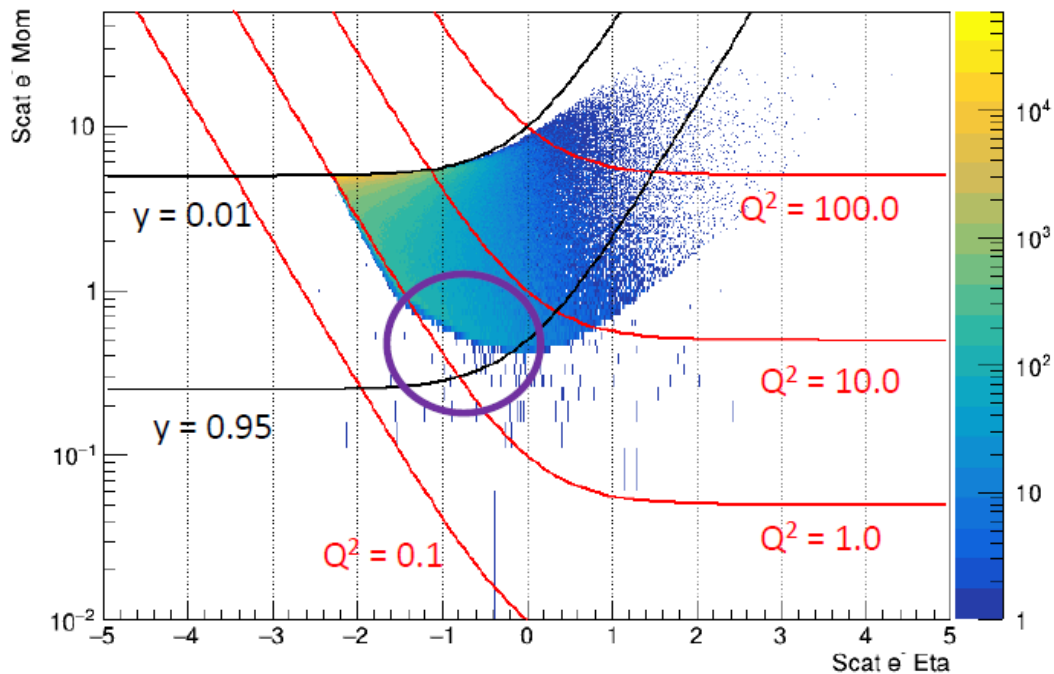


Low Q^2 kinematics in pythia8 ep

Barak Schmookler

PYTHIA-8 Phase Space Issues

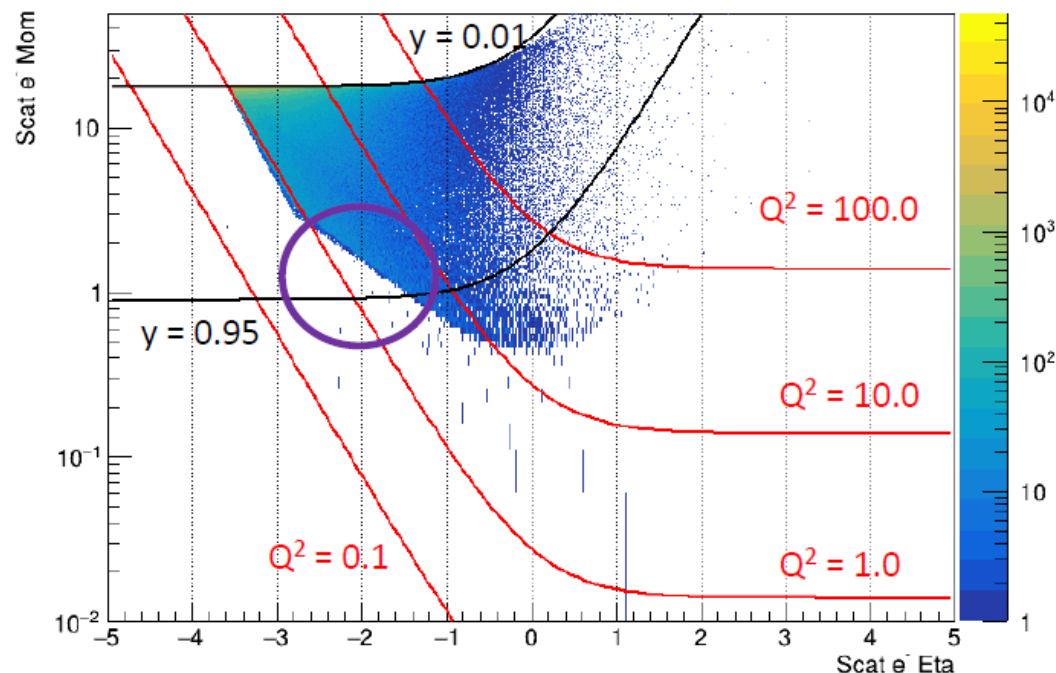
Scattered Electron Momentum Vs Eta: 5x41



- ❑ Pythia-8 does not easily cover $Q^2 < 1$ (can force it, but don't trust the behavior)
- ❑ Also see certain regions of phase space (purple circles) are not filled

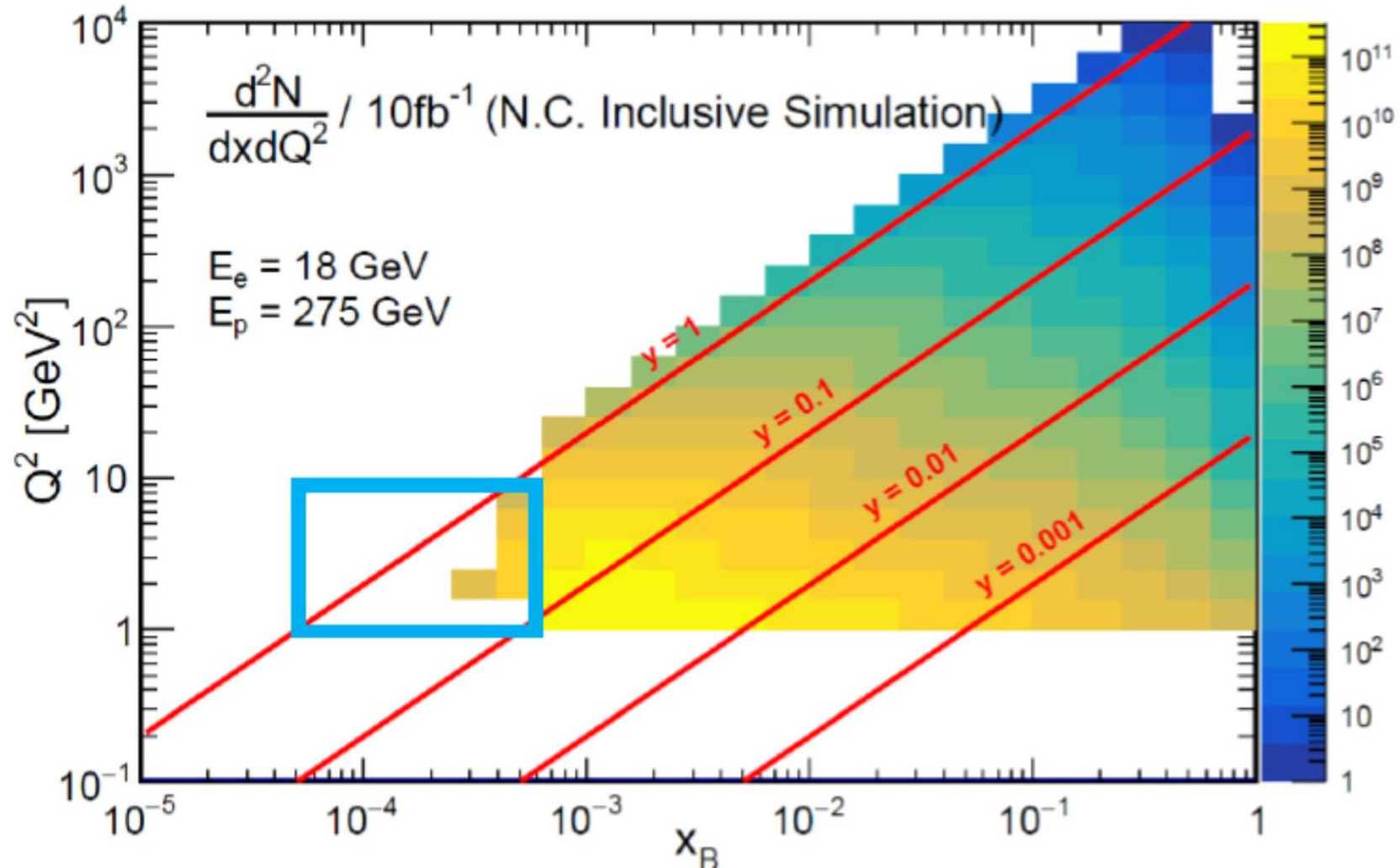
- ❑ Scatter plots show momentum vs pseudorapidity for the scattered beam electron
- ❑ Red curves are lines of constant Q^2 and black curves are lines of constant y
- ❑ In this representation, immediately see what Q^2 are covered by the pFRICH acceptance and the related lepton kinematics

Scattered Electron Momentum Vs Eta: 18x275



We saw similar 'hole' during ATHENA

PYTHIA8



Fix from Pythia8 developers

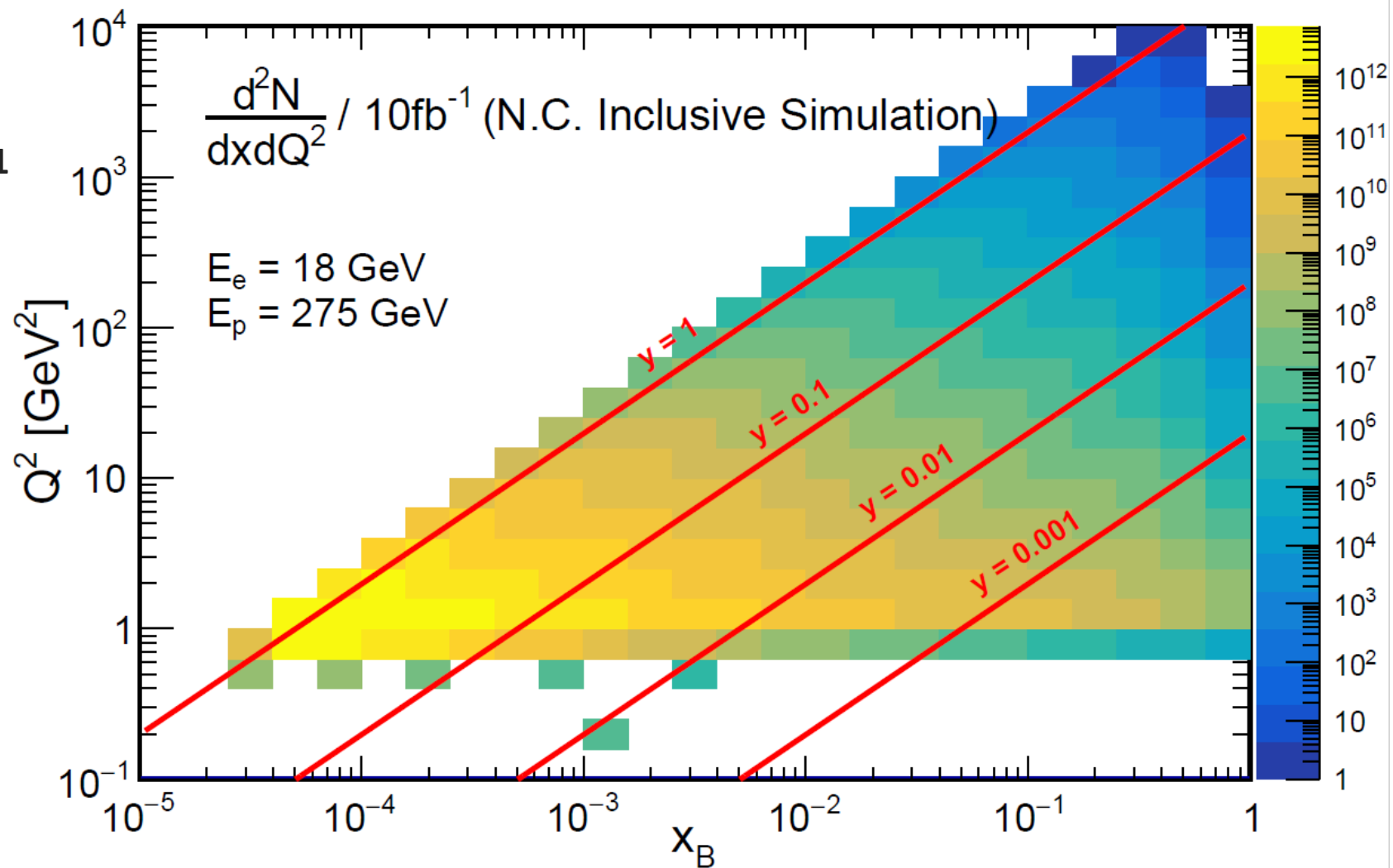
PhaseSpace:mHatMin = force 0.1
PhaseSpace:pTHatMindiverge = force 0.1

“This is a bit of a stretch of the DIS framework, however, as the pure DIS-like setup might not be sufficient to describe events down to $Q^2 = 1$.”

“We still do not have a model to handle the transition region from DIS to Photoproduction in Pythia 8...We have some good ideas how to make an improved model for Pythia 8.”

- Ilkka Helenius 08/30/21

1/31/2023



Inclusive cross section looks okay.
I think some other (SIDIS) results looked strange.

