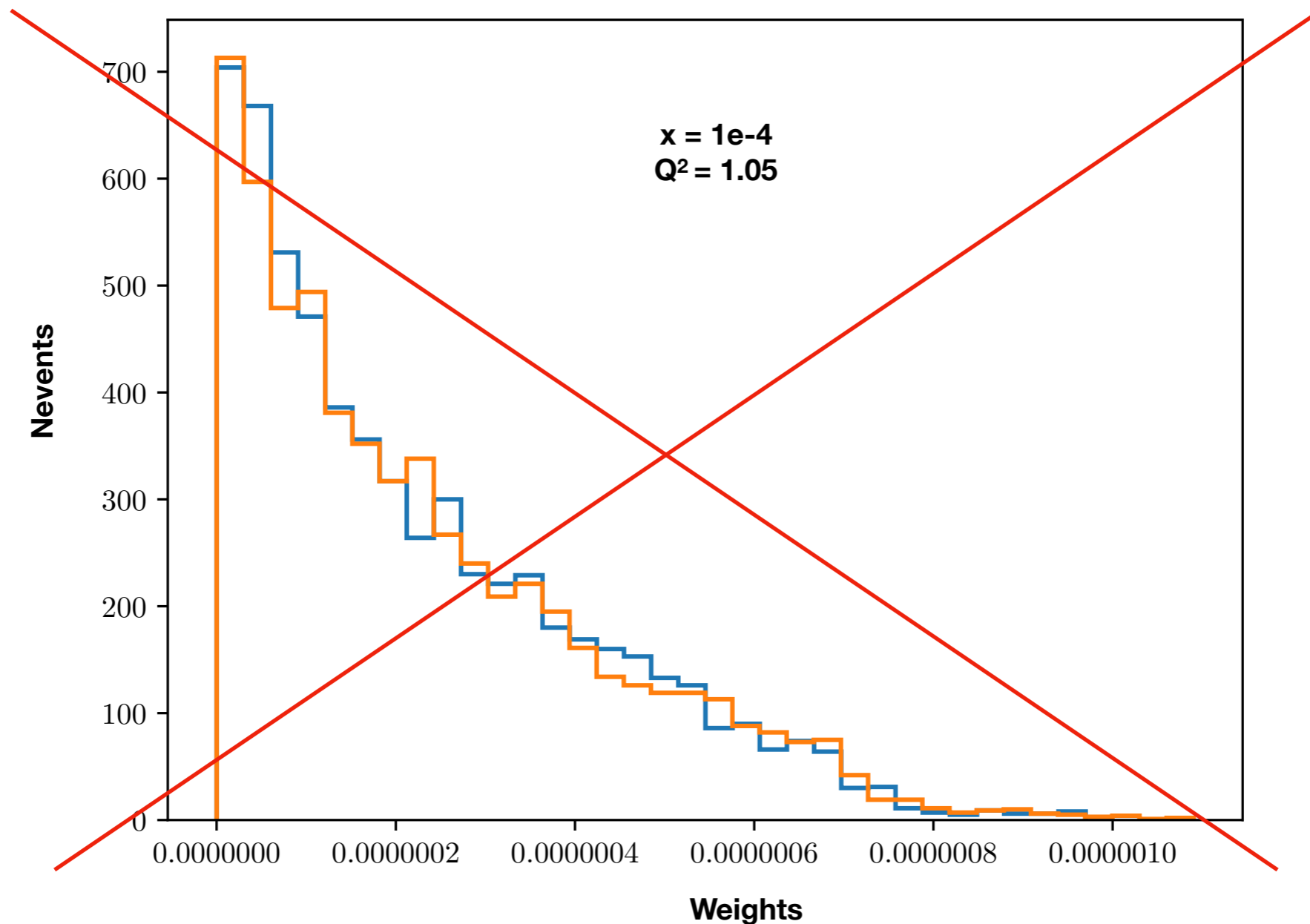# Updates on Statistical tests for EIC

Tuesday, 16 June 2020
Inclusive group

Recap

Gauging differences on level of events distributions is <u>not</u> what we need nor should do.

The only observable accessed for analyses from experiments is the integrated cross section per bins of (x, Q^2).
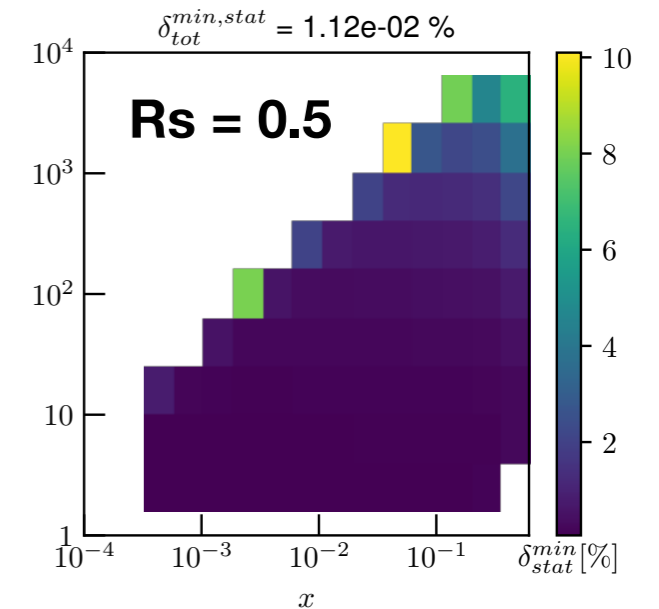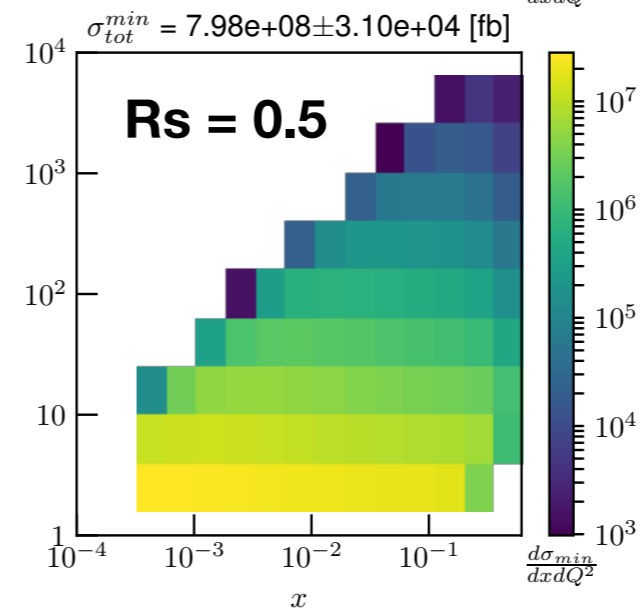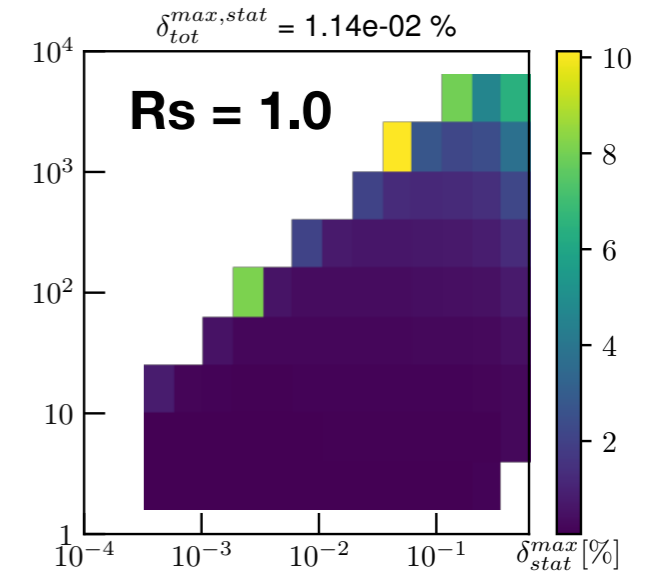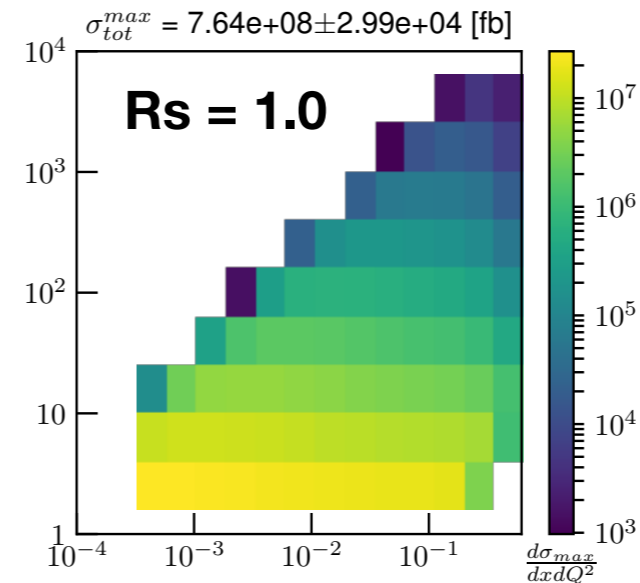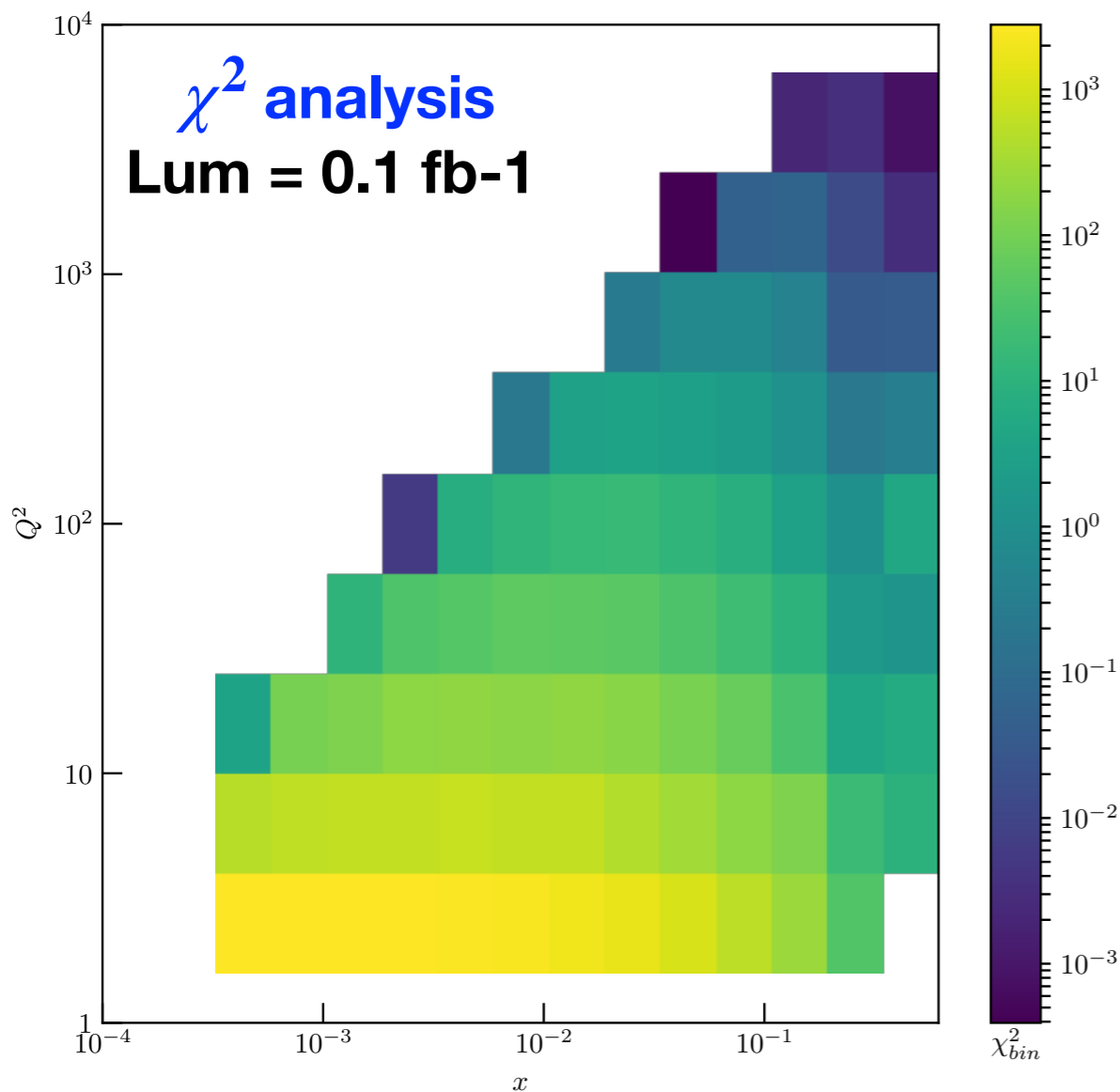

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New strategy

Comparison of two samples on the level of integrated

integrated cross section per bins of (x, Q2) via a χ^2 analysis

$$\chi^2_{jk,lm} = \left(\sigma^{\mathcal{H}}_{jk} - \sigma^{\mathcal{H}_0}_{jk}\right) cov^{-1}_{jk,lm} \left(\sigma^{\mathcal{H}}_{lm} - \sigma^{\mathcal{H}_0}_{lm}\right)$$

$$cov_{jk,lm} = \begin{cases} \sum_h^{\mathcal{H}_0,\mathcal{H}} (\delta^h_{stat})^2_{jk} + (\delta^h_{MC})^2_{jk}, & \text{if } jk = lm \\ 0, & \text{otherwise} \end{cases}$$

$\chi^2_{tot}/N_{bins} = 3.5790e{+}02$

χ^2 **analysis**

Lum = 0.1 fb-1

$\sigma^{max}_{tot} = 7.64e{+}08 \pm 2.99e{+}04$ [fb]

Rs = 1.0

$\sigma^{min}_{tot} = 7.98e{+}08 \pm 3.10e{+}04$ [fb]

Rs = 0.5

$\delta^{max,stat}_{tot} = 1.14e{-}02$ %

Rs = 1.0

$\delta^{min,stat}_{tot} = 1.12e{-}02$ %

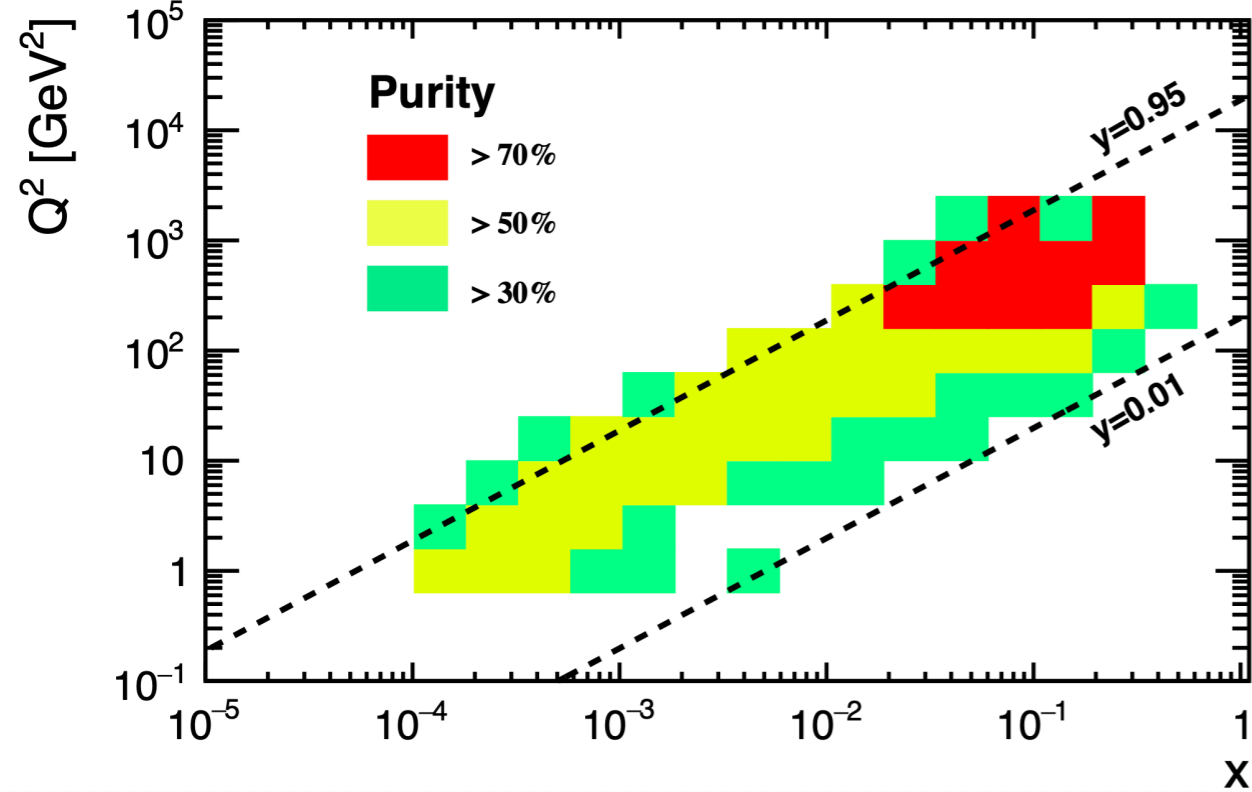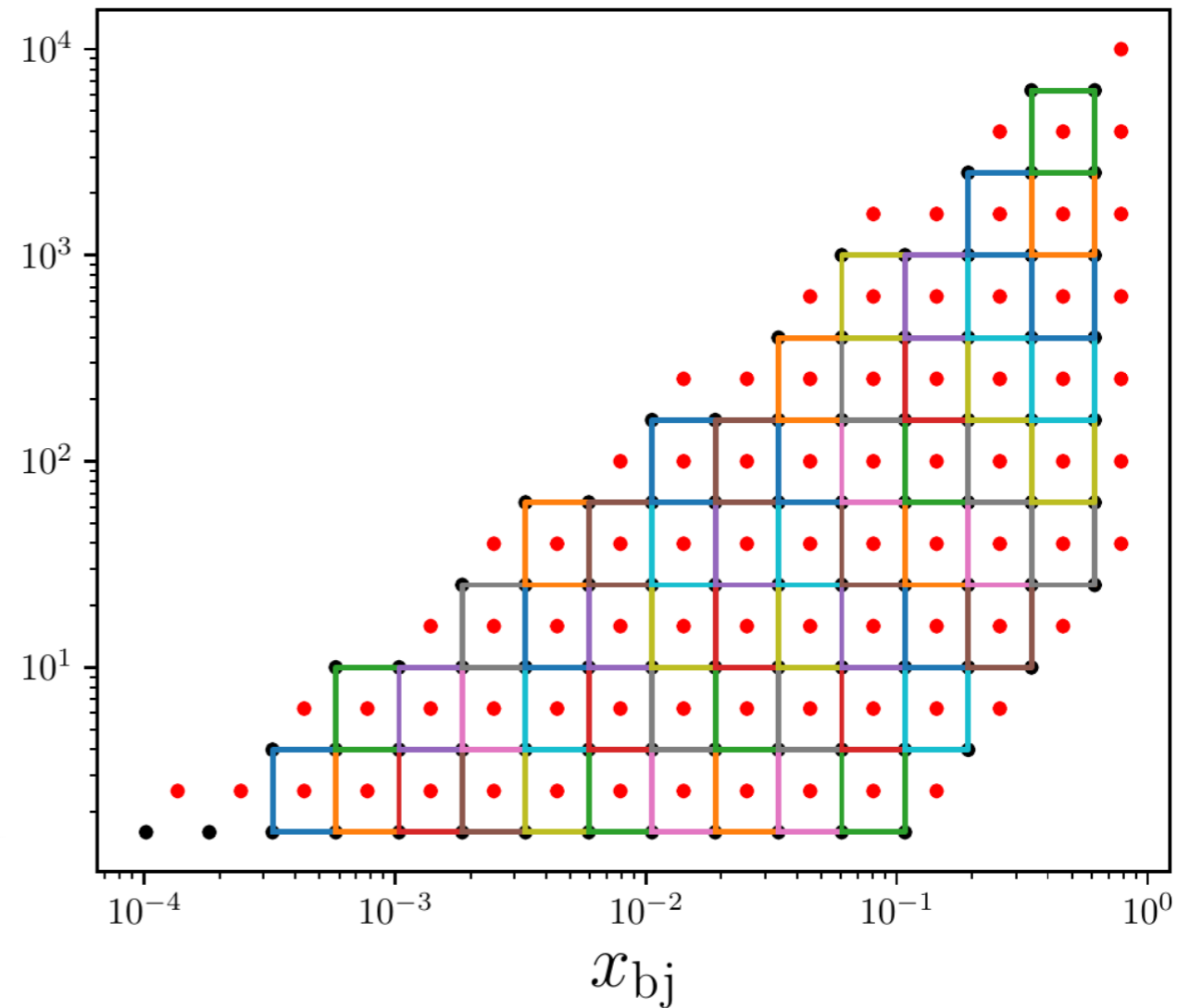**Rs = 0.5**

Purity based Kinematics

@Xiaoxuan
IRG Meeting June 2, 2020

Purity Map: NC 18x275 GeV with radiation, standard EIC smear

@Nobuo

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Summary

1. **[Done]** **Well defined strangeness scenarios (DIS NC for now)**
   - **[Next]** **Same study for DIS CC**
   - **[Next]** **Same study for nuclear DIS NC and CC.**
   - **[Next]** **Similar study for SIDIS (more details on this later)**
   - **... other ideas?**

2. **[Done]** **Reliable** χ^2 **analysis framework based on covariance matrix that could potentially include systematic correlated uncertainties.**

3. **[Done]** **Study based on Purity defined kinematics.**

4. **[Next]** **Inclusion of systematic uncertainties based on HERA.**