

# Charmonia production simulation with the new SPD release

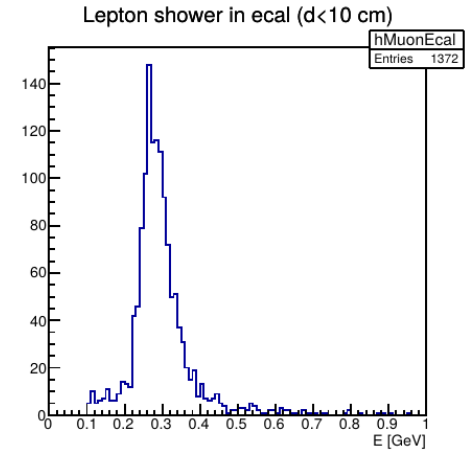
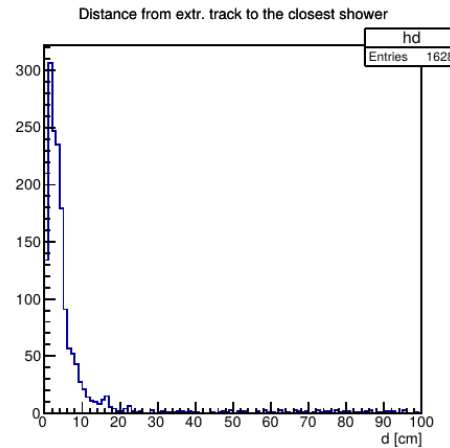
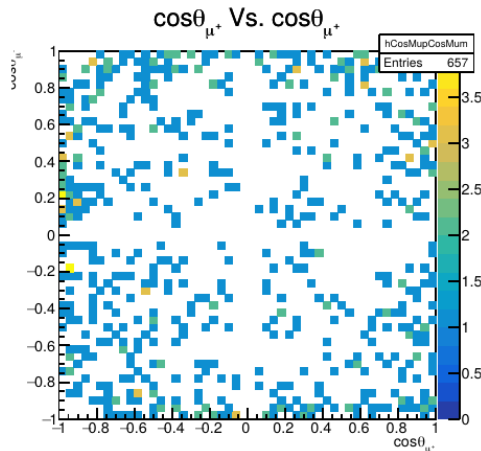
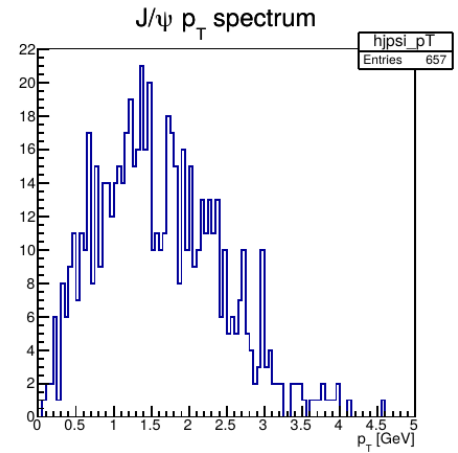
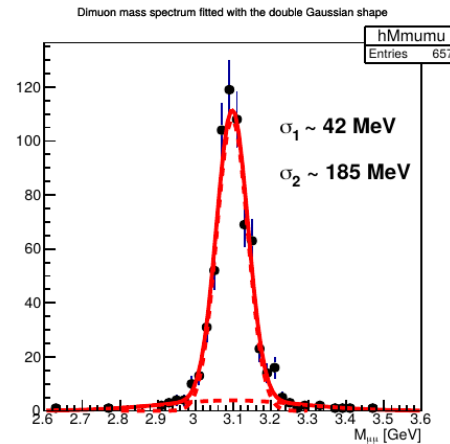
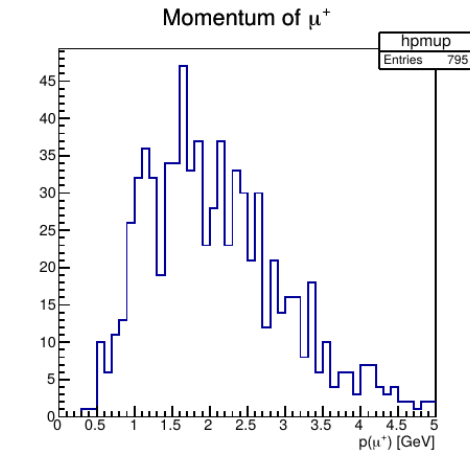
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SPD Physics and MC meeting  
31.03.2021

- I has been a very recent and major update of SpdRoot
- What do we have now:
  - charged particle momentum reconstruction
  - primary vertex reconstruction
  - Emc particles
  - RS hits
  - Examples with basic physics are added

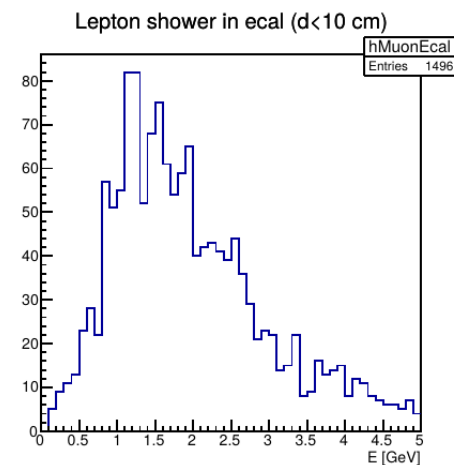
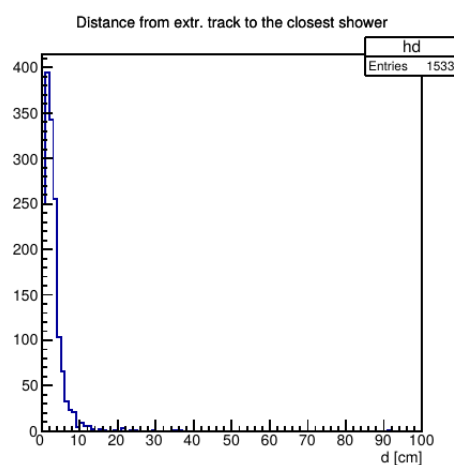
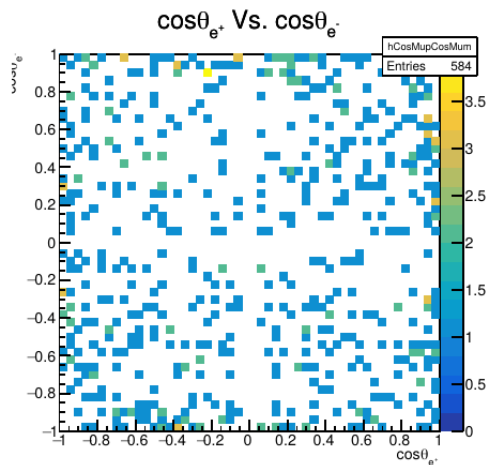
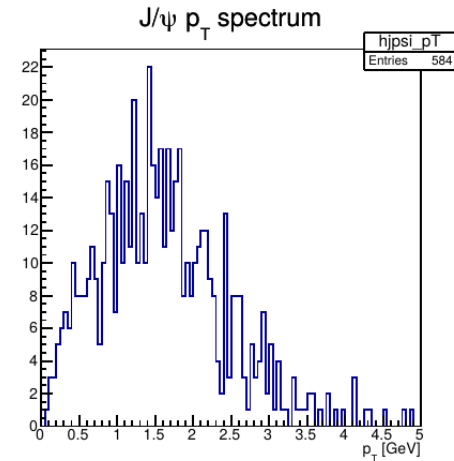
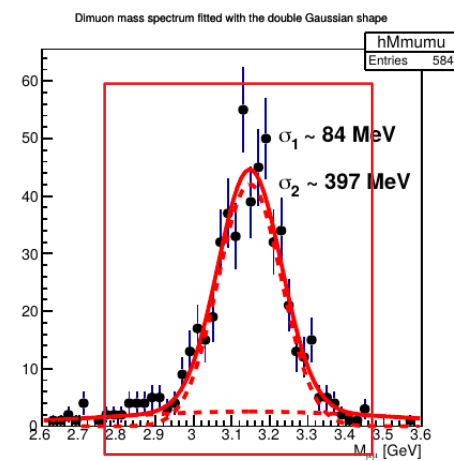
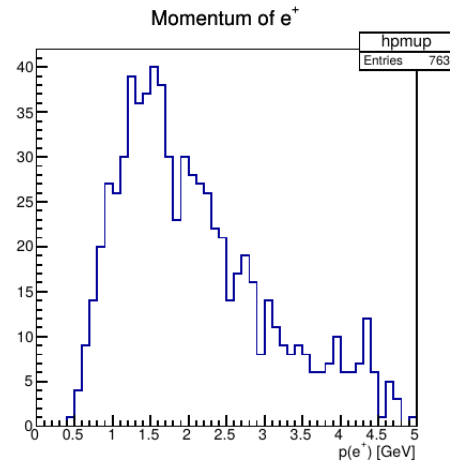
# $J/\psi \rightarrow \mu^+\mu^-$

- Example: jpsi-mumu
- Magnetic field: 1T
- 1K event generated



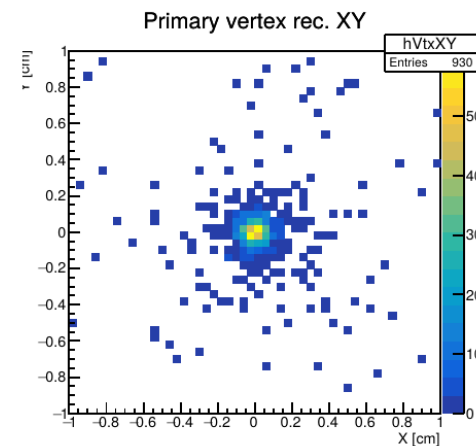
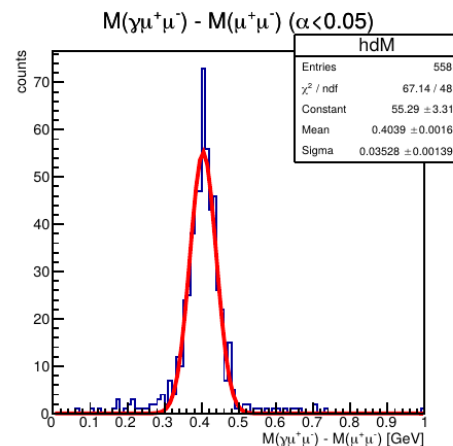
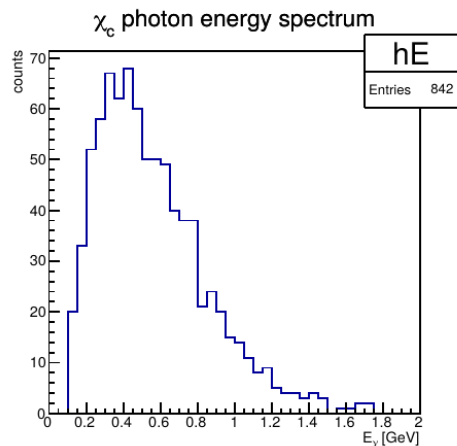
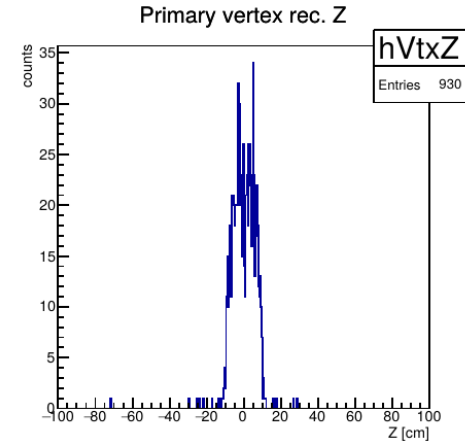
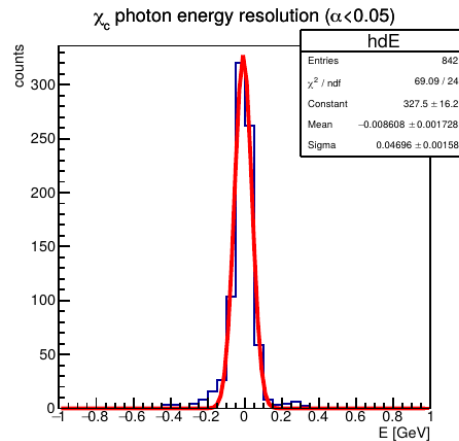
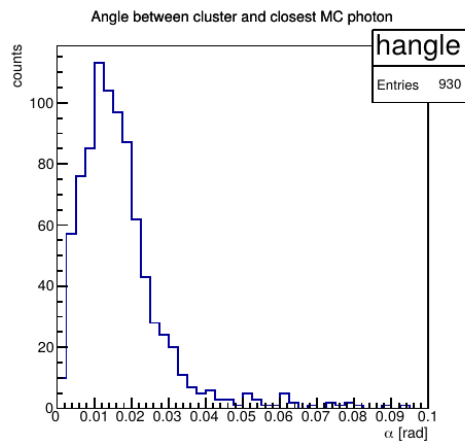
# $J/\psi \rightarrow e^+e^-$

- Example: jpsi-ee
- Magnetic field: 1T
- 1K events generated



# $\chi \rightarrow \gamma J/\psi, J/\psi \rightarrow \mu^+ \mu^-$

- Example: chic
- Magnetic field: 1T
- Reasonable primary vertex smearing in Z-direction should be considered
- 1K events generated

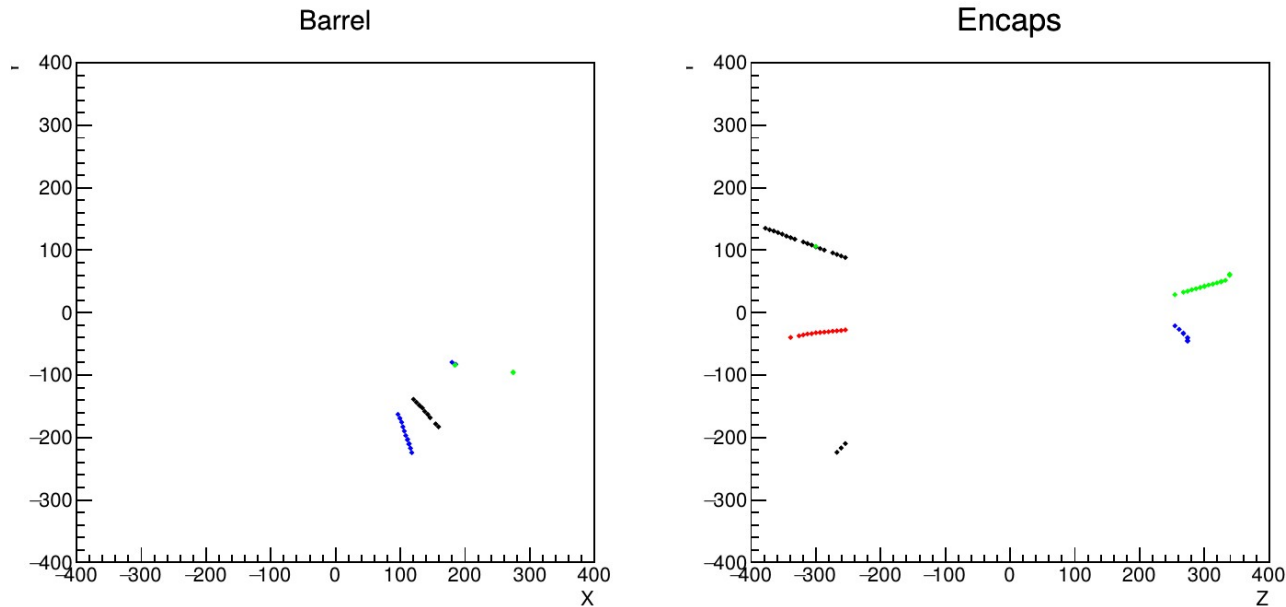


	Time for 1000 events (time per event)	Storage size
Simulation ("XSimuQSL.C")	1818s (1.8s)	598 M (0.6 M per event)
Reconstruction ("RecoFullEvent.C")	2483s (2.5s)	516 M (0.5 M per event)

Required statistics:

- for  $J/\psi/\chi_c$  - 10 million
- for MB - at least 1 billion (10 billion would be reasonable good)

- RS “Hits” are currently 1-dimensional, I would suggest add the second coordinate.
- I would volunteer for pion/muon separation. My ideas are based on Kalimat fit track propagator.



- It has been a very significant and important update of SpdRoot! (Many thx to Artur!)
- For physics with charmonia we have most of tools needed with the exception of TOF (for  $\eta_c$ ) and muon identification in the RS.
- Performance of the SpdRoot may be an issue in future!
- I would proceed with muon/pion separation in RS and  $\eta_c \rightarrow \Lambda\bar{\Lambda}$