Charm and Beauty at EIC

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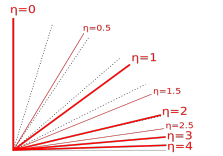
p e

Minimum bias (e/p 10/100)



$N \sim \sigma L \sim 20 \cdot 10^{-30} \cdot 10^{34} \sim 200{,}000/\text{sec}$

Scattered e

PhP
0.001<Q2<1
σ~20μb

π±/K±
~5/event

e±
~0.02/event

μ±
~0.001 /event

gammas from π0
~4/event

Ptot,GeV

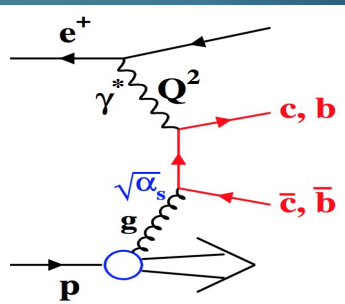
η

DIS
1<Q2<100
σ~600nb

σ~2nb
DIS
Q2>100

Charm BGF gγ->QQ̄

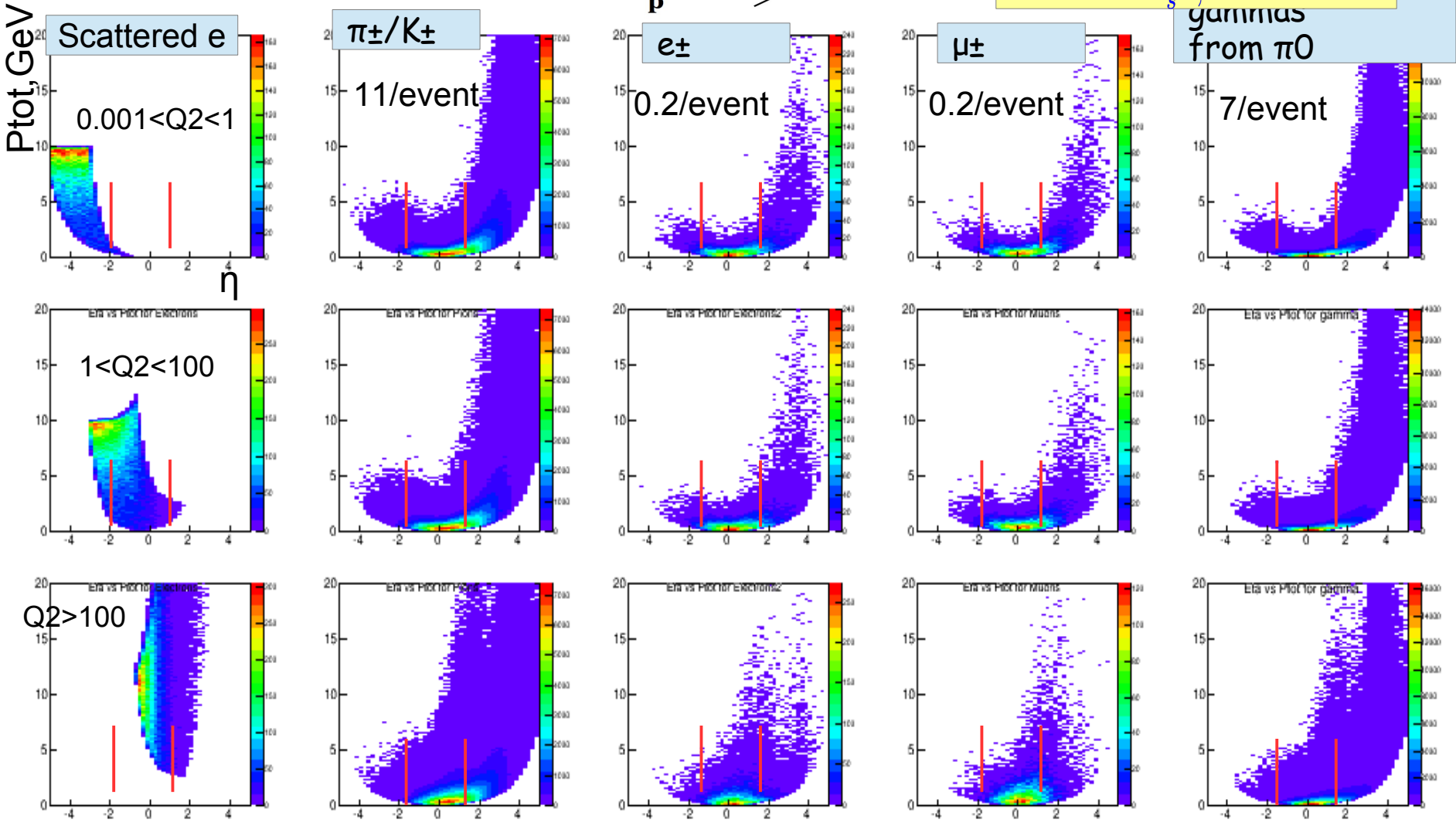
Boson Gluon Fusion (BGF)



σ ~60 nb (e/p 10/100)

N~60·10^{-33}·10^{34} ~600/sec

$D^{*+} \to D^o \pi_s^+$, $D^o \to K^- \pi^+$



Beauty BGF gγ->Q$\overline{Q}$

$B^- \rightarrow D^0 \mu \nu$, $D^0 \rightarrow K^-\pi^+$

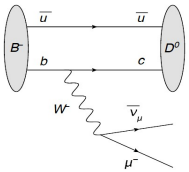


Figure 2.15.: Quark level diagram for the decay $B^- \rightarrow D^0 \mu^- \nu_\mu$.

σ ~0.3 nb(e/p 10/100)

N~$0.3 \cdot 10^{-33} \cdot 10^{34}$~3/sec

Scattered e

π±/K±

e±

μ±

gammas from π0

Ptot, GeV

η

0.001<Q2<1

16/event

0.5/event

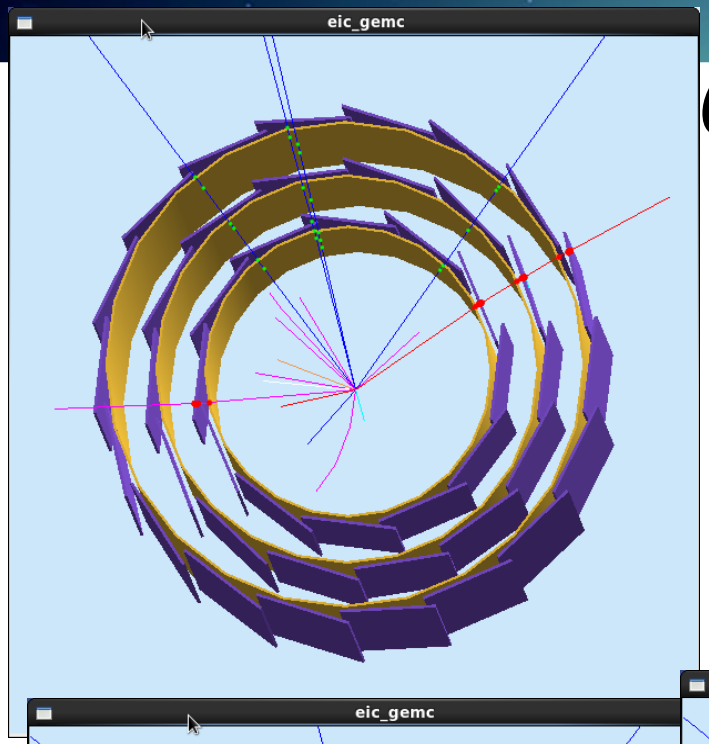
0.4/event

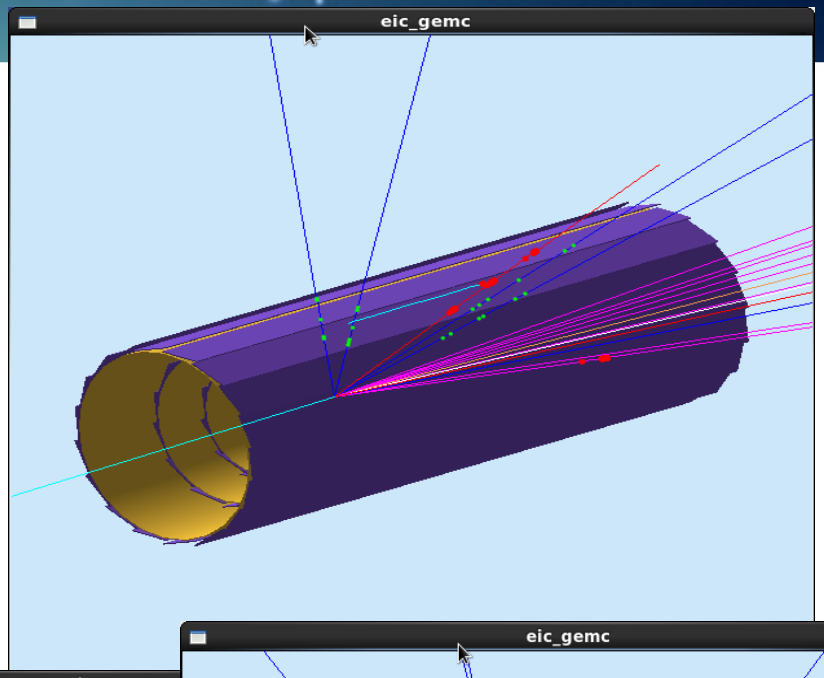
10/event

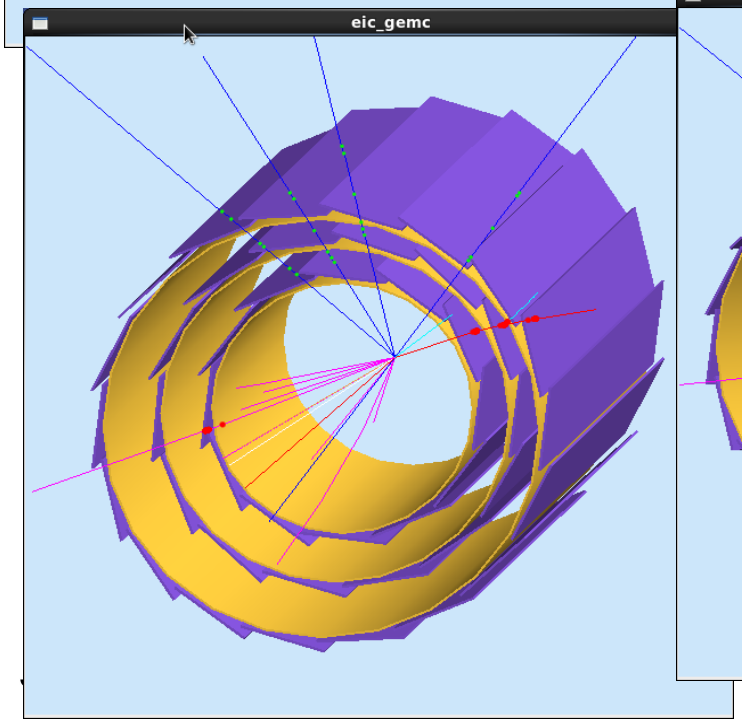
1<Q2<100

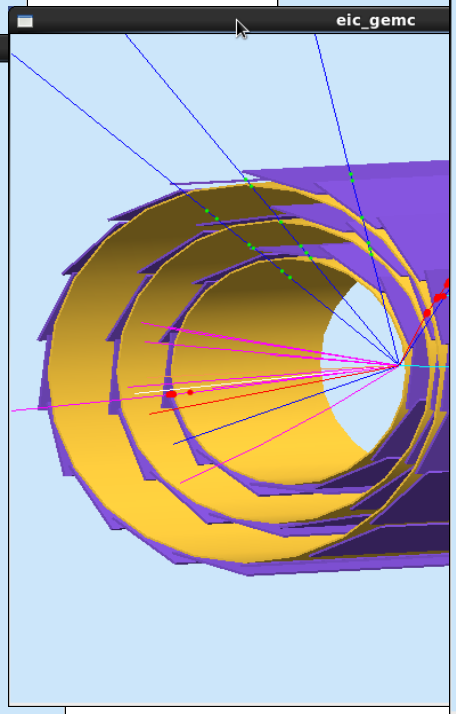
Q2>100

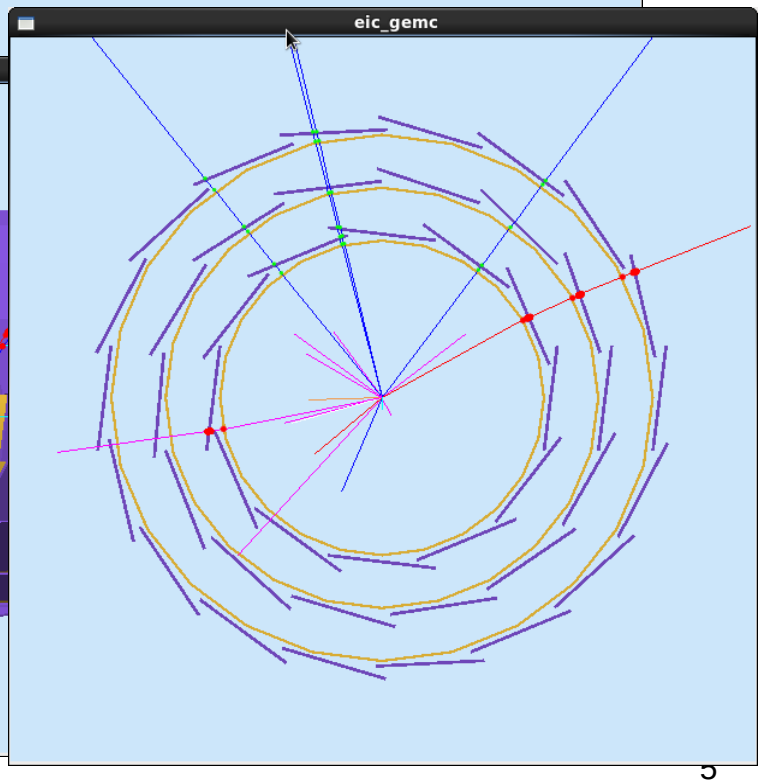
GEMC



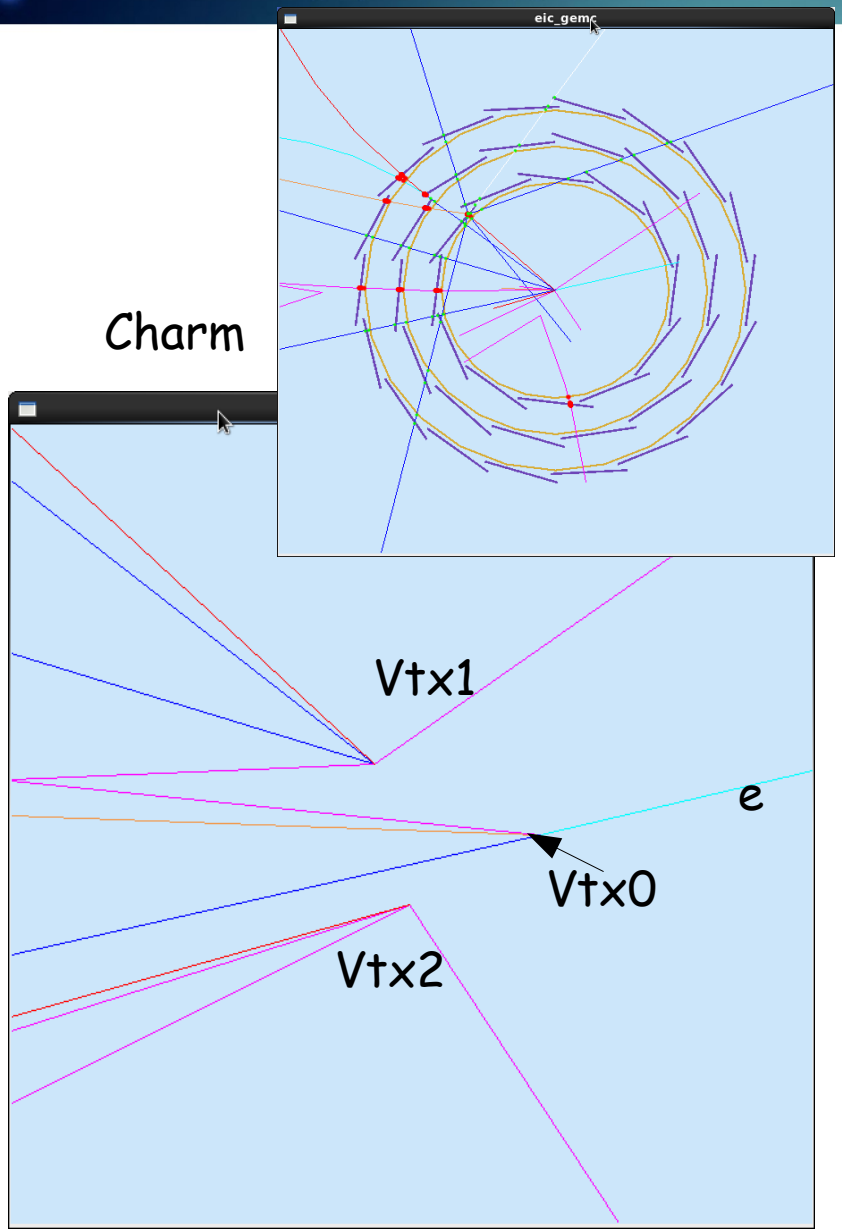




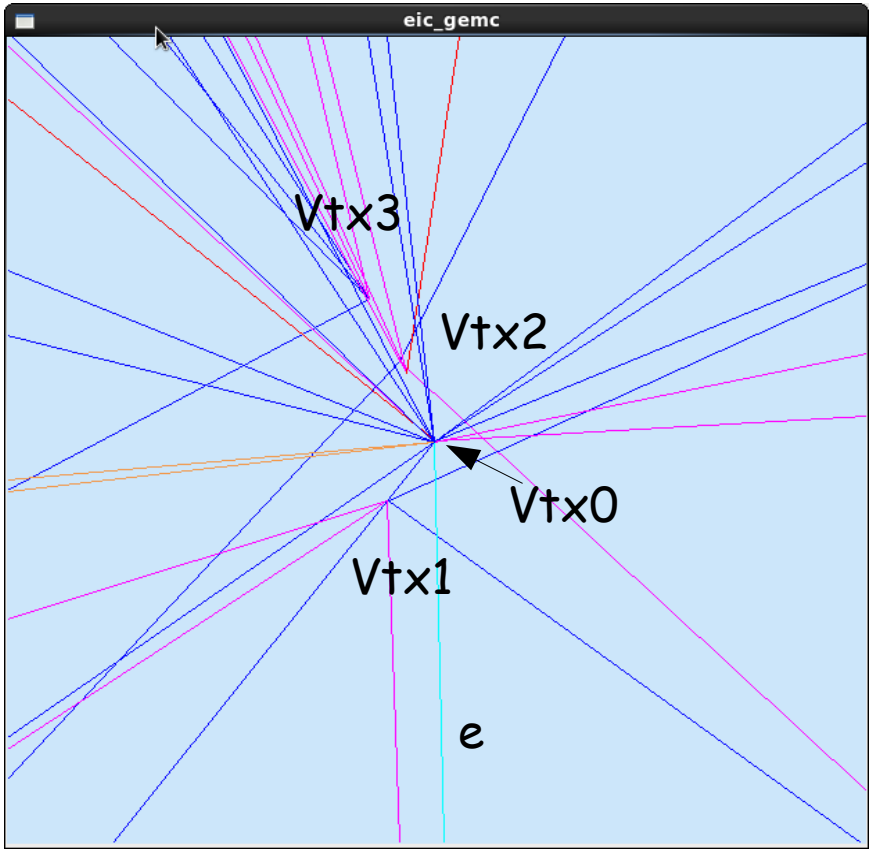




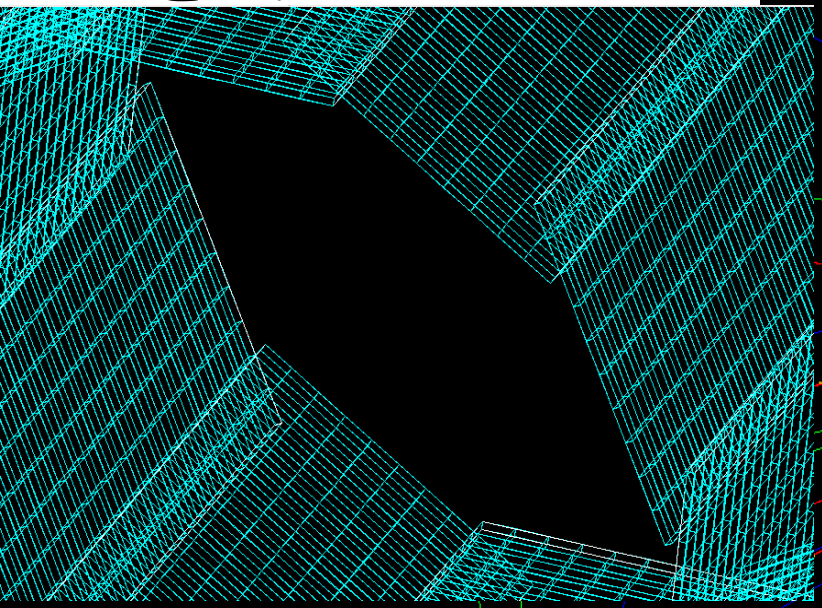
Charm

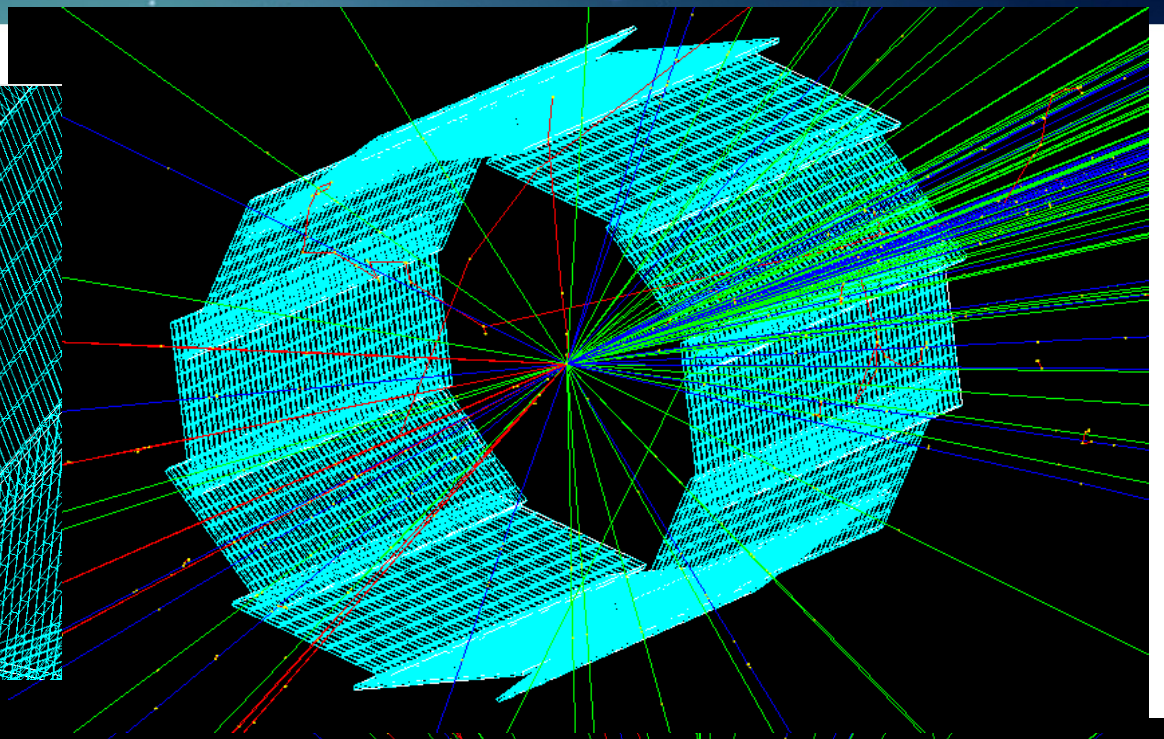


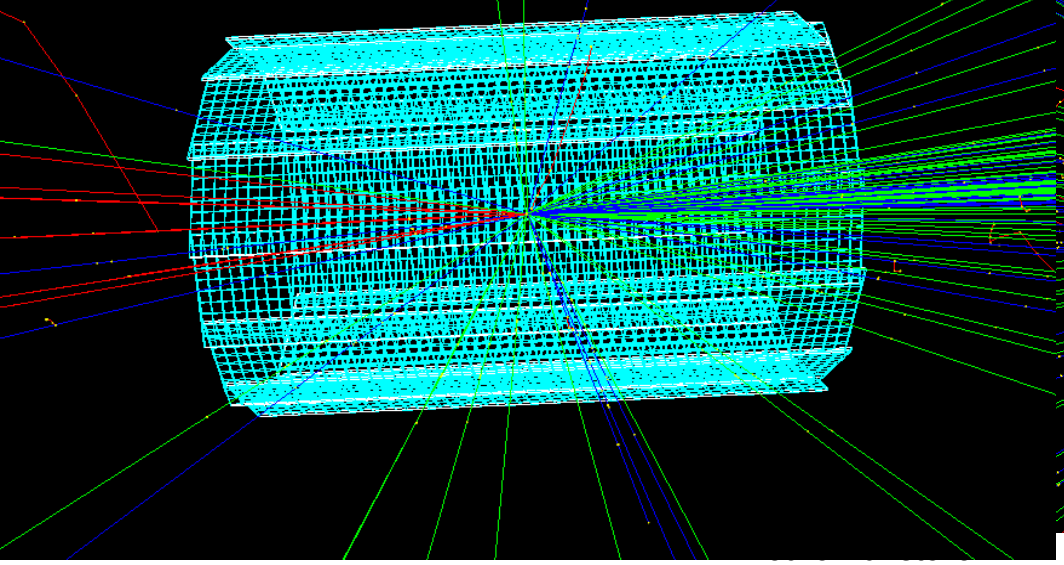
Beauty

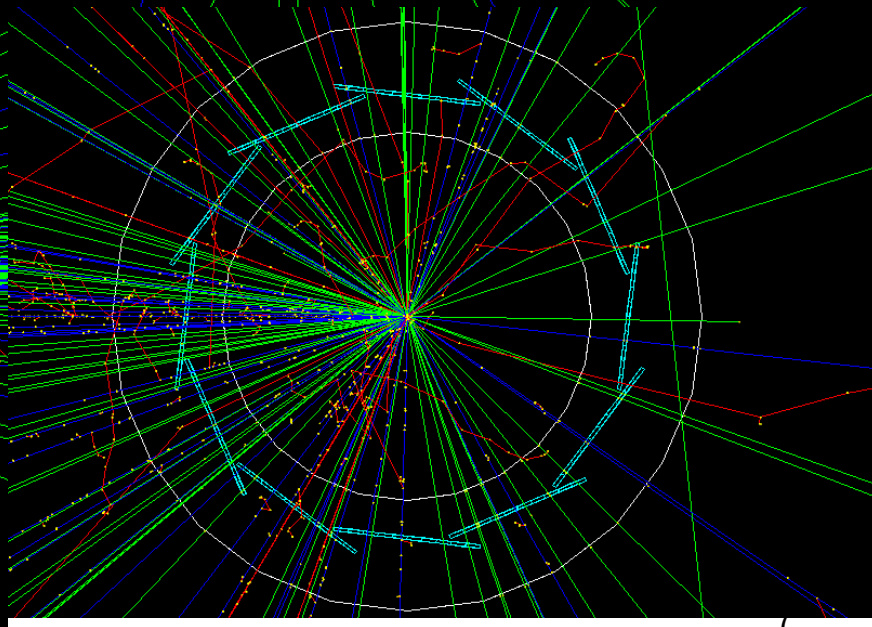


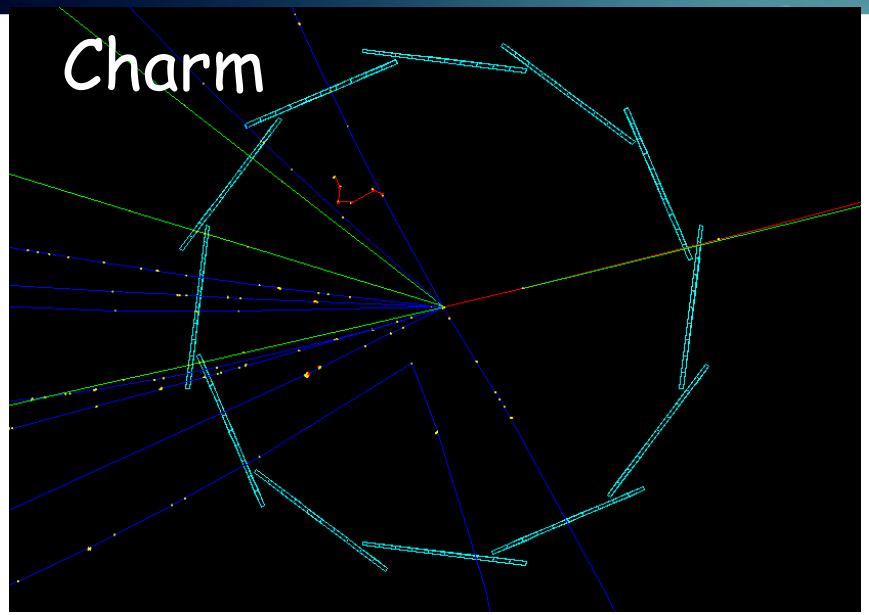
GEANT4

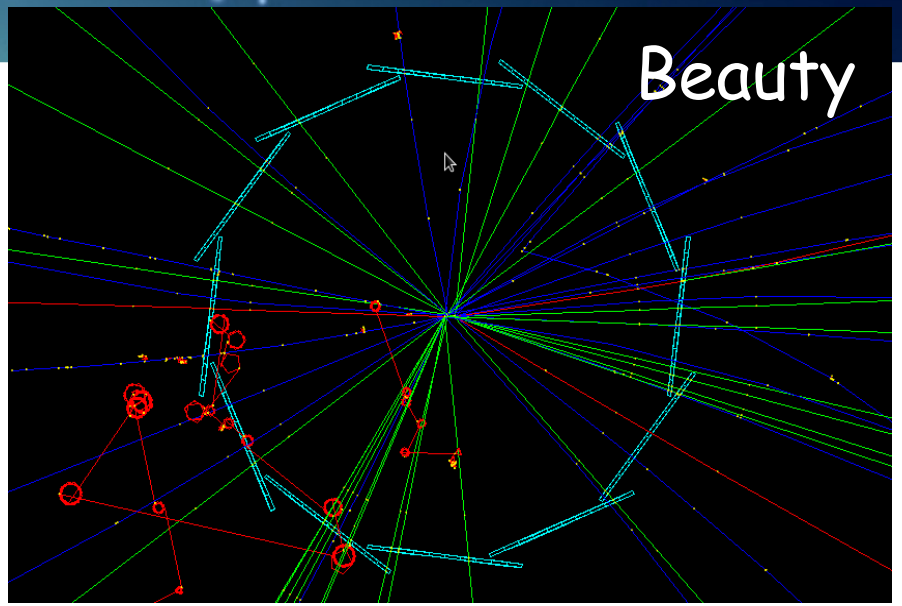


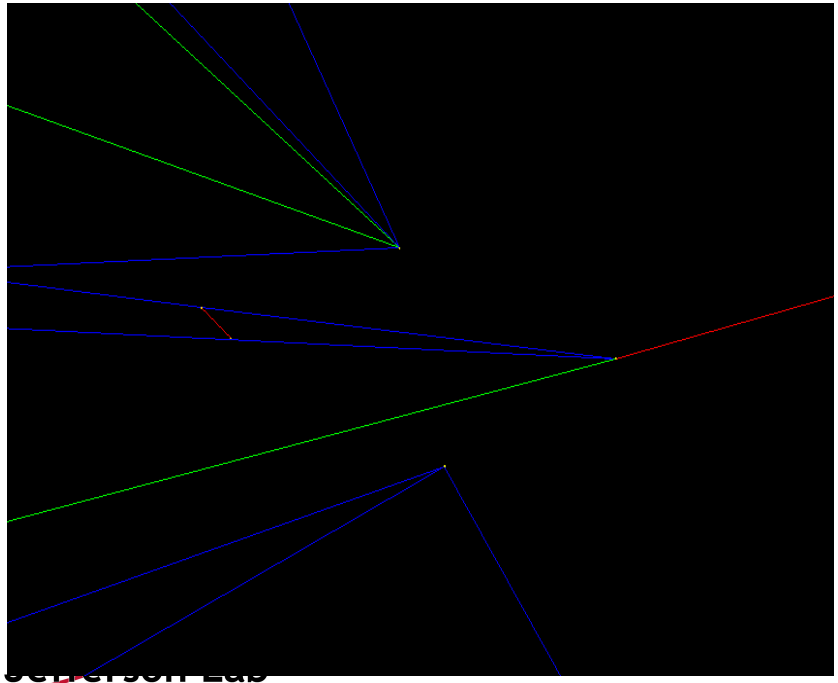


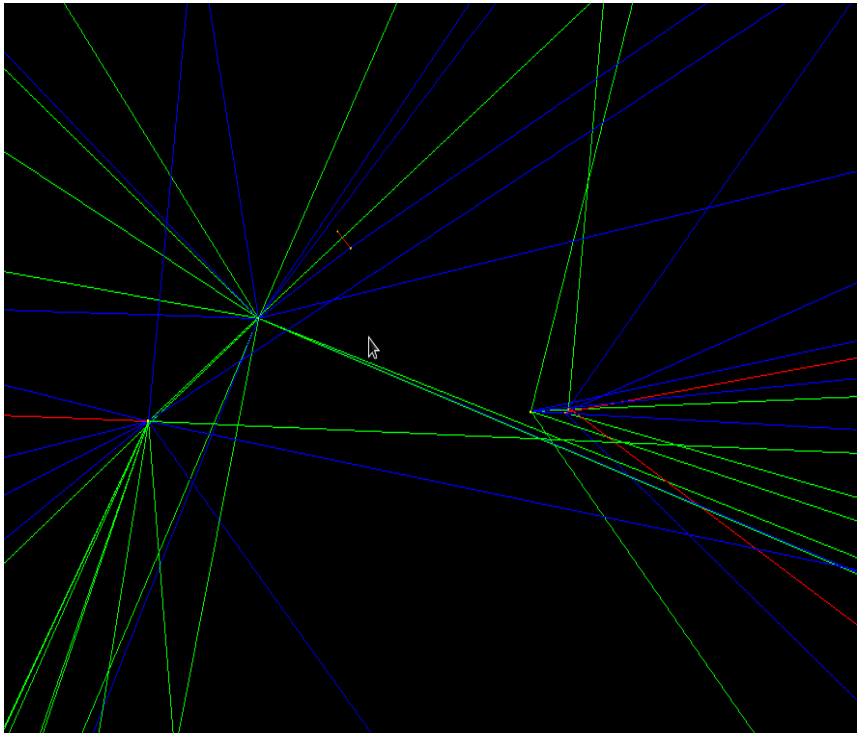





Charm


Beauty





Charm production in Charge Current DIS

$\sigma(e+p \to \bar{\nu}_e + X) \sim 50pb$ (HERA $Q^2>200GeV^2$)

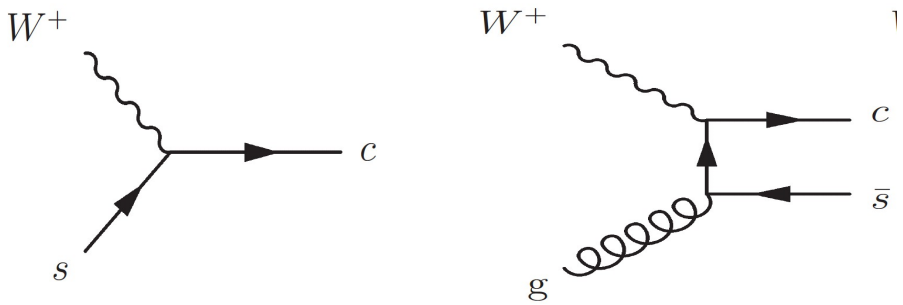
$\sigma(e+p \to \bar{\nu}_e + c + X) \sim 5pb$ (HERA $Q^2>200GeV^2$)

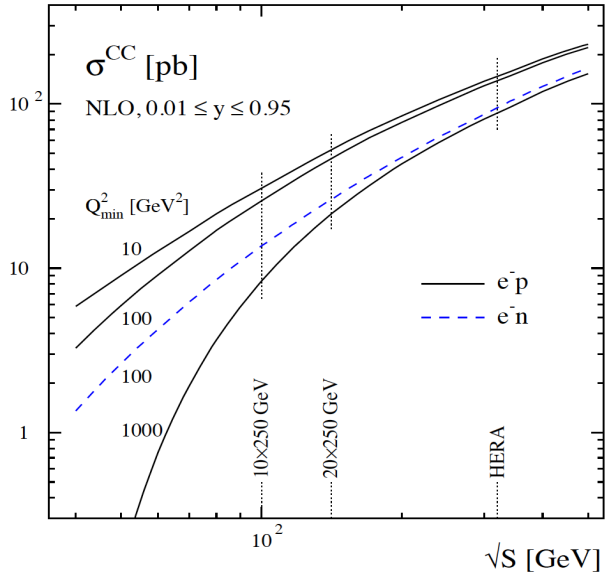
At EIC :

σ(CC DIS) ~ 10 pb

σ(CC DIS + charm) ~ 1 pb (?)

=> ~ 1 event/ minute





- Measurements of strange distribution (+polarization)

  $W^+ s \to c$

  $|V_{sc}| = 0.97$
- Flavor mixing

  $W^+ d \to c$

  $|V_{cd}| = 0.224$
- BGF

  $W^+ g \to c \bar{s}$

- Backup
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