in pp (20 weeks)

Same as 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**

Upsilons in Au+Au (20 weeks)

Ncoll Au+Au MB	257			
Ncoll Au+Au 0-10%	955			
AuAu 80 B MB recorded events	8.00E+10			
Nupsilon in 80 B events AuAu MB	1.45E+05			
		Y(1S)	Y(2S)	Y(3S)
Nupsilon in 80 B events AuAu MB within CEMC	4.56E+04	3.28E+04	8.20E+03	4.56E+03
Nupsilon in 80 B events AuAu MB reco	27938	20115	5029	2794
		Y(1S)	Y(2S)	Y(3S)
Nupsilon in 8 B events AuAu 0-10% (Ncoll scaling)	5.38E+04	3.87E+04	9.68E+03	5.38E+03
suppression factor		5.30E-01	1.70E-01	3.50E-02
Nupsilon in 8 B events AuAu 0-10% after suppression	2.23E+04	2.05E+04	1.64E+03	1.88E+02
Nupsilon in 8 B events AuAu 0-10% within CEMC	7.04E+03	6.46E+03	5.18E+02	5.93E+01
Nupsilon in 8 B events AuAu 0-10% reco	4316	3962	318	36

Upsilons in Au+Au (20 weeks – Year 1)

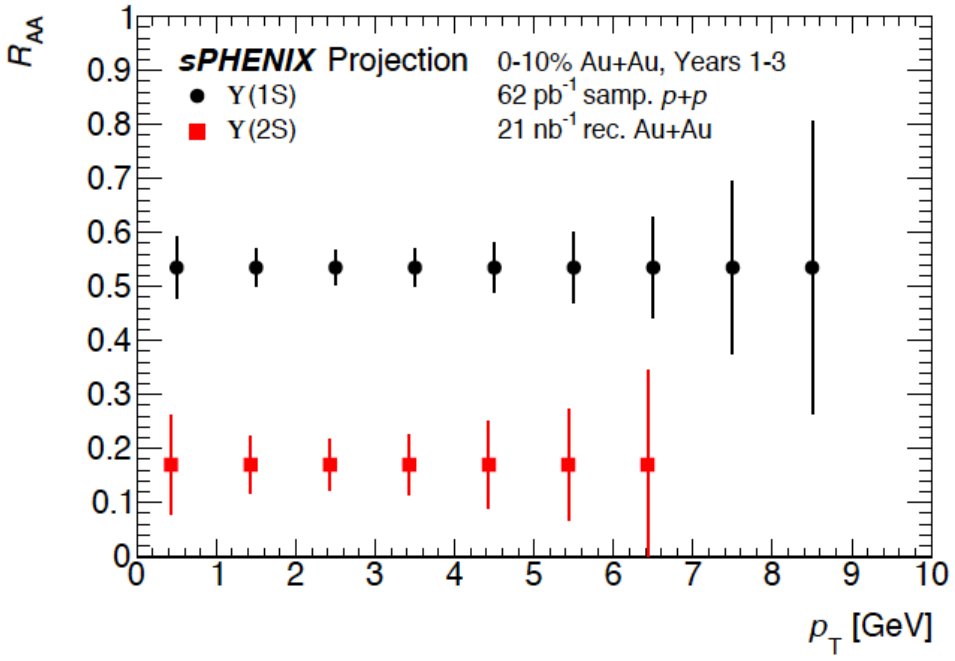
YEAR 1 - 20 WEEKS

Ncoll Au+Au MB	257			
Ncoll Au+Au 0-10%	955			
AuAu 12 B MB recorded events	1.20E+10			
Nupsilon in 12 B events AuAu MB	2.17E+04			
		Y(1S)	**Y(2S)**	**Y(3S)**
Nupsilon in 12 B events AuAu MB within CEMC	6.84E+03	4.92E+03	1.23E+03	6.84E+02
Nupsilon in 12 B events AuAu MB reco	4.19E+03	3.02E+03	7.54E+02	4.19E+02

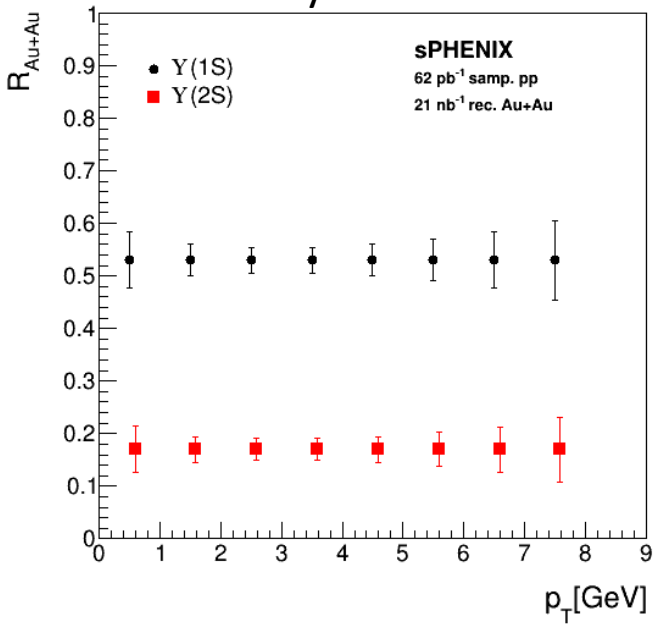
		Y(1S)	**Y(2S)**	**Y(3S)**
Nupsilon in 1.2 B events AuAu 0-10% (Ncoll scaling)	8.06E+03	5.81E+03	1.45E+03	8.06E+02
suppression factor		5.30E-01	1.70E-01	3.50E-02
Nupsilon in 1.2 B events AuAu 0-10% after suppression	3.35E+03	3.08E+03	2.47E+02	2.82E+01
Nupsilon in 1.2 B events AuAu 0-10% within CEMC	1.06E+03	9.69E+02	7.77E+01	8.89E+00
Nupsilon in 1.2 B events AuAu 0-10% reco	647	594	48	5

For Au+Au Signal Extraction Matters

Including signal extraction



Purely statistics



- Will work on this in the coming week