Pythia+SIMC

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Setting and Inputs

Q^2=3, W=3.14, SHMS Center

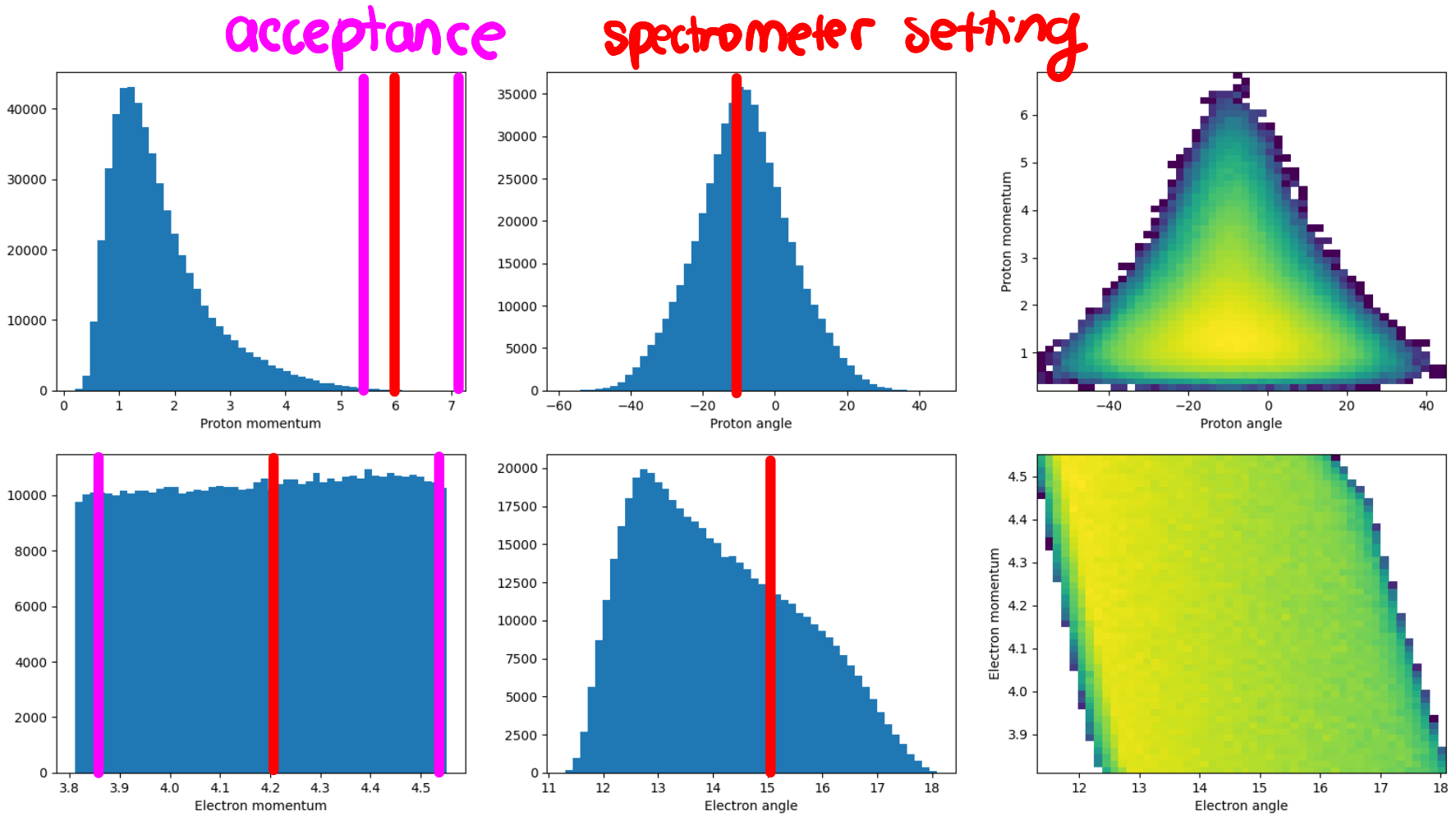
SIMC input:

```
Ebeam = 10590.7              ;  (MeV)
dEbeam = 0.05                ;  beam energy variation (%)
electron_arm = 1             ;  1=hms,2=sos, 5=shms
hadron_arm = 5               ;  1=hms,2=sos, 5=shms
spec%e%P = 4199.8.           ;  e arm central momentum (MeV/c)
spec%e%theta = 14.987        ;  e arm angle setting (degrees)
spec%p%P = 6040.9            ;  p arm central momentum (MeV/c)
spec%p%theta = 9.473         ;  p arm angle setting (degrees)
```

Pythia input:

```
"./out/Q3W3center2.dat" ! output file name
11                      ! lepton beam type
1000000,10              ! N events, n events to print
5.4                     ! Minimum SHMS energy to save event
0.15,0.35               ! xmin and xmax
0.56,0.66               ! ymin and ymax
2.0,4.0                 ! Q2min and Q2max
```

Pythia Event Distribution



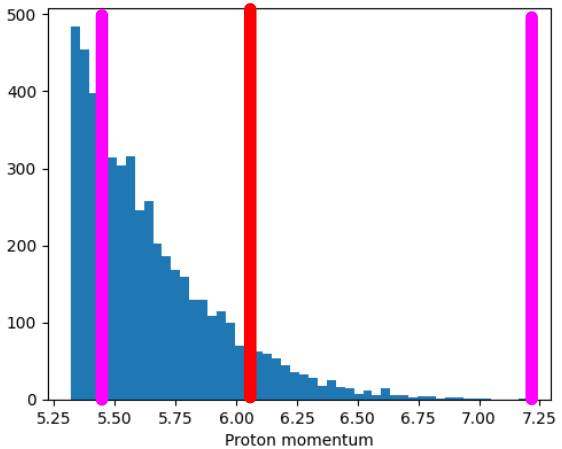
Pythia is inclusive – kinematic inputs control e' but not p'. Only a small percentage of events fall within the SHMS acceptance.

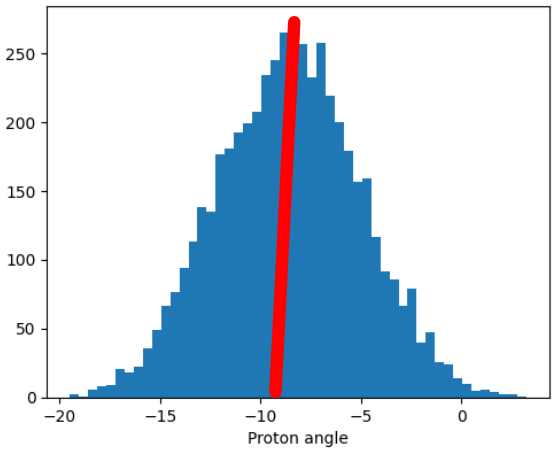
Pythia Event Selection

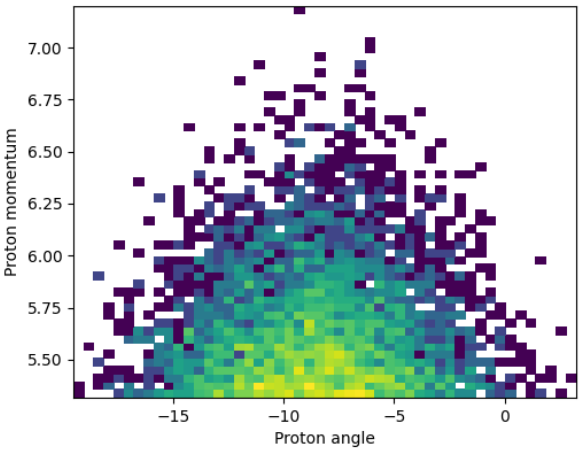
- File **src/drivers/pythia6-eic.f** defines the input and output of the program
- Previously, Henry has used this to remove events containing ϕ mesons
- Added input parameter ePmin: Minimum proton energy to save event
- Also removing exclusive channels: Skip events with ϕ, ω, ρ, η, η'
- Still generating all possible events, but control which ones to write to file
- 1M events runs in 4–5 minutes and produces 1k events after cuts

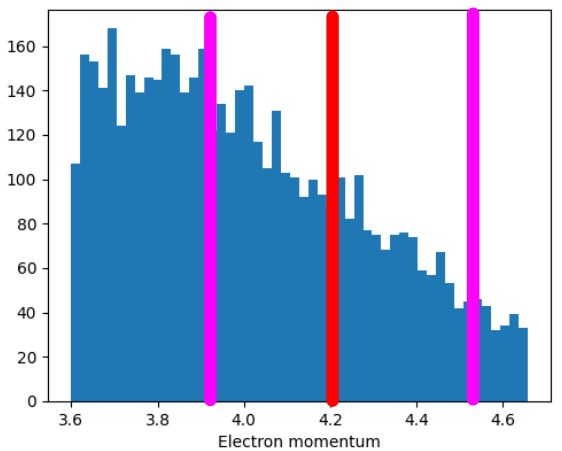
Restricted Event Distribution

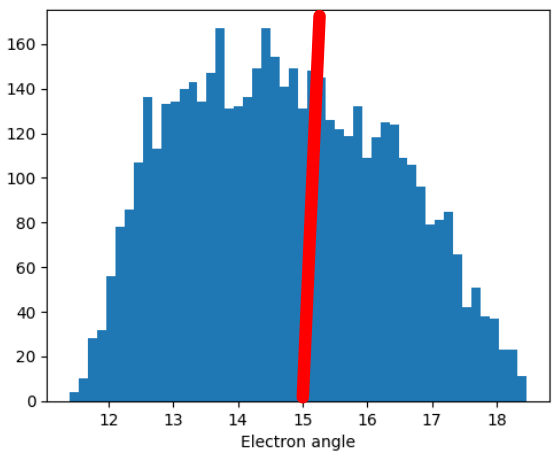
Ran 5M events in Pythia to generate 5k events after cuts.

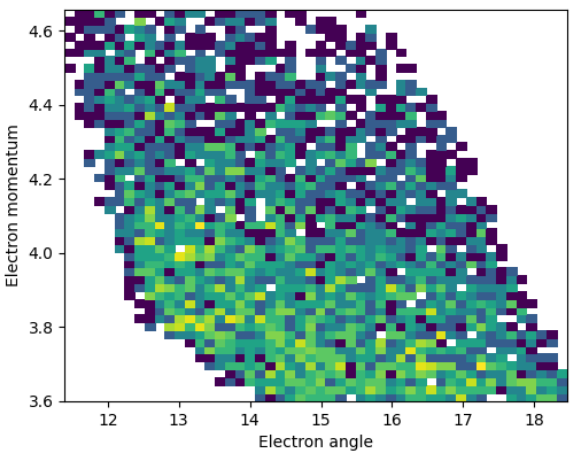








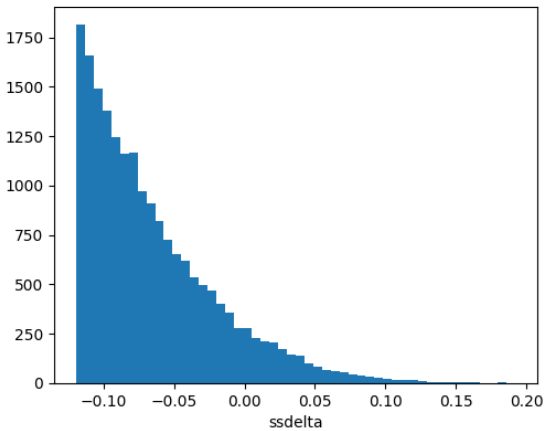


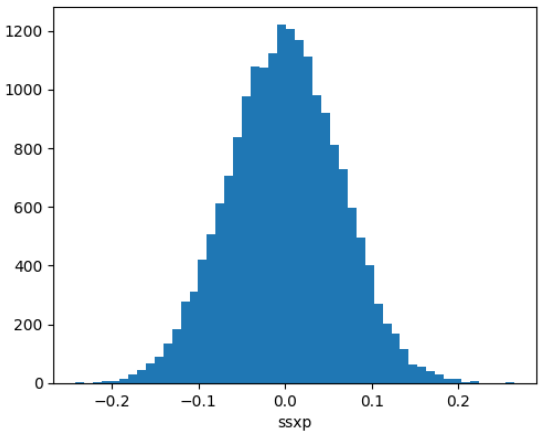


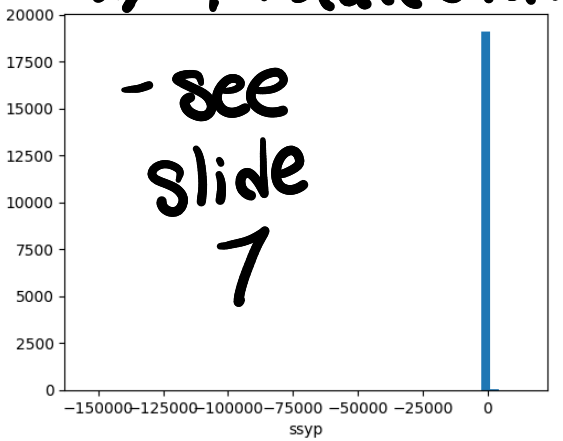
Only 311 of these events make it through SIMC.

Pythia Event Acceptance Variables

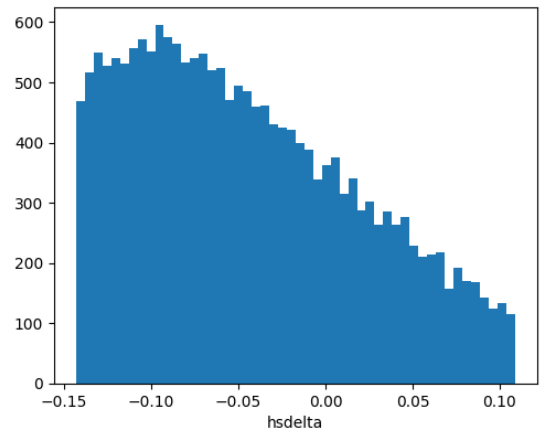
Plot acceptance variables: odd behaviour of yp.

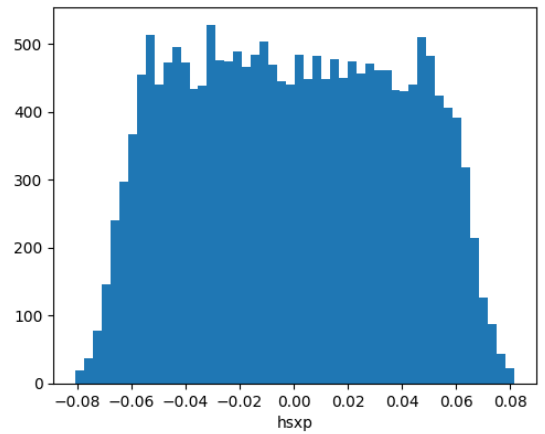


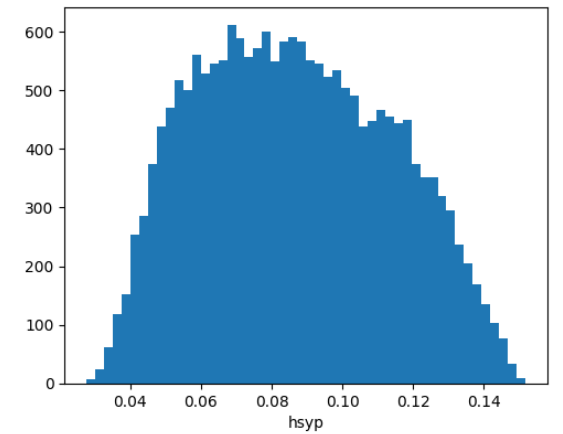




Miscalculated - see slide 7

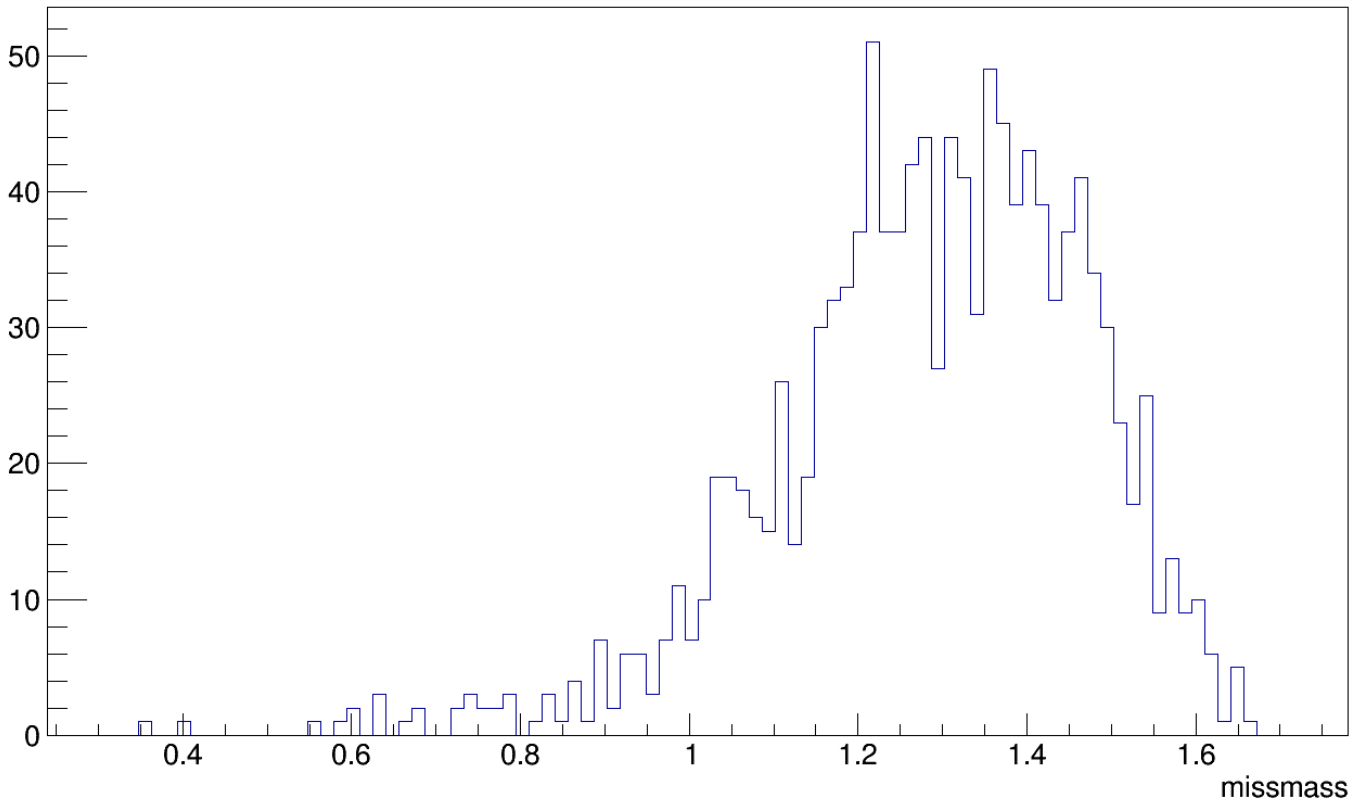






Missing Mass of Pythia+SIMC

20M pythia events → 19k output events → 1233 SIMC events



Similar to data!

Edit: Pythia Event Acceptance Variables

Miscalculation of yp. Still has a wider distribution than spectrometer acceptance but is now properly centered at zero.