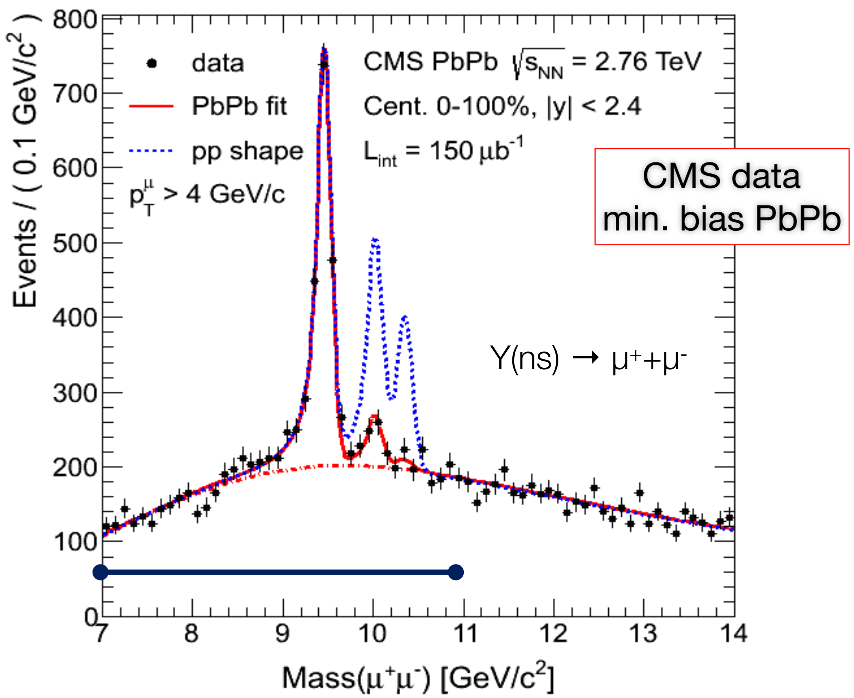
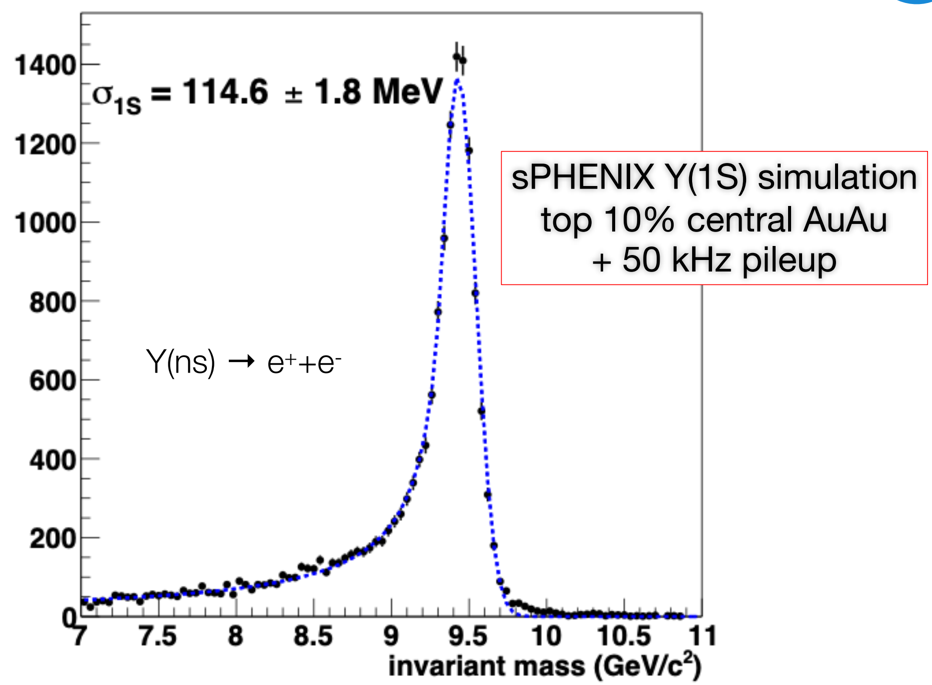
sPHENIX presentation: summarize heavy-quarkonium and low and intermediate mass dileptons plans with sPHENIX.

Upsilons at sPHENIX and LHC





Differential suppression of Υ(nS), temperature dependence of QGP Debye screening length

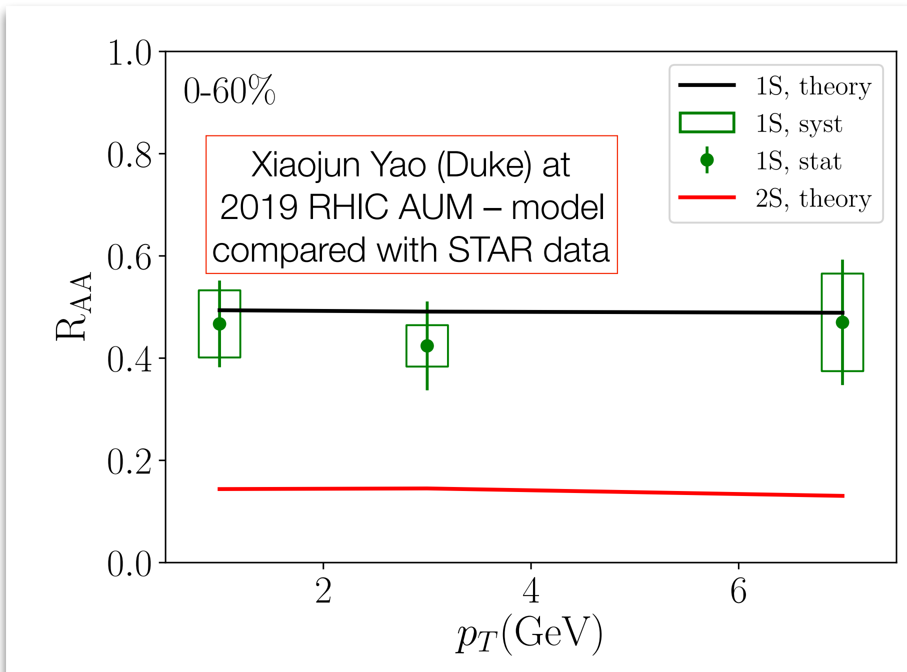
Updated!

Υ(1S) width key f.o.m. in work of Inner Detector Optimization Task Force – deciding INTT configuration (pattern recognition vs. radiative tails and conversions)

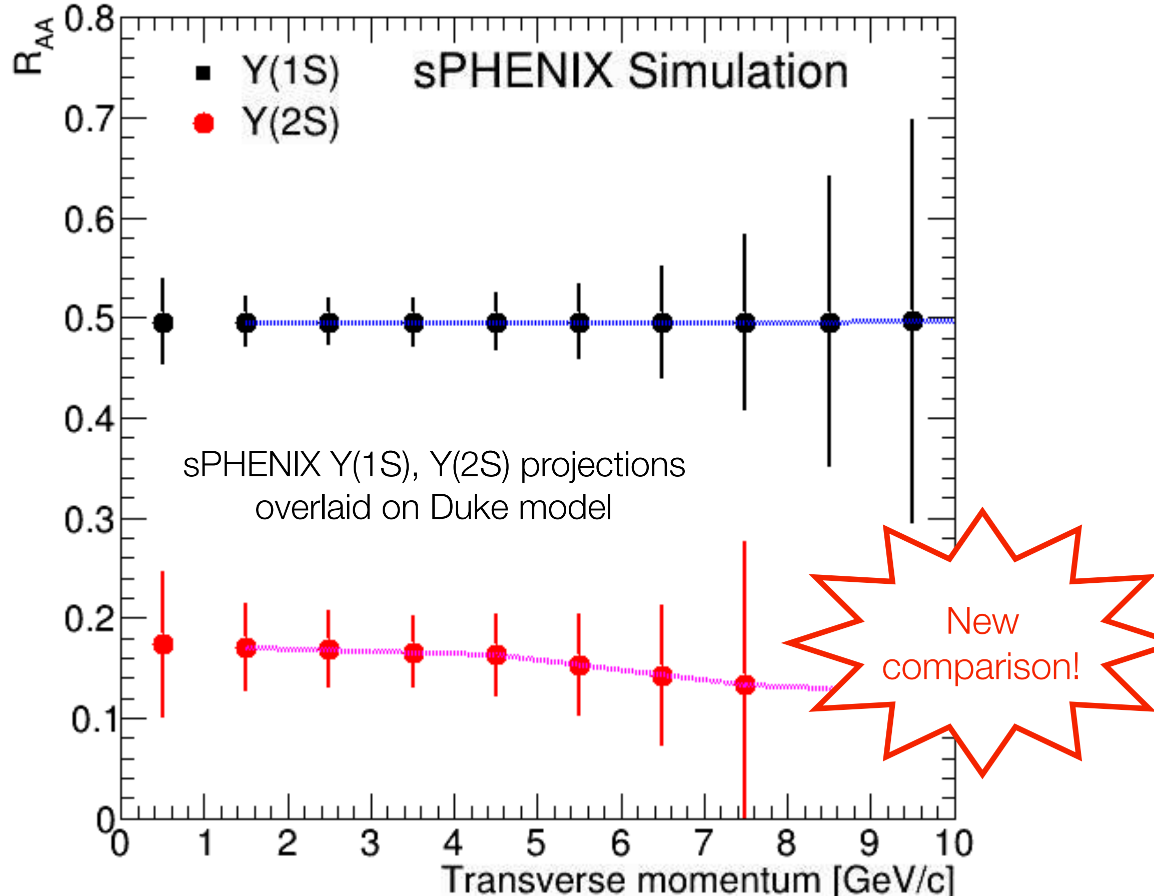
Quarkonium in the medium – recent work

Detailed balance affected by dissociation, strong energy loss of bare HQ, recombination

See X. Yao, B. Mueller, arXiv:1811.09644



Following discussions with sPHENIX collaborators X.Yao generated projections in sPHENIX acceptance



Upsilon statistics

From sPHENIX science proposal

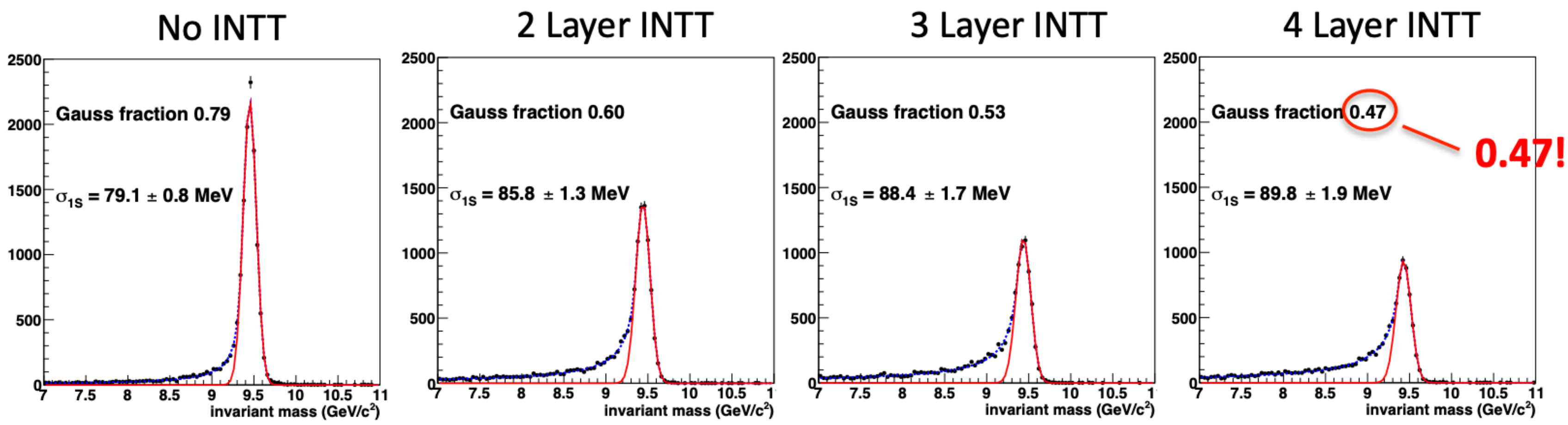
Table 4.1: The yields of the three Υ states obtained in 10 weeks of $p+p$, 22 weeks of Au+Au and 10 weeks of p+Au RHIC running. All yields include the effect of electron identification efficiency. The numbers for Au+Au and p+Au are calculated assuming no suppression of any of the Υ state yields.

Species	$\int \mathbf{L\,dt}(\mathbf{\|Z\|} < \mathbf{10cm})$	Events	$\langle N_{coll} \rangle$	eID eff.	Υ(1S)	Υ(2S)	Υ(3S)
$p+p$	175 pb^{-1}	7350 B	1	0.9	8770	2205	1155
Au+Au (MB)		100 B	240.4	0.57	16240	4080	2140
Au+Au (0–10%)		10 B	962	0.49	5625	1415	740
p+Au (MB)	960 nb^{-1}	1680 B	4.3	0.84	6560	1650	860
p+Au (0–20%)		336 B	8.2	0.8	2360	592	311

Low and Intermediate mass dileptons

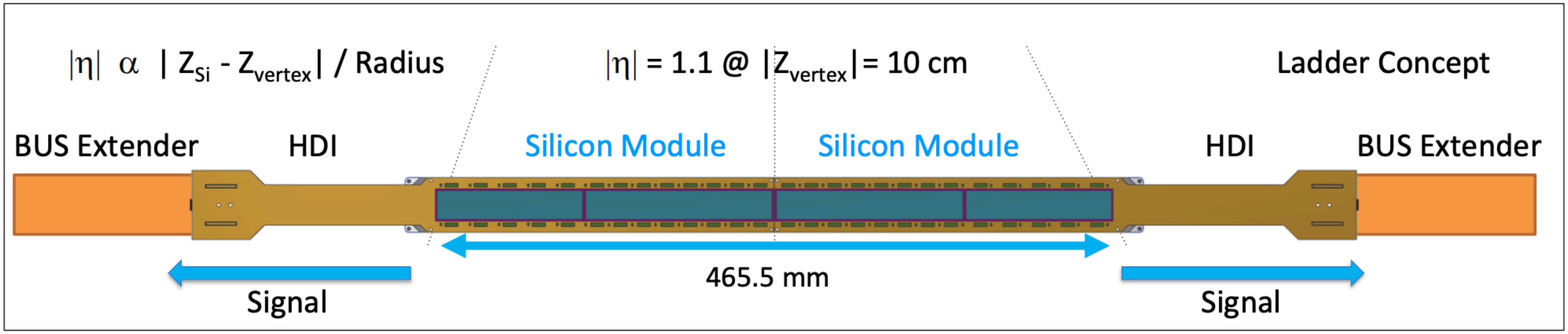
- sPHENIX optimized for jet, Upsilons (i.e., high mass dileptons), HF
  - Background falls with mass, p_T
- Low p_T requires large hadron rejection power O(1000-10000)
- Approaches (in combination): E/p matching, RICH, dE/dx, precise tracking
  - EMCal PHENIX: ~8%/√E; sPHENIX: 13%/√E
  - suitable gas RICH ~50cm; available room in sPHENIX ~10cm
  - the two-layer INTT is 4% X_0 – conversions

Impact on Upsilon Mass Spectra…



- Simulation done with the latest INTT and TPC simulation
  - **Need to reduce the material budget to the minimum necessary**

Two Barrel Configuration



Barrel	Center of Sensor Tangent Radius (mm)	Pseudo rapidity	QTY of Ladders	Angle (deg)	Coverage (PHI) (%)	Overlap (%)	Clearance (mm)	Chip Power Dissipation (W)	Stave Rad Length (%)	Barrel Rad Length (%)
1	-	-	24	-	100	1.1	2.2	79.88	0.5	2.0
1a (Inner)	71.88	1.38	12	0	52.7	0	0.7	39.94	0.25	1.0
1b (Outer)	78.29	1.30	12	0	48.4	0	4.0	39.94	0.25	1.0
2	-	-	32	-	100	1.7	2.6	106.50	0.5	2.0
2a (Inner)	96.80	1.12	16	0	52.4	0	0.6	53.25	0.25	1.0
2b (Outer)	102.64	1.07	16	0	49.4	0	2.9	53.25	0.25	1.0
Total	-	-	56	-	-	-	10.67	186.38	1.0	4.0