Upsilon mass resolution in each Si tracker configuration

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sPHENIX tracker meeting
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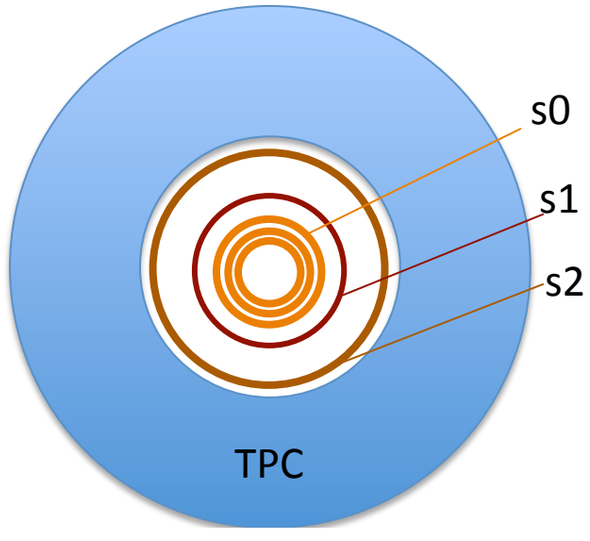
Simulation methodology

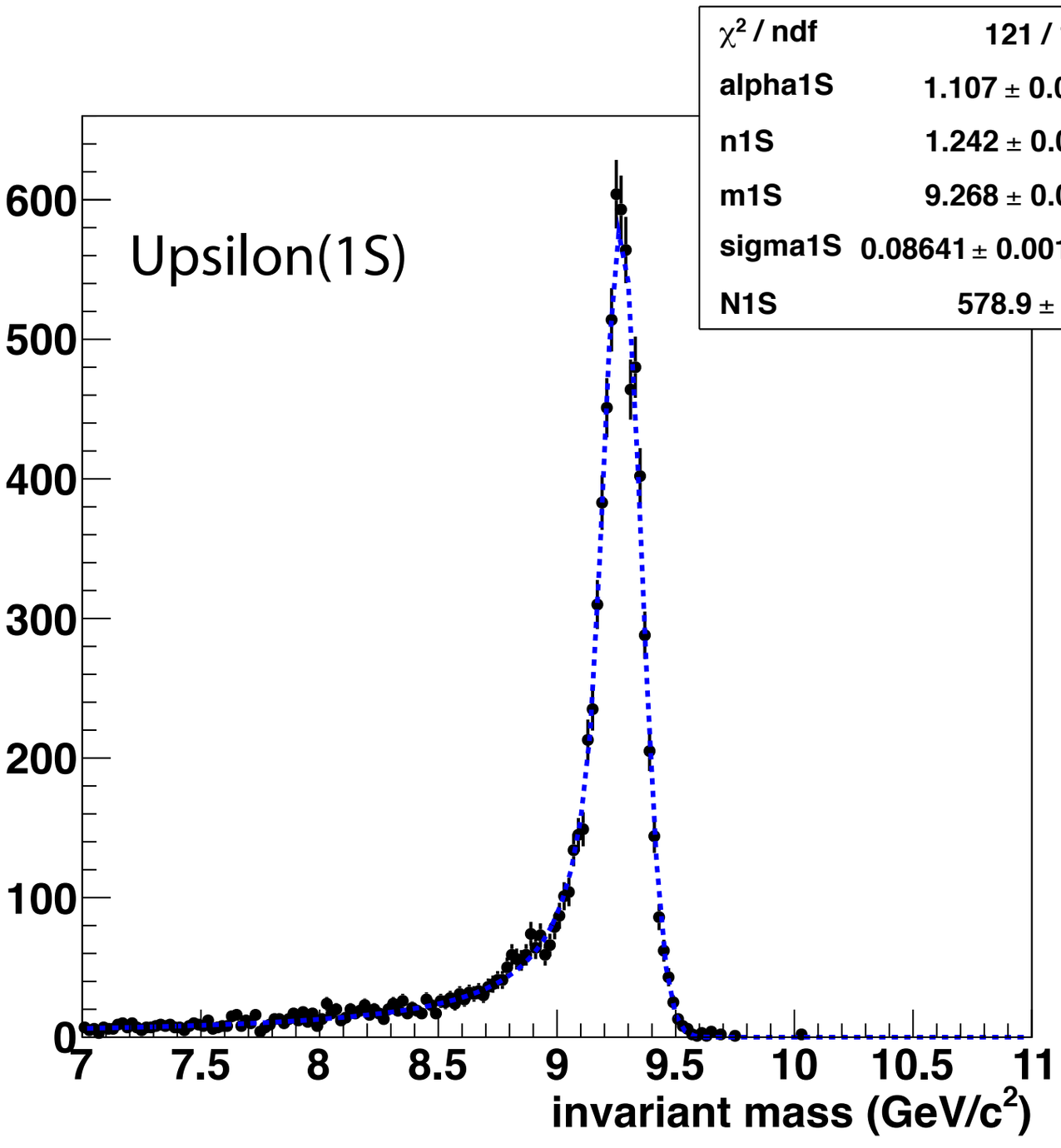
Tentative update design



Station	R [cm]	X_0 [%]
(p0)	2.4	1.3
s0a	8	1.0
s0b	10	1.0
s0c	12	1.0
s1	15	**0.6**
s2	30	1.0

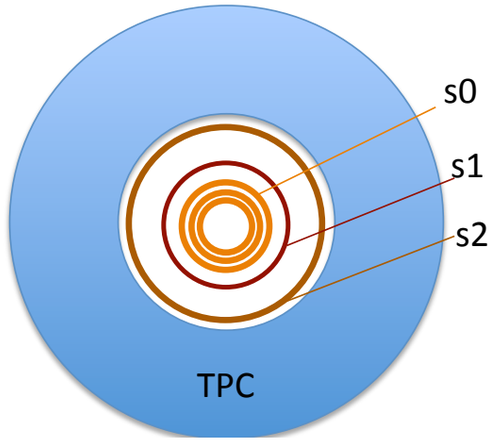
- sPHENIX Geant4 simulation is used.
- Silicon pixel (P0) and silicon-strip tracker (S0, S1, S2) follow cylinder geometry instead of realistic plane geometry. The pixel layer P1 is not taken into account.
- Ganging at the S1 and S2 stations are off. Here we assume the ganging effects can be perfectly eliminated in offline analyses.
- I think Bremsstrahlung in Upsilon $\rightarrow e^+e^-$ decay, namely Upsilon $\rightarrow e^+e^-\gamma$, is not implemented in the simulation framework.

Ref. configuration (same as C&S review)



Tony's result was sigma ~ 94 MeV/c.
I got a better result, probably due to ganging off.

Update design 1 (see page 2)



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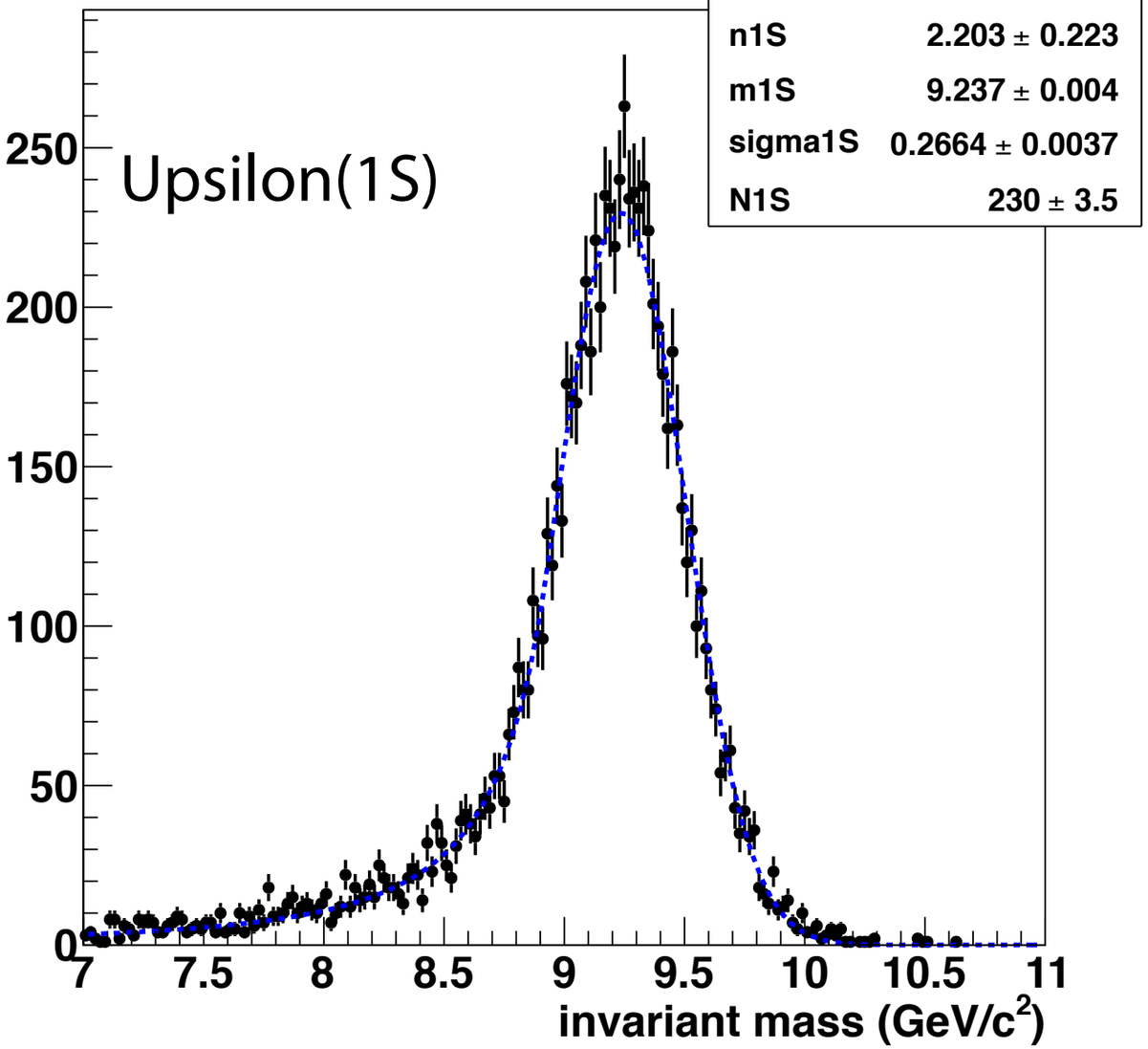
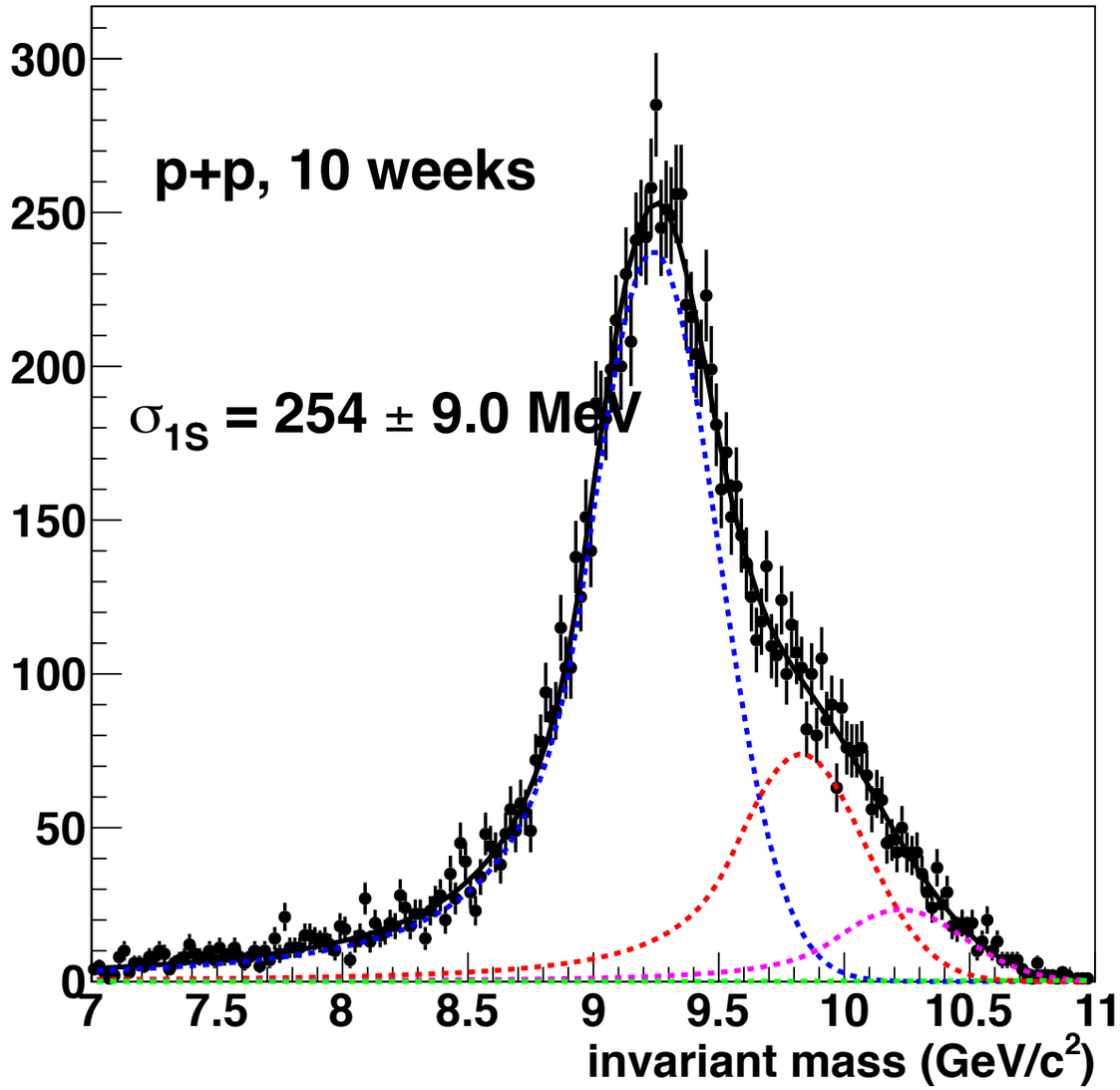
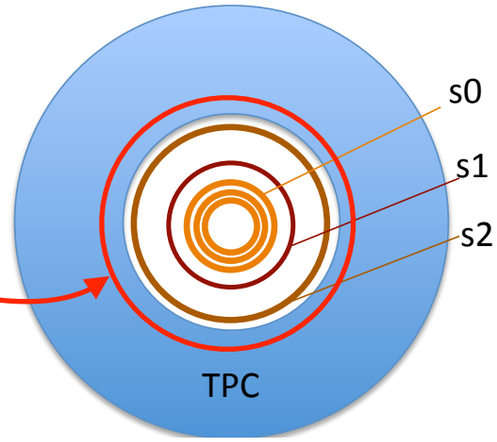


Y(1S,2S,3S) → e^+e^-



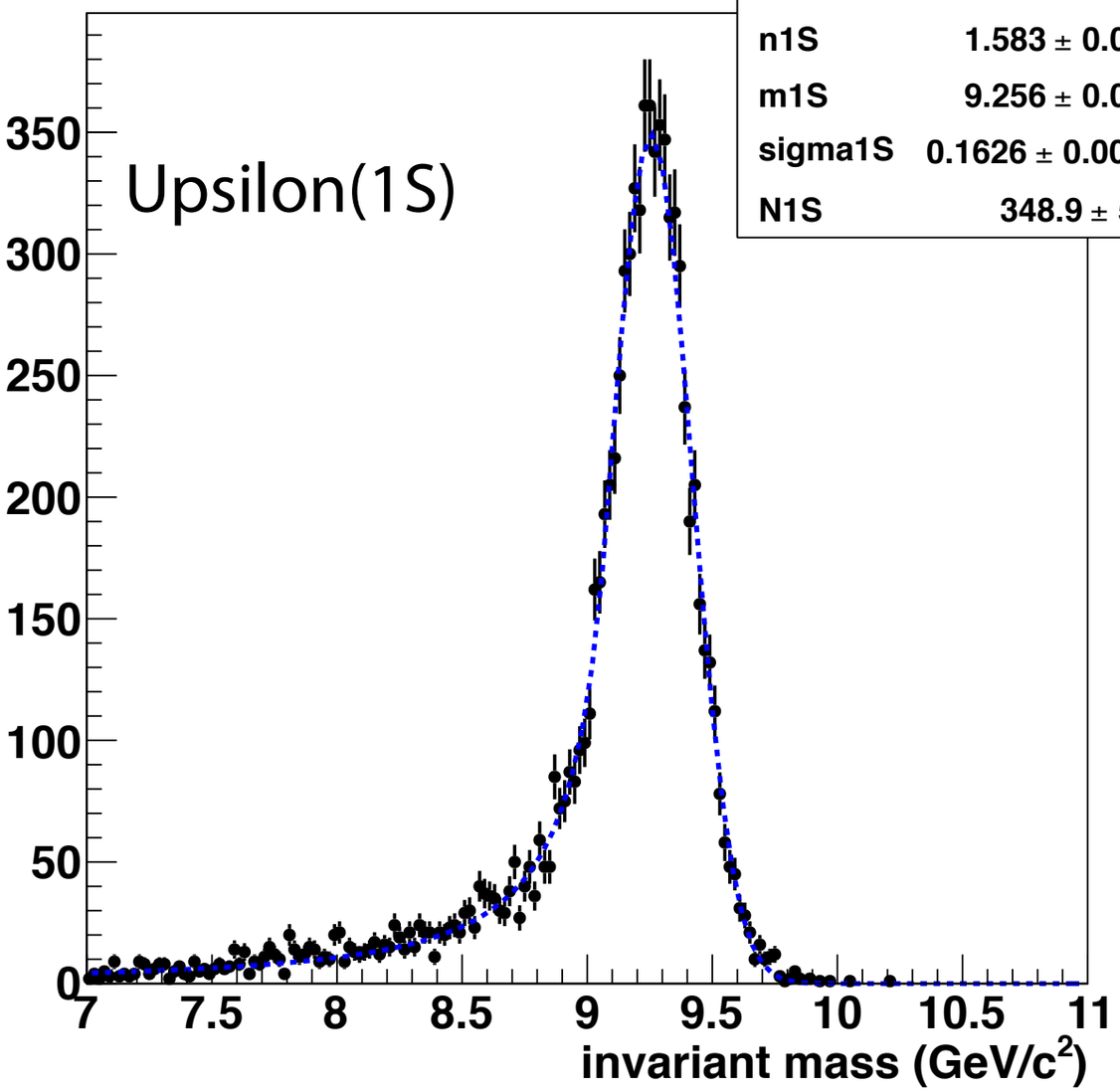
Update design 2 (design 1 + one more S2)

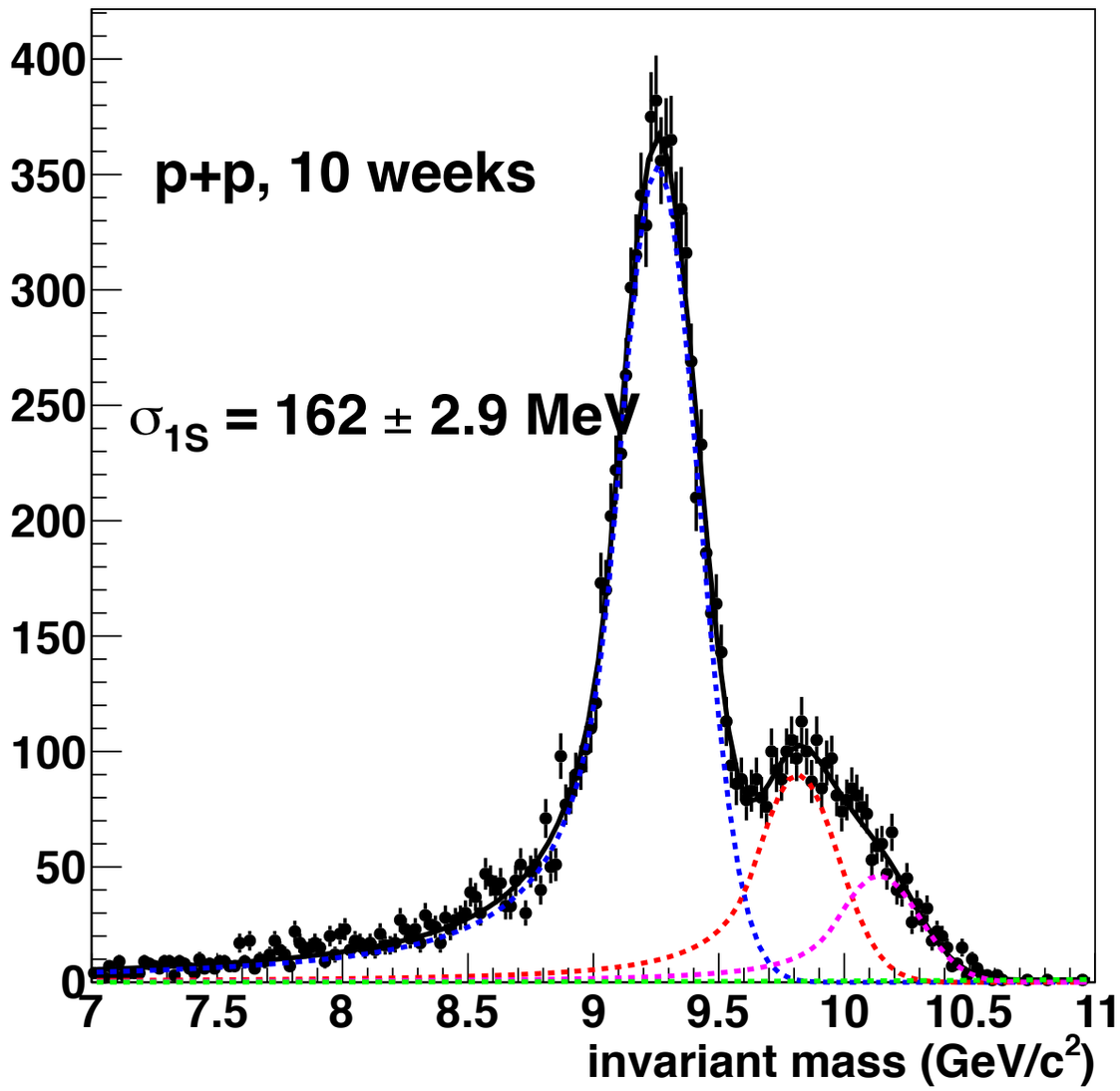
Additional S2 layer (R=40cm)



Station	R [cm]	X_0 [%]
(p0)	2.4	1.3
s0a	8	1.0
s0b	10	1.0
s0c	12	1.0
s1	15	**0.6**
s2	30	1.0
s2	40	1.0

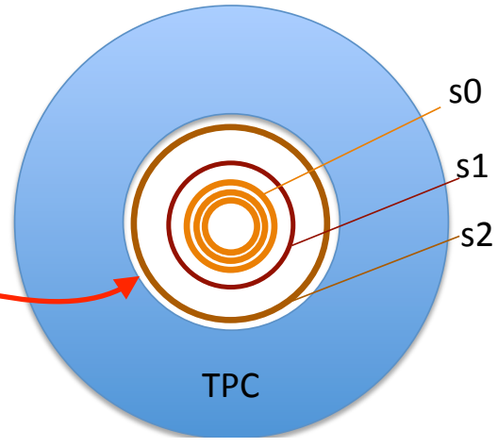
Y(1S,2S,3S) → e^+e^-



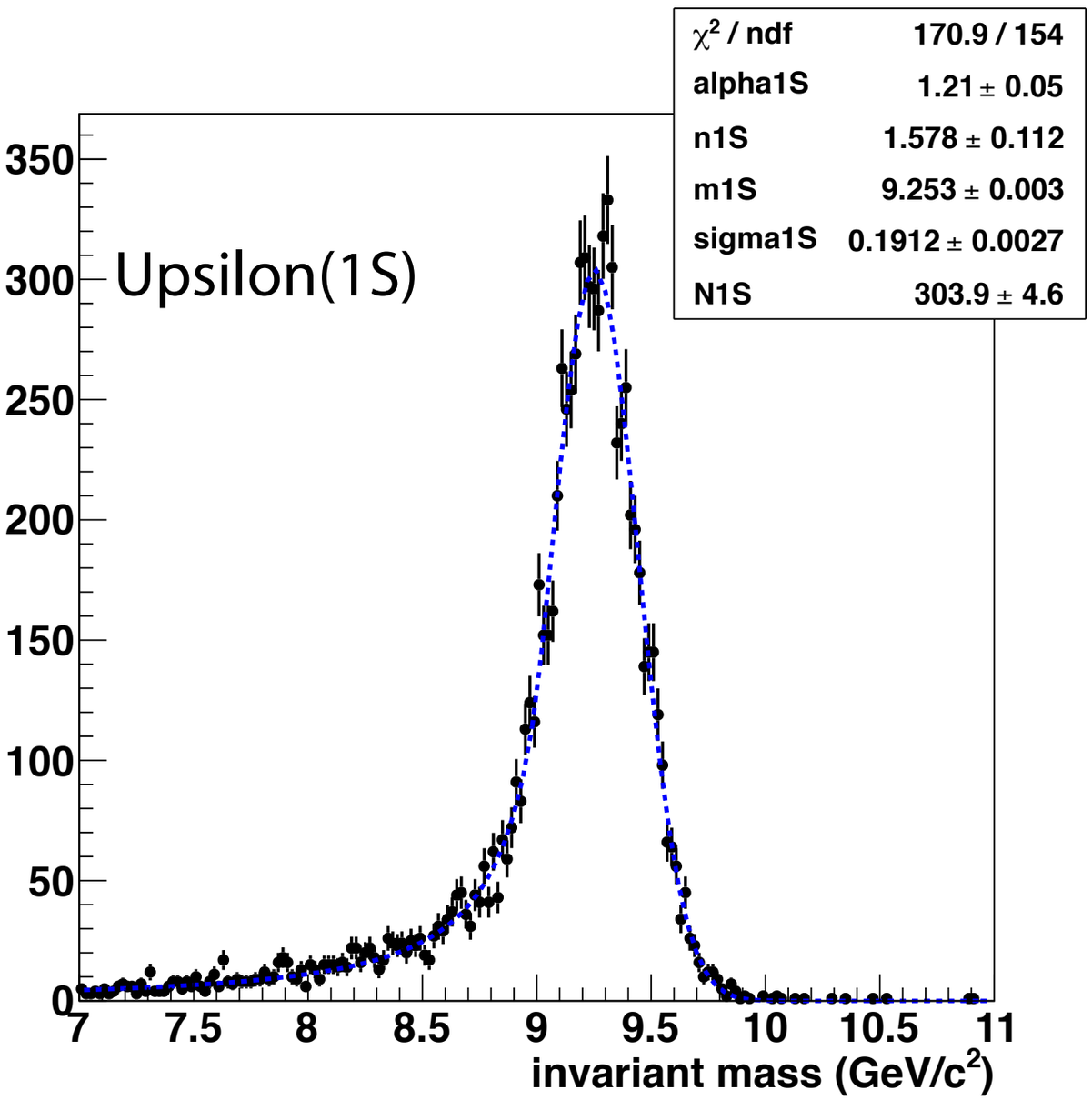


Update design 3 (S2 moves to R=40cm)

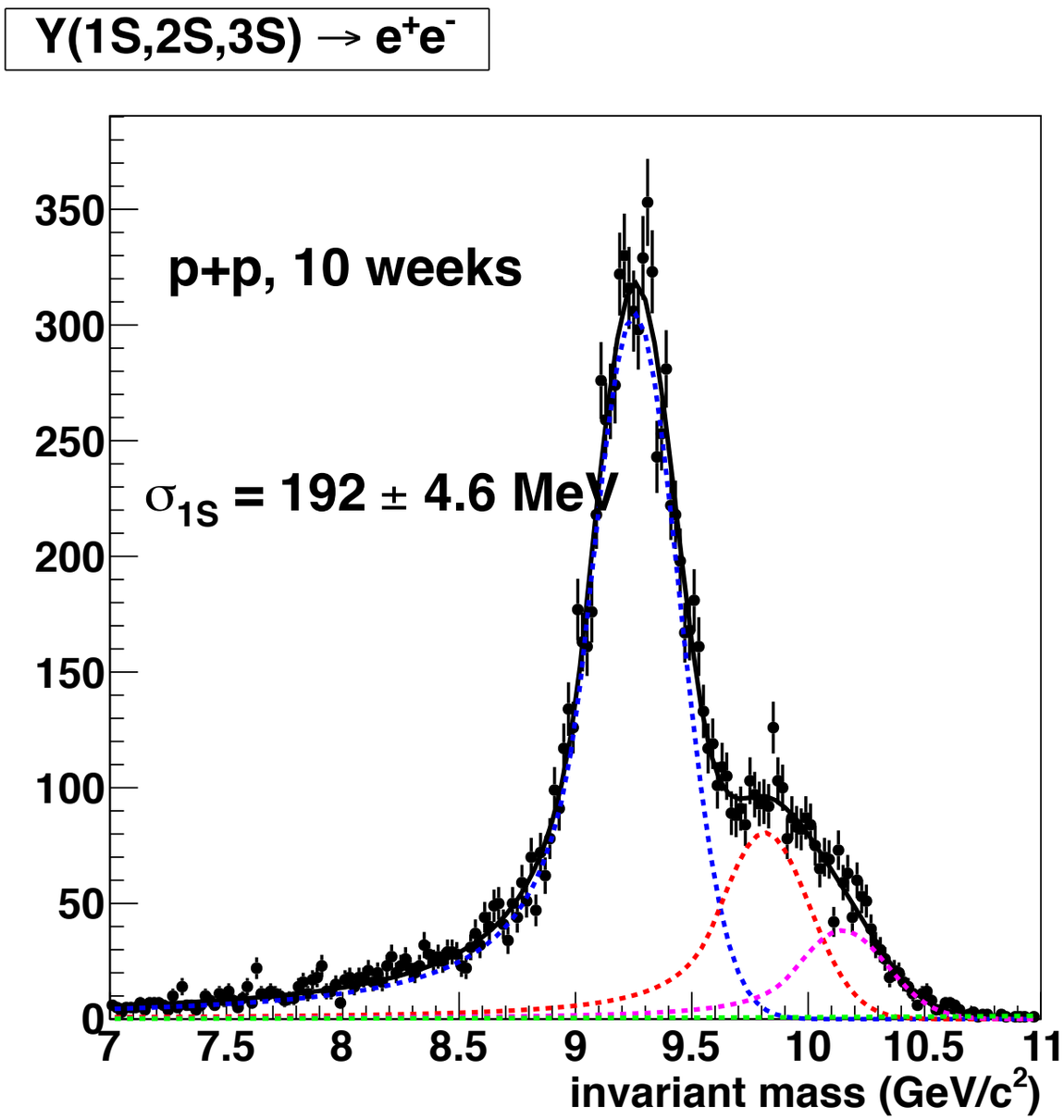
S2 is moved to R=40cm



Station	R [cm]	X_0 [%]
(p0)	2.4	1.3
s0a	8	1.0
s0b	10	1.0
s0c	12	1.0
s1	15	**0.6**
s2	~~30~~ 40	1.0



$\Upsilon(1S,2S,3S) \rightarrow e^+e^-$



Summary

- Update design 2 looks acceptable once we get the pixel layer.
- But design 1 and 3 look hardly working once some systematic errors would be taken into account.
- Need more discussion and simulation.