

Study of elastic proton-proton scattering at $\sqrt{s} = 5$ and 10 GeV at NICA SPD

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Used generators and geometry

Used generators:

Pythia8, minimum bias, $\sqrt{s} = 10 \text{ GeV}$

```
*----- PYTHIA Process Initialization -----*
| We collide p+ with p+ at a CM energy of 1.000e+01 GeV
|-----|-----|-----|
| Subprocess                Code | Estimated
|                            | max (mb)
|-----|-----|-----|
| non-diffractive           101 | 2.531e+01
| A B -> A B elastic         102 | 7.114e+00
| A B -> X B single diffractive 103 | 2.583e+00
| A B -> A X single diffractive 104 | 2.583e+00
| A B -> X X double diffractive 105 | 8.662e-01
| A B -> A X B central diffractive 106 | 0.000e+00
|-----|-----|-----|
*----- End PYTHIA Process Initialization -----*
```

Used geometry:

- pipe
- MVD
- hybrid magnet
- Straws (barrel + endcap)

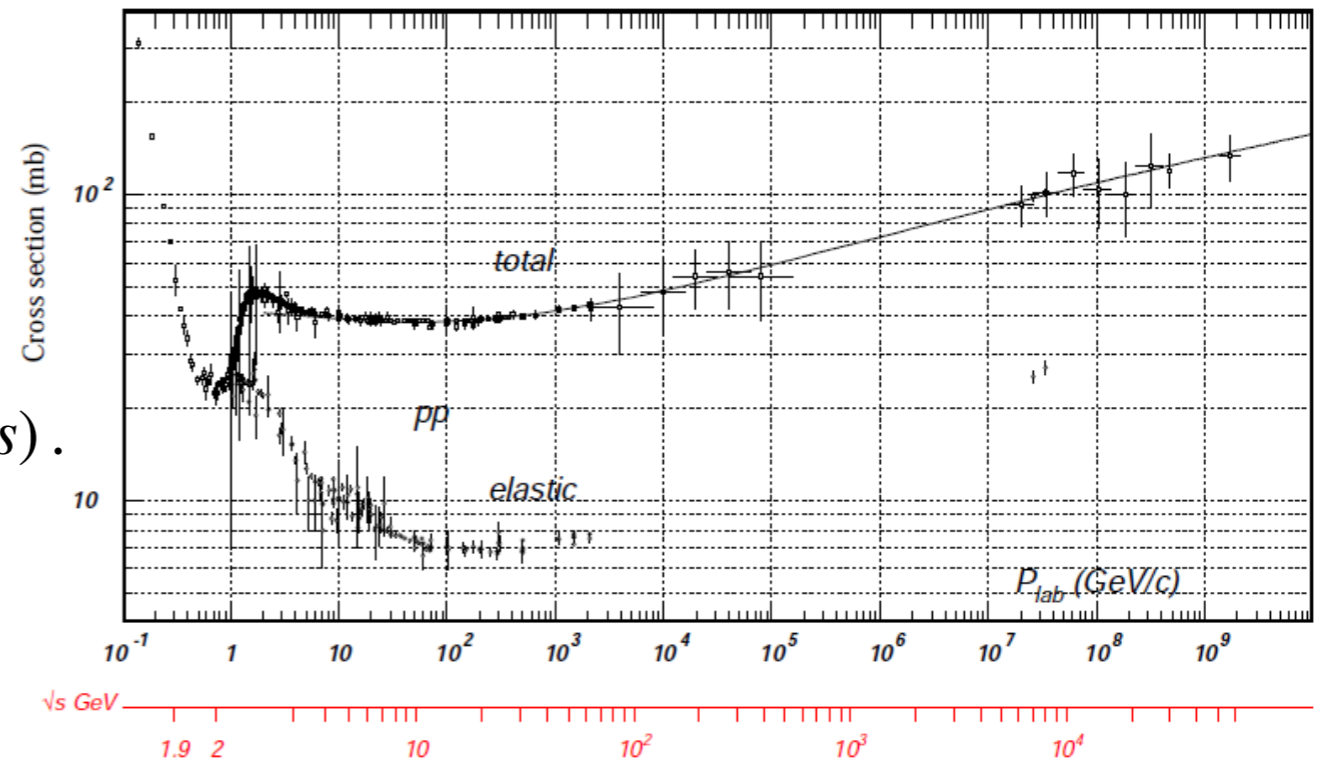
Reconstruction efficiency ($pp \rightarrow pp$): $\approx 10\%$

Estimated $N_{events} = 2.13e11$, ($\tau_{data\ taking} = 0.3 \cdot 10^7 s$).

FTFGen, $\sqrt{s} = 5 \text{ GeV}$

```
Using G4HadronInelasticDataSet()
Try 1 cross_secel 0.000000e+00
cross(mb)in= 8.953248e+00
cross(mb)el= 0.000000e+00

Element A Z N: 1 1 0
Proposed Xs (mb): Tot El In: 8.953248e+00 0.000000e+00 8.953248e+00
CHIPS cross sections are used:-----
Plab      Total      Elastic      Inelastic
1.233759e+01 3.899851e+01 9.576042e+00 2.942247e+01
```



Reconstruction efficiency ($pp \rightarrow pp$): $\approx 34\%$

Estimated $N_{events} = 9.77e11$ ($\tau_{data\ taking} = 0.3 \cdot 10^7 s$).

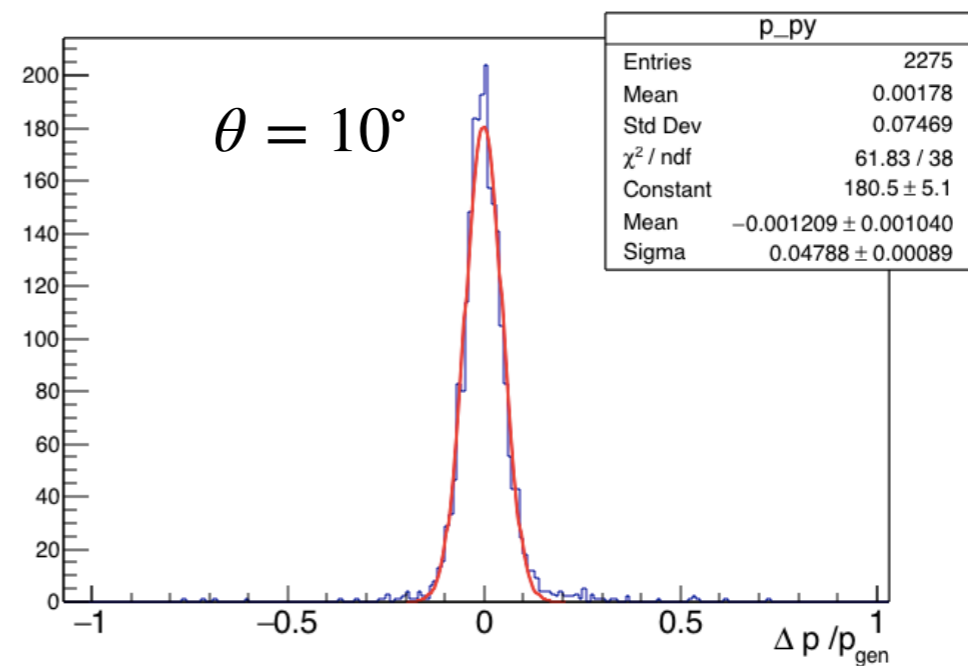
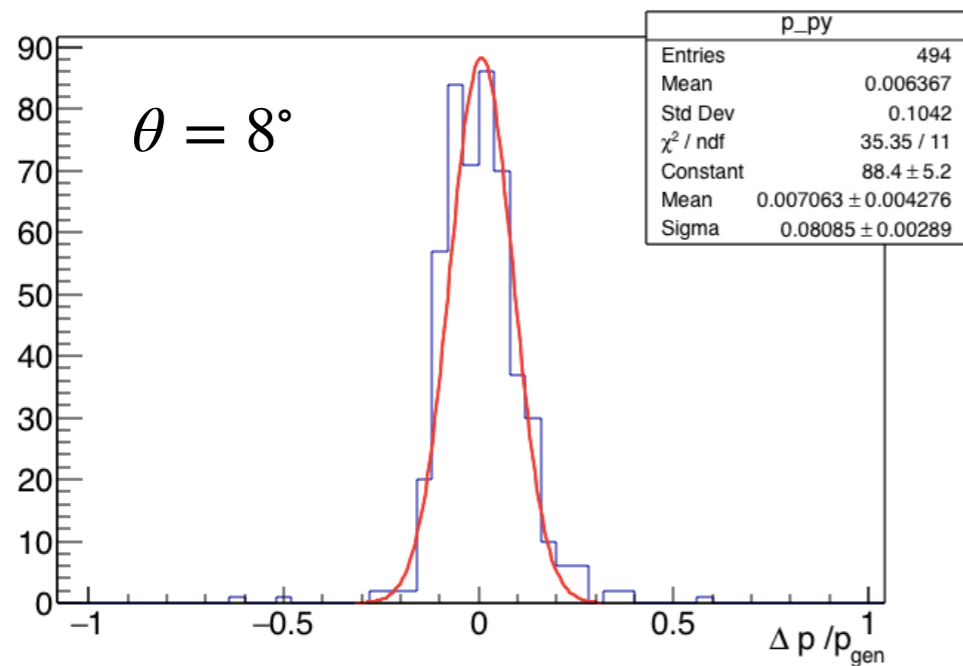
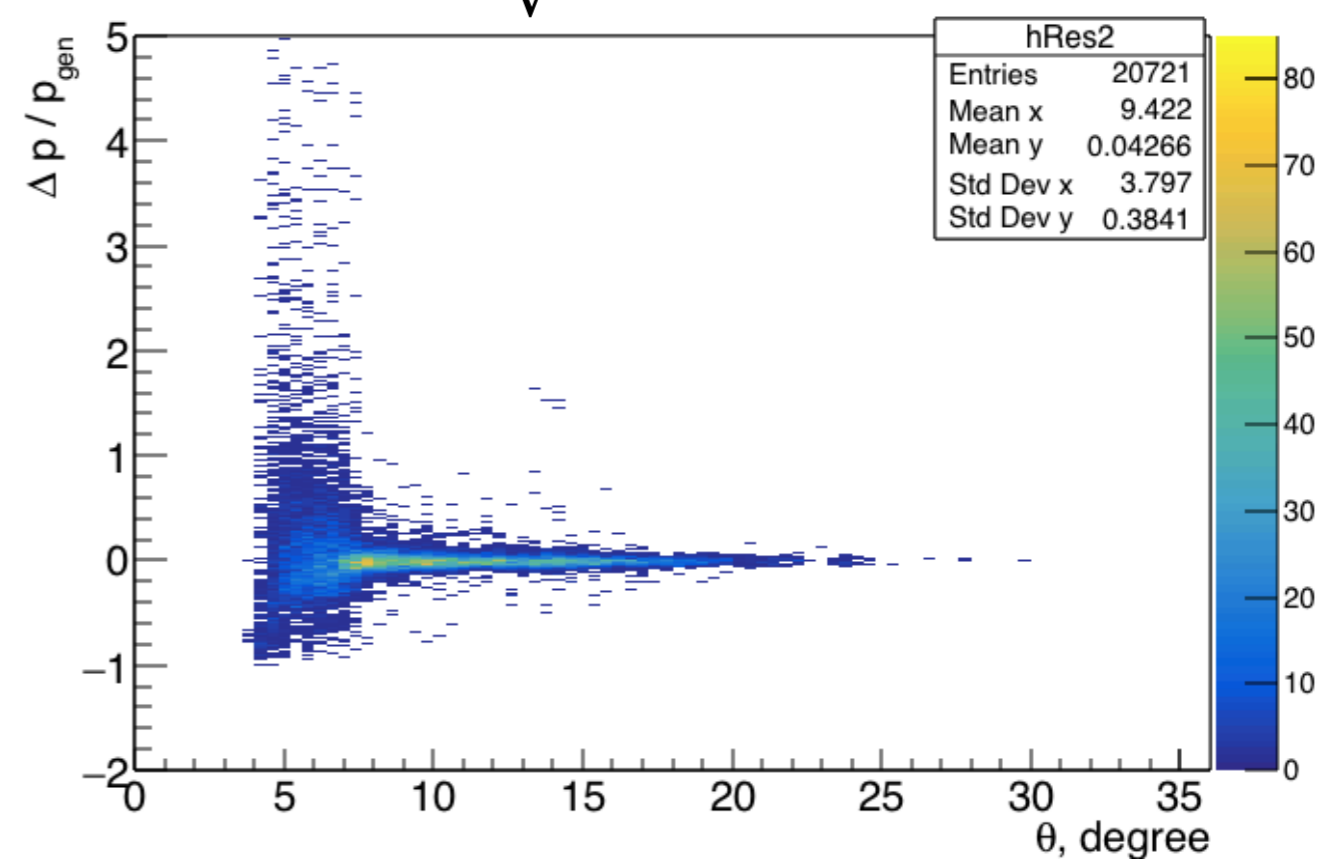
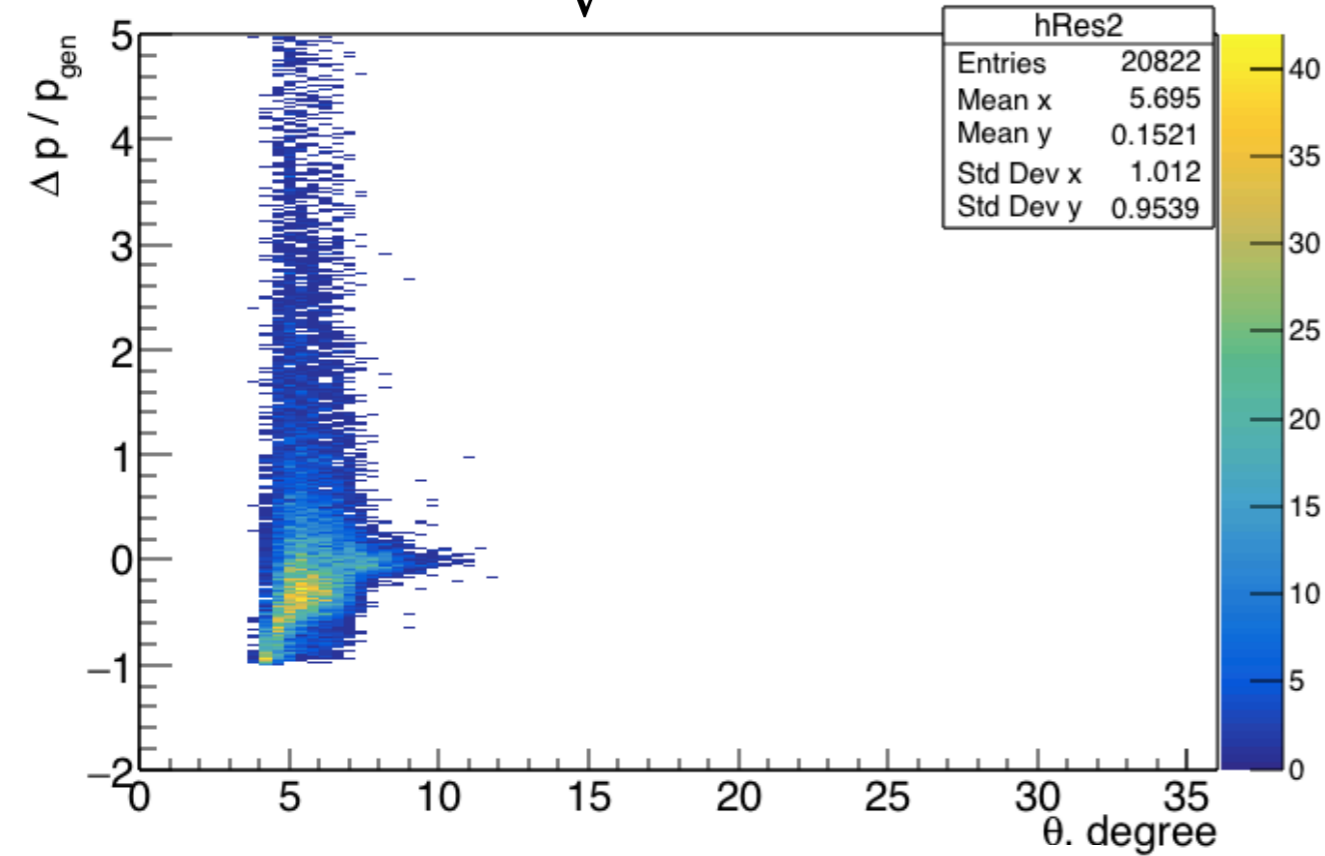
Momentum resolutions

Plots are shown only for signal events, $\Delta p/p = \frac{p_{rec} - p_{gen}}{p_{gen}}$

$\sqrt{s} = 10 \text{ GeV}$

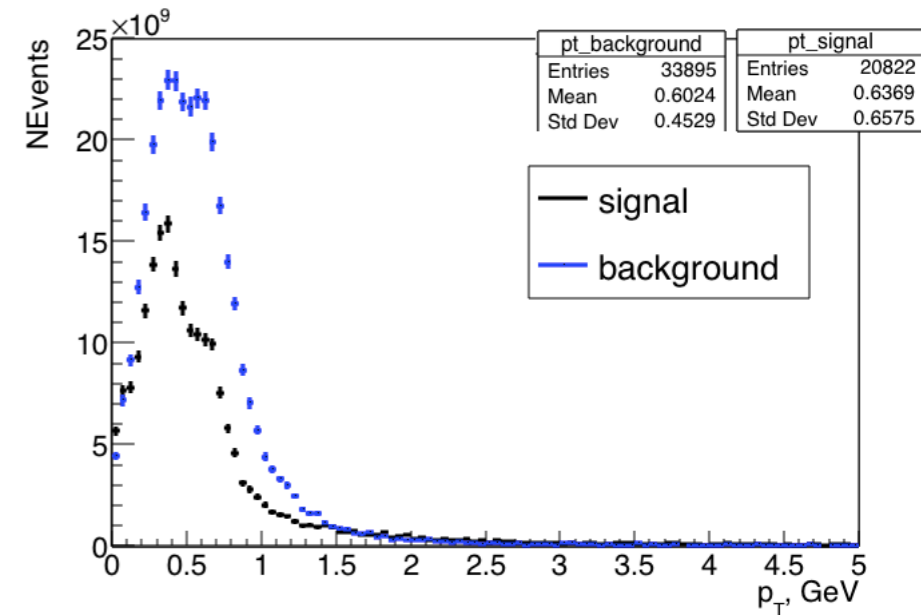
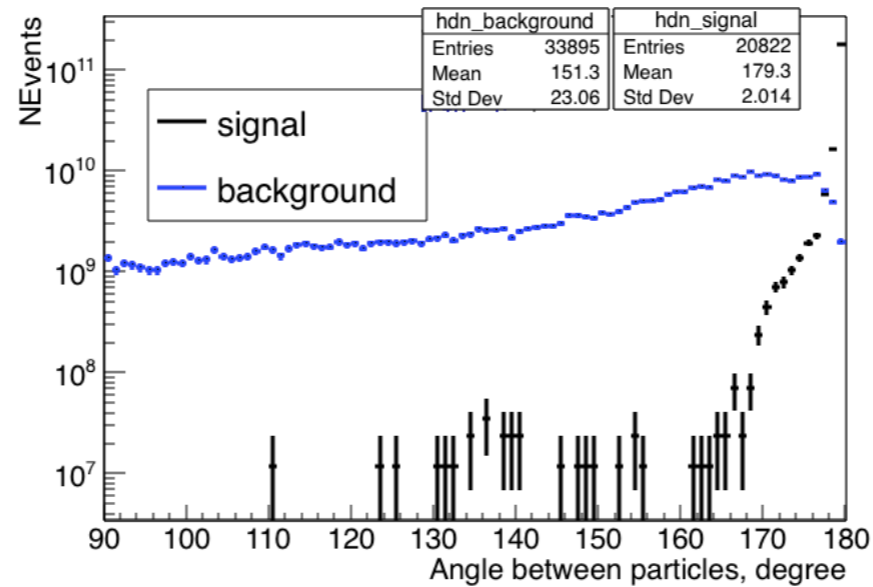
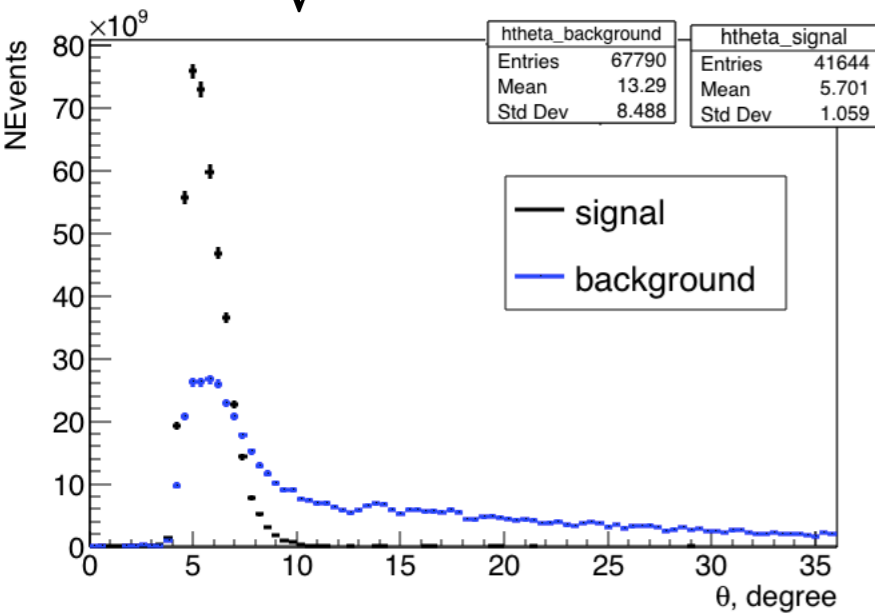
p_{gen}

$\sqrt{s} = 5 \text{ GeV}$

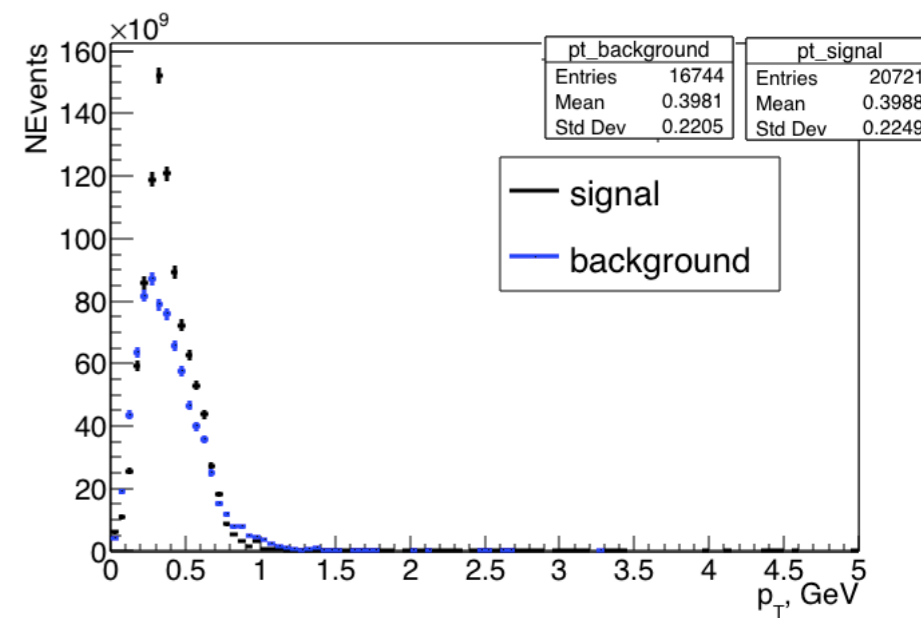
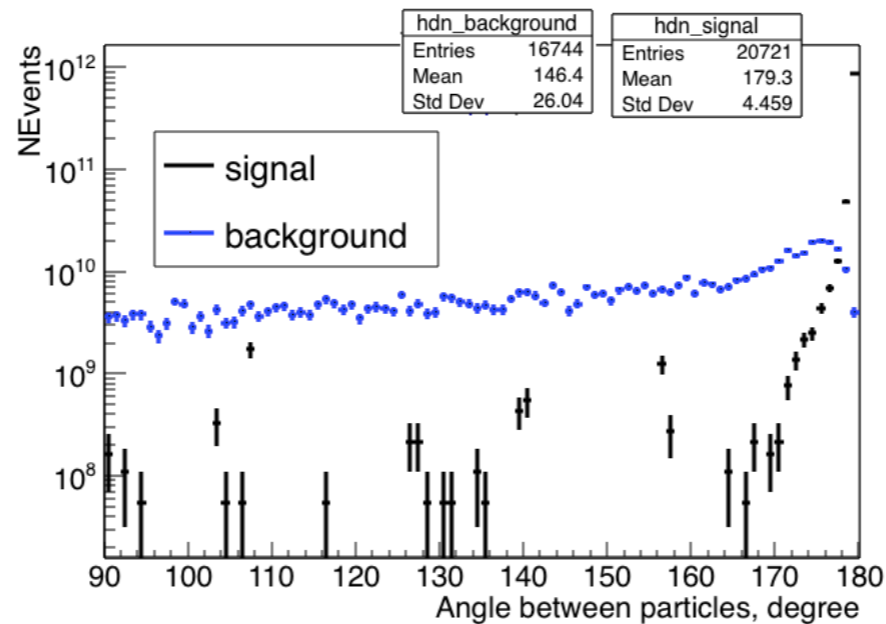
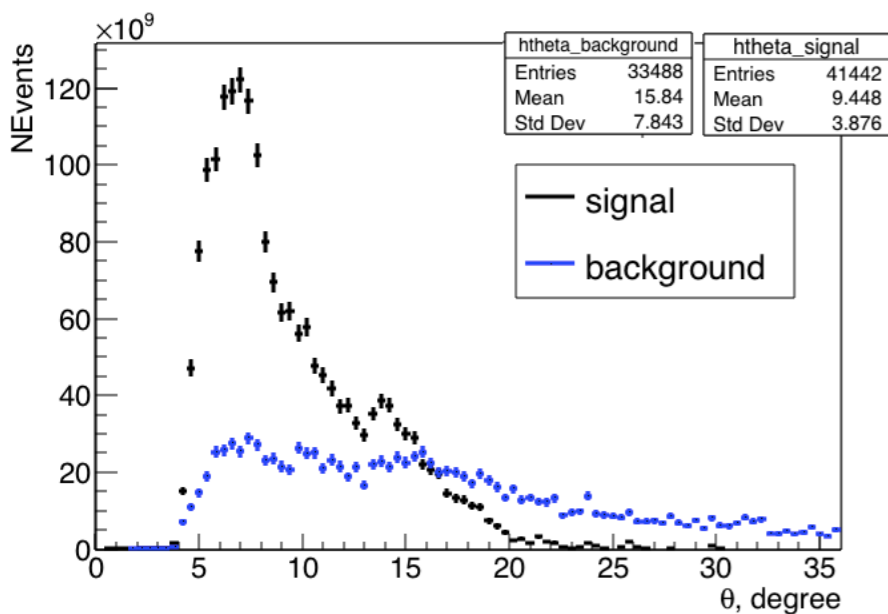


Kinematic distributions

$\sqrt{s} = 10 \text{ GeV}$

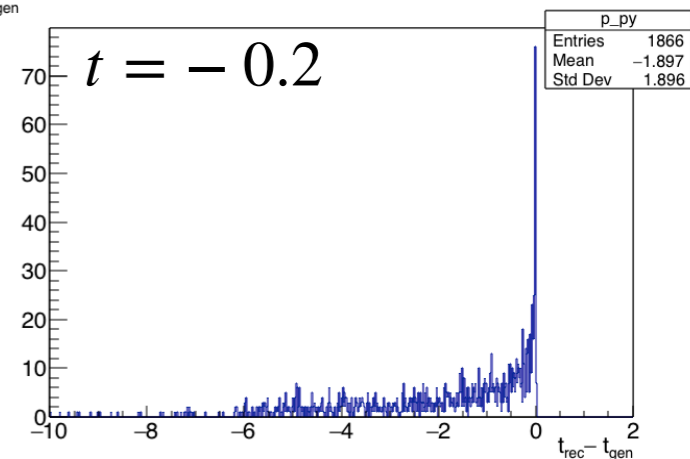
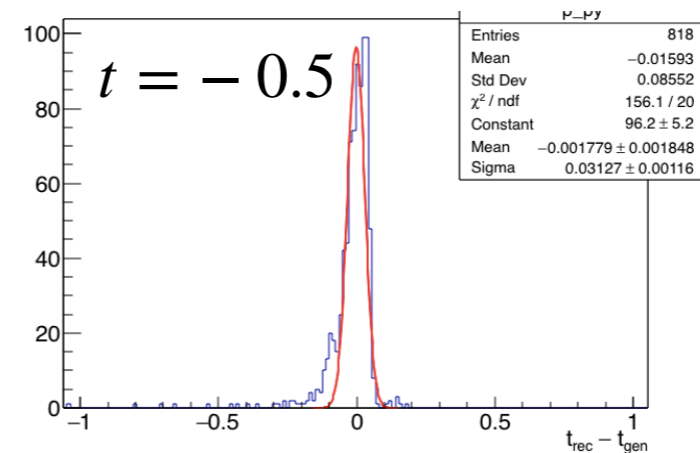
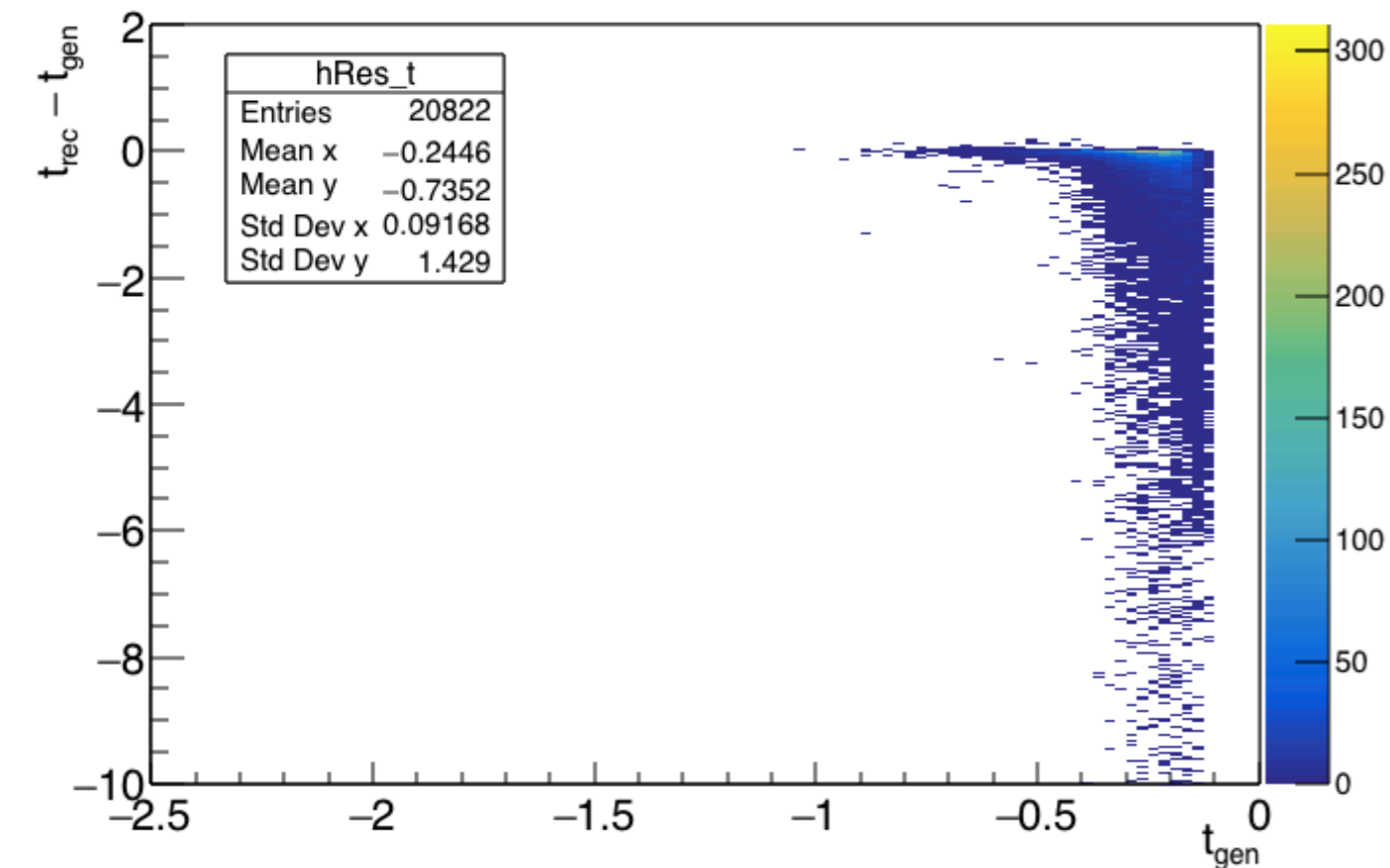
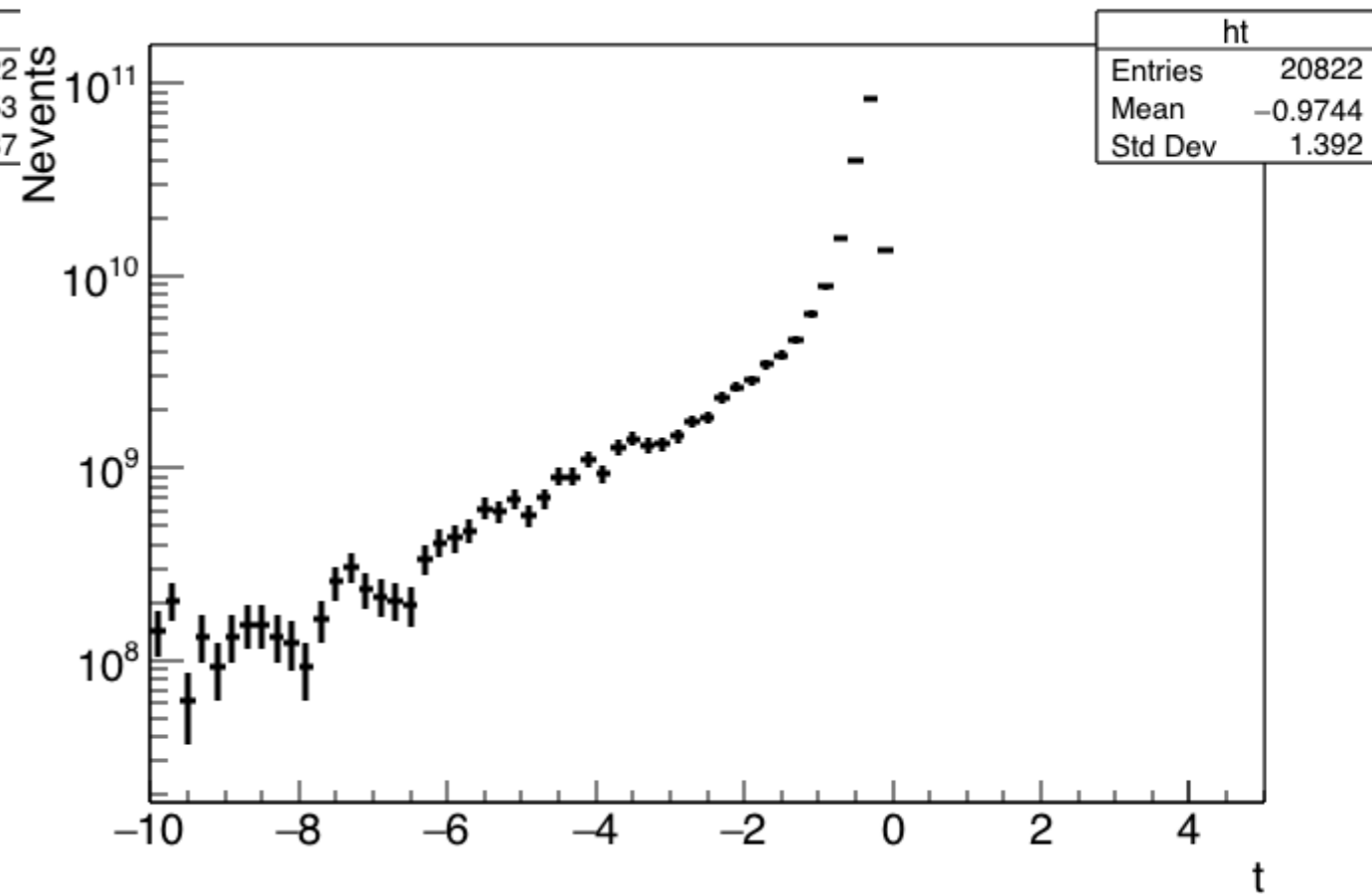
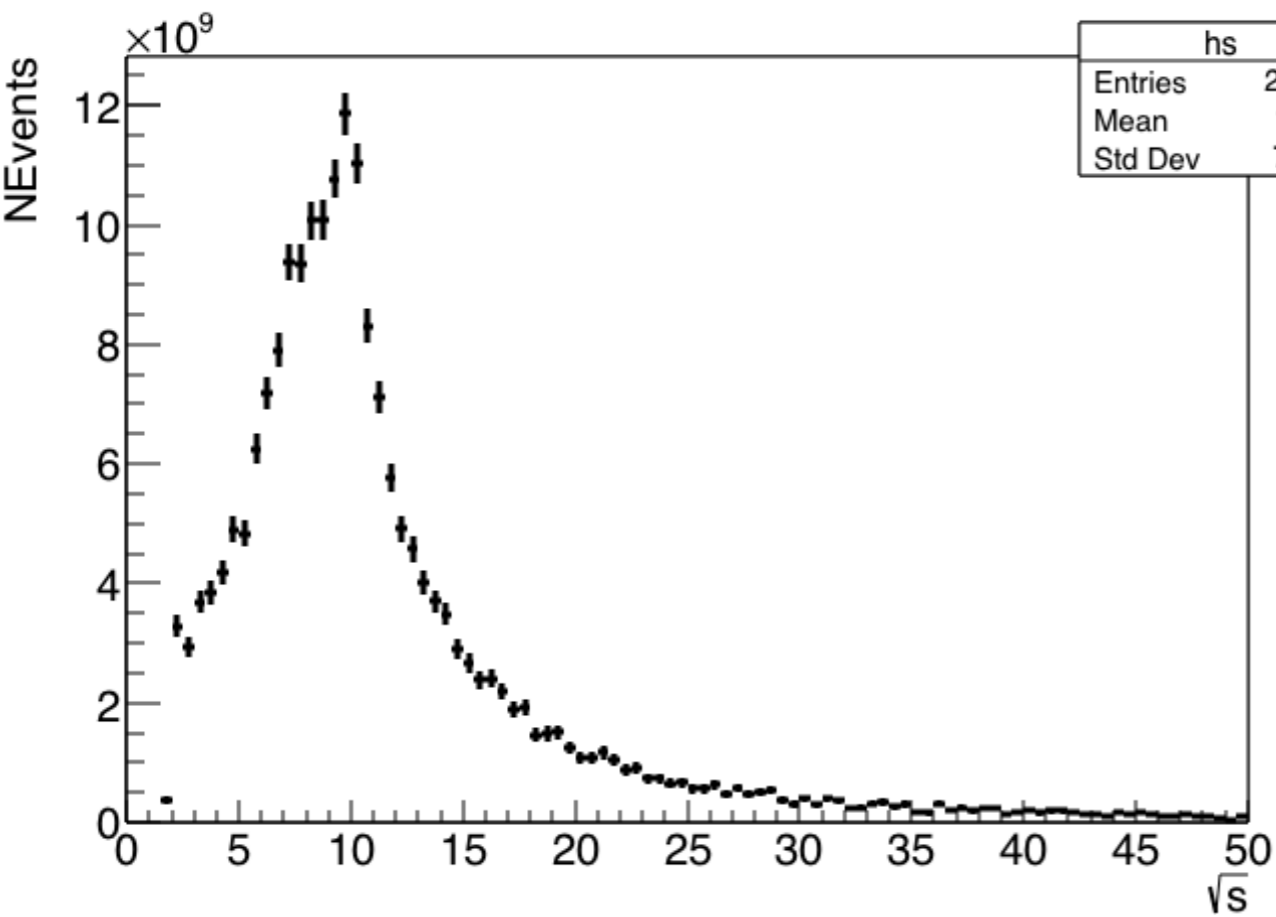


$\sqrt{s} = 5 \text{ GeV}$



Plots are scaled to the number of registered $pp \rightarrow pp$ events during the $0.3 \cdot 10^7$ s of data taking.

Mandelstam variables at $\sqrt{s} = 10 \text{ GeV}$



Mandelstam variables at $\sqrt{s} = 5 \text{ GeV}$

