Update on Separation of Three Υ states in ePIC

Saeahram Yoo · Minjung Kim · Spencer Klein · Daniel Cebra

Exclusive/Diffraction/Tagging meeting

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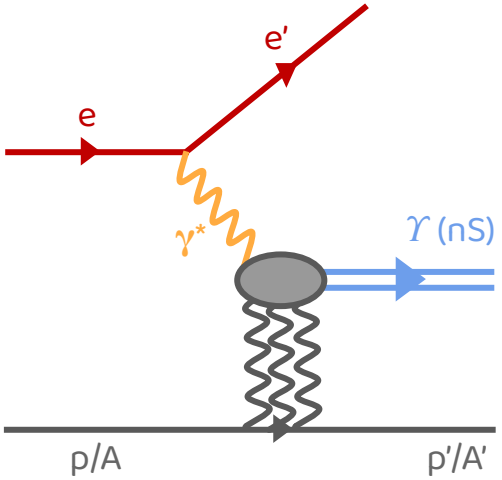
UCDAVIS
UNIVERSITY OF CALIFORNIA

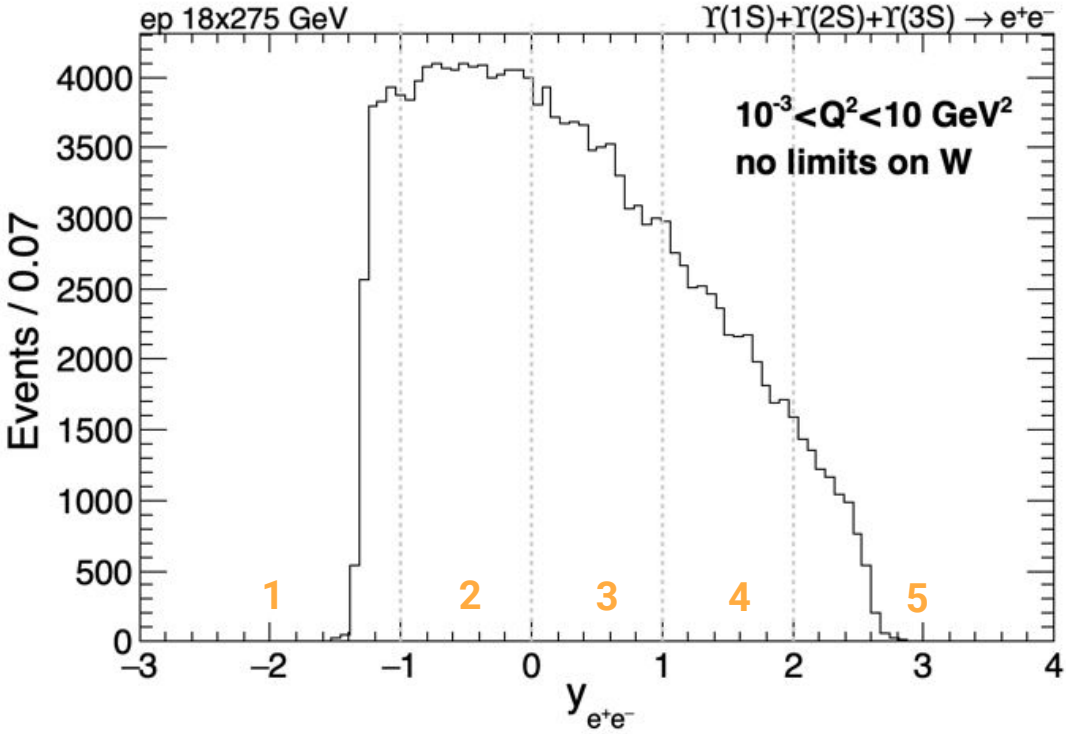
Comments from Last Week

- [v] Comparison of other parameters in the mass fit between the electron channel and the muon channel
- [ ] Assumed integrated luminosity used in this study
- [ ] What is the physics quantity one wants to measure in the end?



Rapidity of Upsilon (e^+e^-)

Realistic Seeding (ChargedReconstructedSeededParticle)

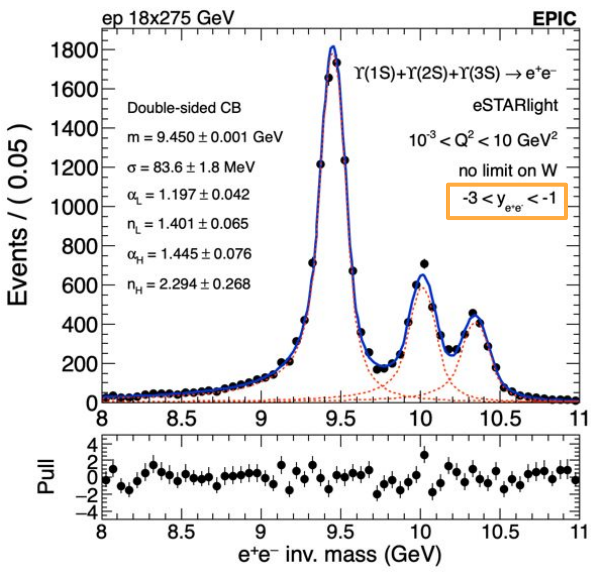


- Separate the regions depending on the reconstructed upsilon rapidity:
  - 1: -3 < y < -1
  - 2: -1 < y < 0
  - 3: 0 < y < 1
  - 4: 1 < y < 2
  - 5: 2 < y < 4

Upsilon Invariant Mass Fit (e^+e^-)

Realistic Seeding (ChargedReconstructedSeededParticle)

1



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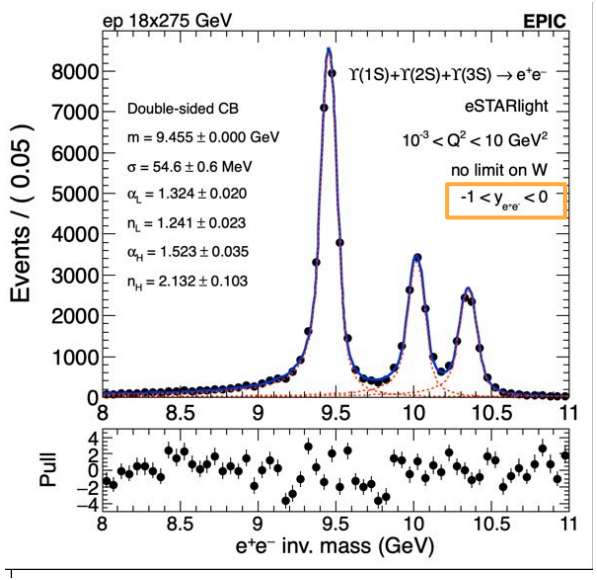

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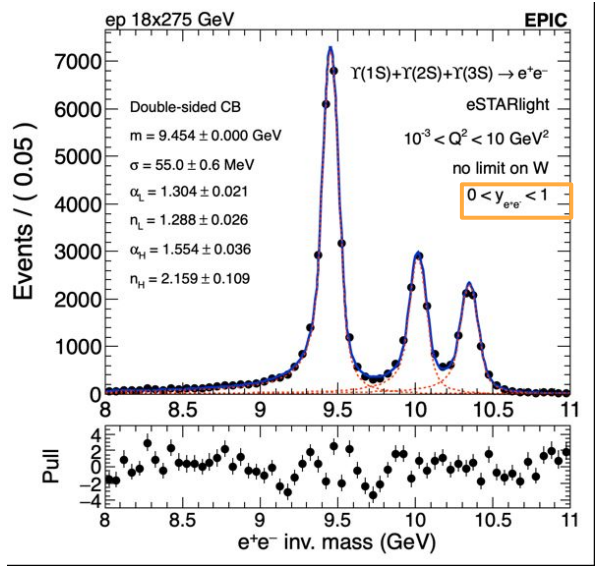

Upsilon Invariant Mass Fit (e^+e^-)

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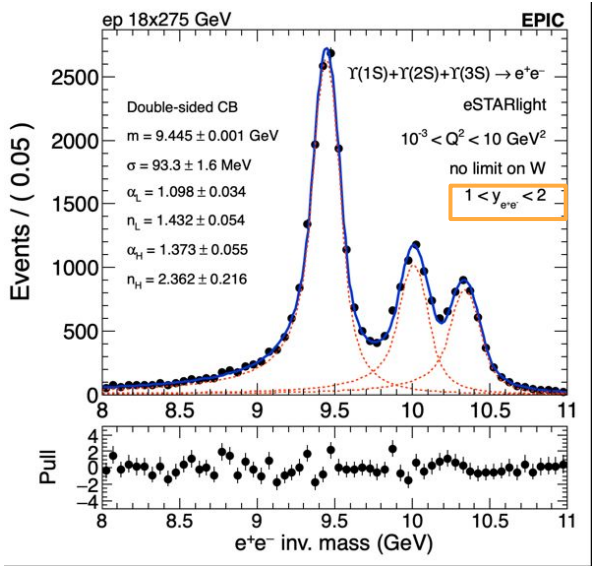
4



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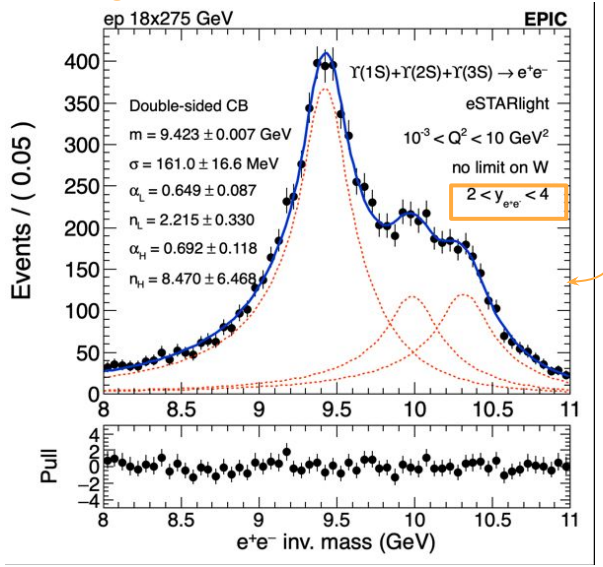
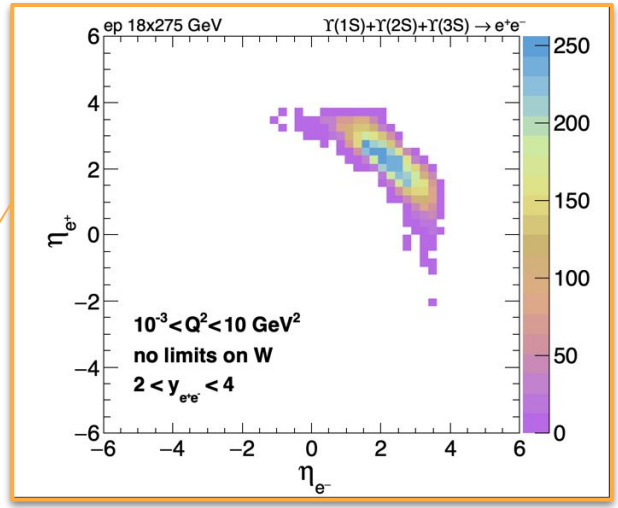
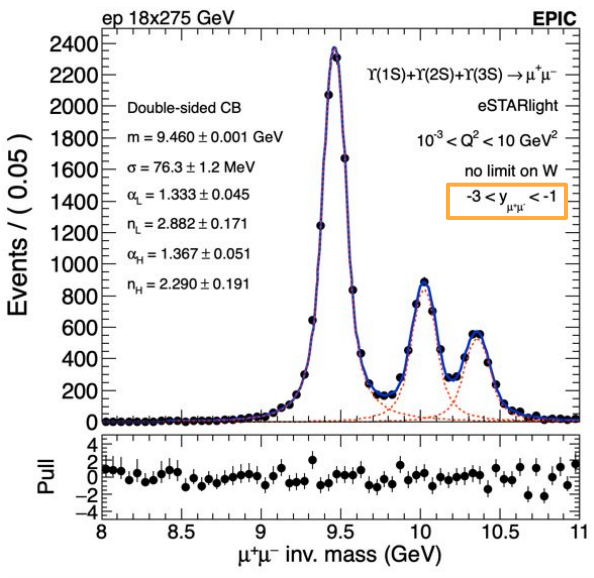




Upsilon Invariant Mass Fit ($\mu^+\mu^-$)

Realistic Seeding (ChargedReconstructedSeededParticle)

1



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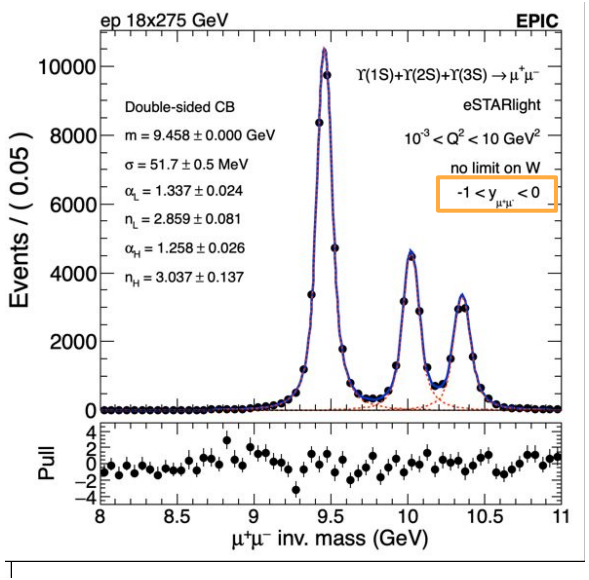

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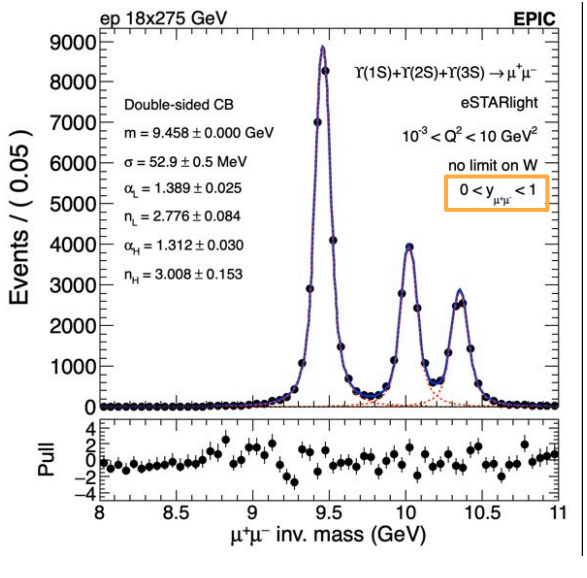

Upsilon Invariant Mass Fit ($\mu^+\mu^-$)

Realistic Seeding (ChargedReconstructedSeededParticle)

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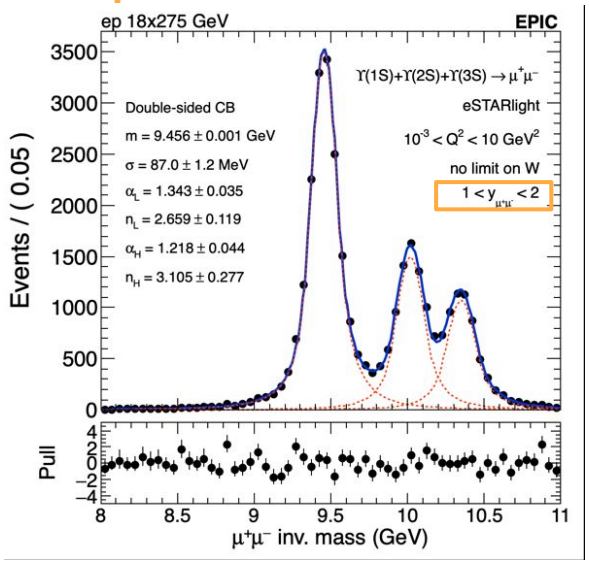

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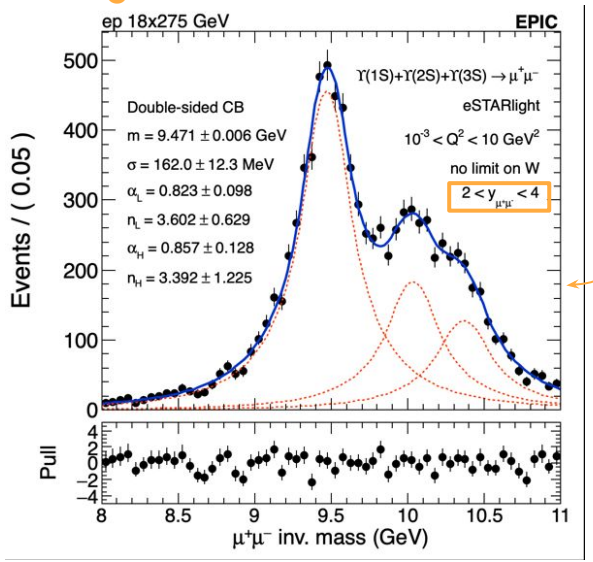

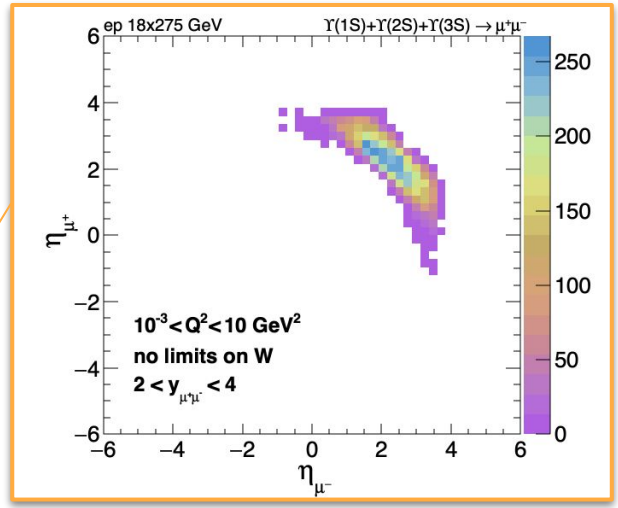

Fit Parameter Comparison

y range	electron channel	muon channel
-3 to -1	σ = 83.6 ± 1.8 MeV α_L = 1.197 ± 0.042, α_H = 1.445 ± 0.076 n_L = 1.401 ± 0.065, n_H = 2.294 ± 0.268	σ = 76.3 ± 1.2 MeV α_L = 1.333 ± 0.045, α_H = 1.367 ± 0.051 n_L = 2.882 ± 0.171, n_H = 2.290 ± 0.191
-1 to 0	σ = 54.6 ± 0.6 MeV α_L = 1.134 ± 0.020, α_H = 1.523 ± 0.035 n_L = 1.241 ± 0.023, n_H = 2.132 ± 0.103	σ = 51.7 ± 0.5 MeV α_L = 1.337 ± 0.024, α_H = 1.258 ± 0.026 n_L = 2.859 ± 0.081, n_H = 3.037 ± 0.137
0 to 1	σ = 55.0 ± 0.6 MeV α_L = 1.304 ± 0.021, α_H = 1.554 ± 0.036 n_L = 1.288 ± 0.026, n_H = 2.159 ± 0.109	σ = 52.9 ± 0.5 MeV α_L = 1.389 ± 0.025, α_H = 1.312 ± 0.030 n_L = 2.776 ± 0.084, n_H = 3.008 ± 0.153
1 to 2	93.3 ± 1.6 MeV α_L = 1.098 ± 0.034, α_H = 1.373 ± 0.055 n_L = 1.432 ± 0.054, n_H = 2.362 ± 0.216	σ = 87.0 ± 1.2 MeV α_L = 1.343 ± 0.035, α_H = 1.218 ± 0.044 n_L = 2.659 ± 0.119, n_H = 3.105 ± 0.277
2 to 4	σ = 161.0 ± 16.6 MeV α_L = 0.649 ± 0.087, α_H = 0.692 ± 0.118 n_L = 2.215 ± 0.330, n_H = 8.470 ± 6.468	σ = 162.0 ± 12.3 MeV α_L = 0.823 ± 0.098, α_H = 0.857 ± 0.128 n_L = 3.602 ± 0.629, n_H = 3.392 ± 1.225