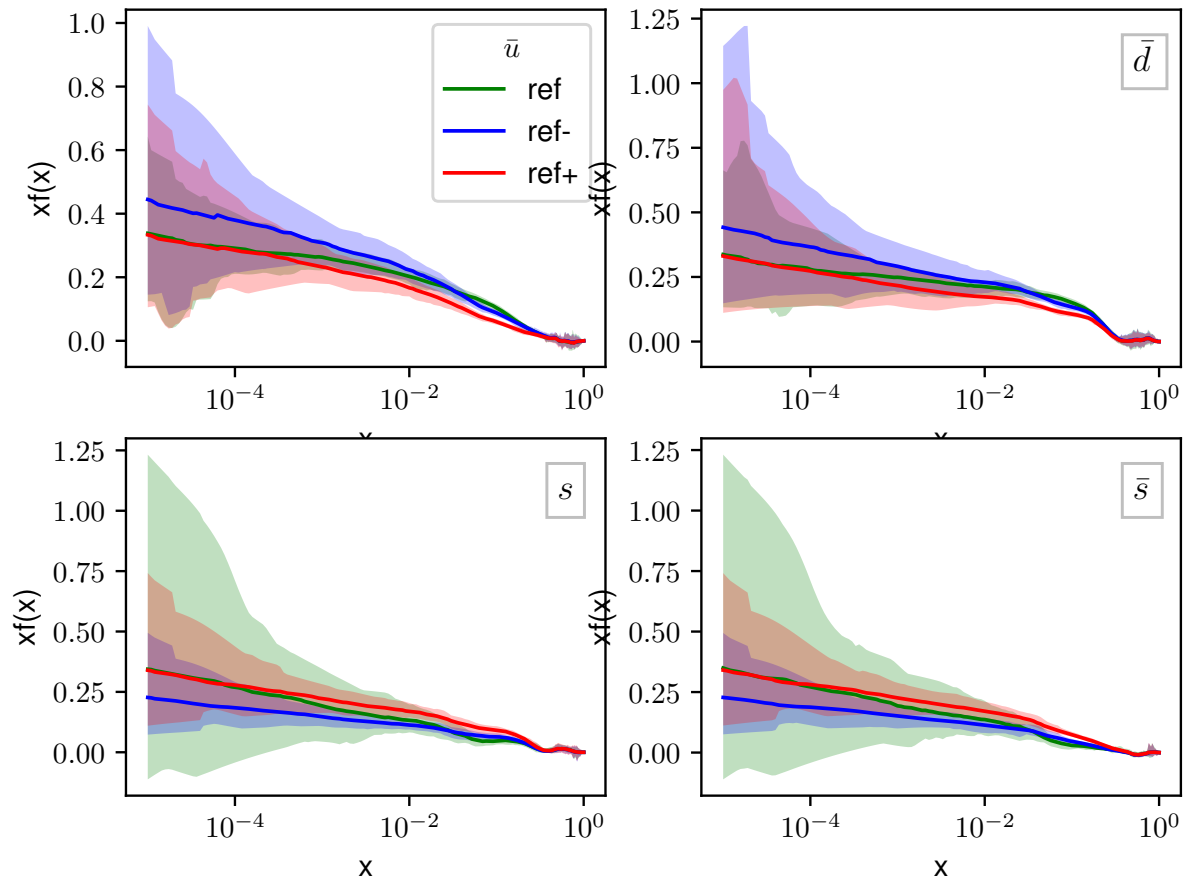# EIC Impact studies

15/09/2020
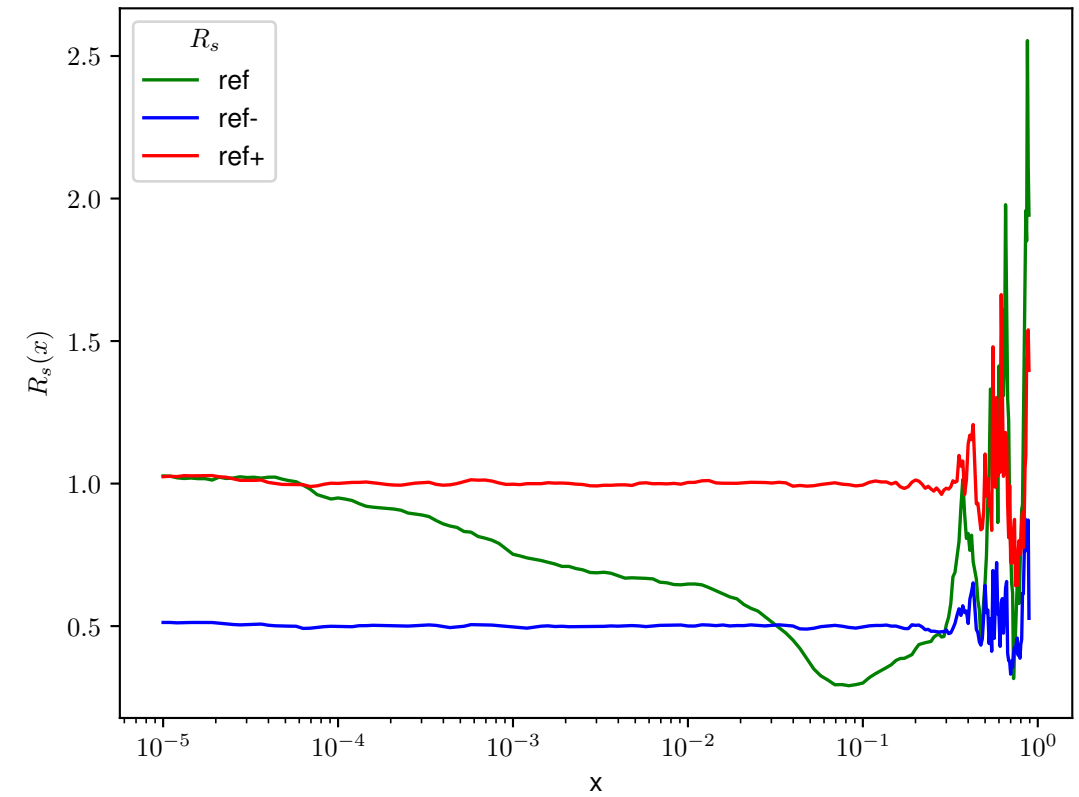
Rabah Abdul Khalek

Recap

NNPDF31_nnlo_pch_as_0118 at Q = 1 GeV

NNPDF31_nnlo_pch_as_0118 $R_s = \frac{s+\bar{s}}{u+\bar{u}}$ at Q = 1 GeV

$$s(x) \to s(x) + \kappa(x)\,, \quad \bar{s}(x) \to \bar{s}(x) + \kappa(x)\,,$$

and:

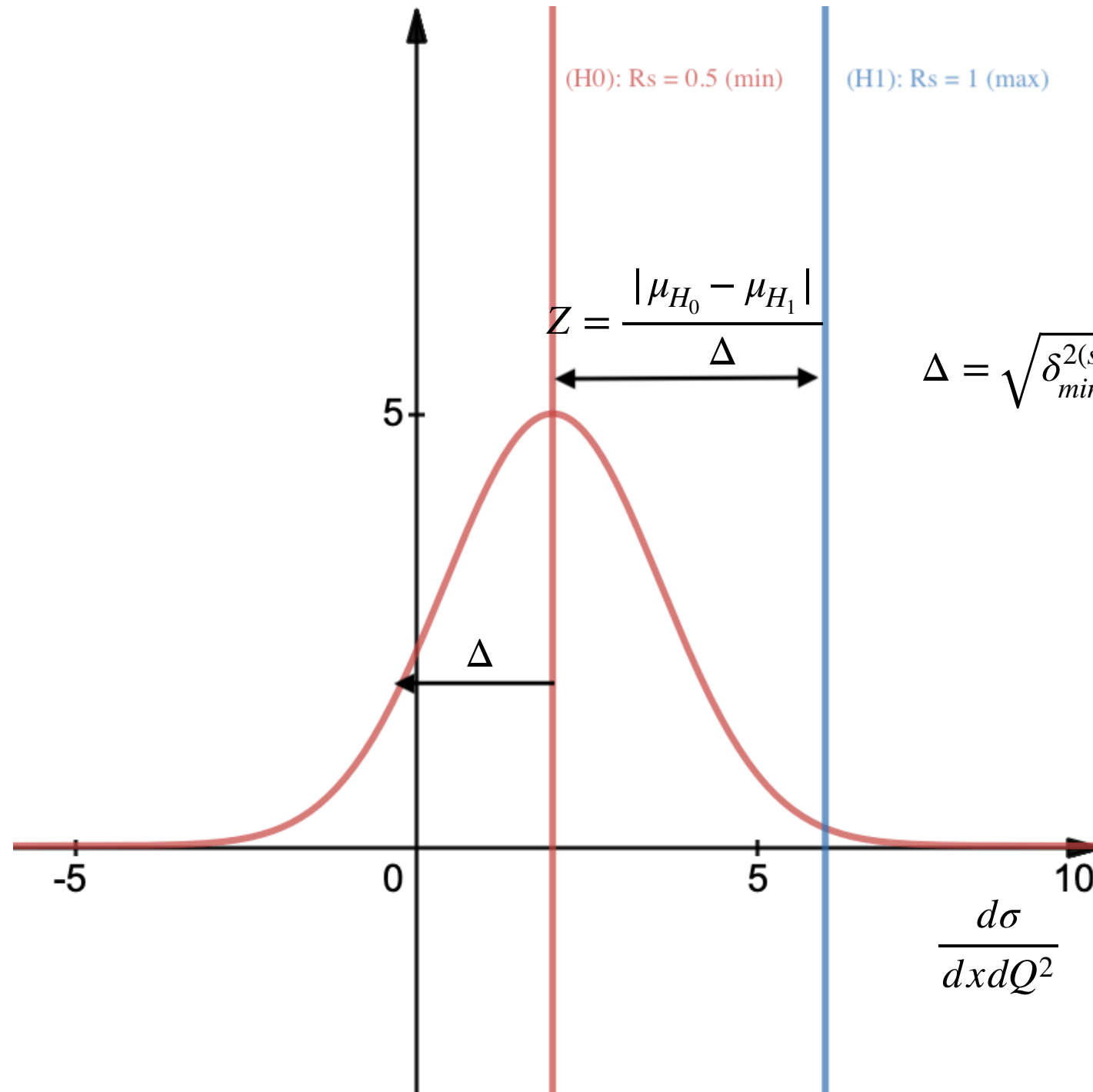$$\bar{u}(x) \to \bar{u}(x) - \kappa(x)\,, \quad \bar{d}(x) \to \bar{d}(x) - \kappa(x)\,.$$
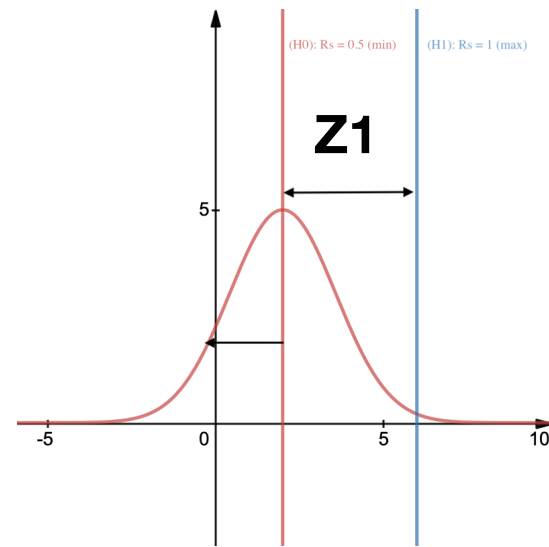
Such that
$$0.5 \le R_s \le 1$$
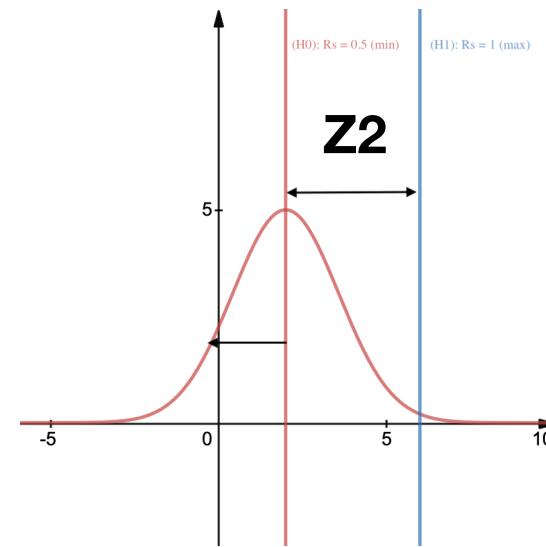
Z-score

For some (x, Q^2) bin
For some PDF replica

(H0): Rs = 0.5 (min) (H1): Rs = 1 (max)

$$Z = \frac{|\mu_{H_0} - \mu_{H_1}|}{\Delta}$$

$$\Delta = \sqrt{\delta_{min}^{2(sys)} + \delta_{max}^{2(sys)} + \delta_{min}^{2(stat)} + \delta_{max}^{2(stat)}}$$

Δ

$$\frac{d\sigma}{dxdQ^2}$$
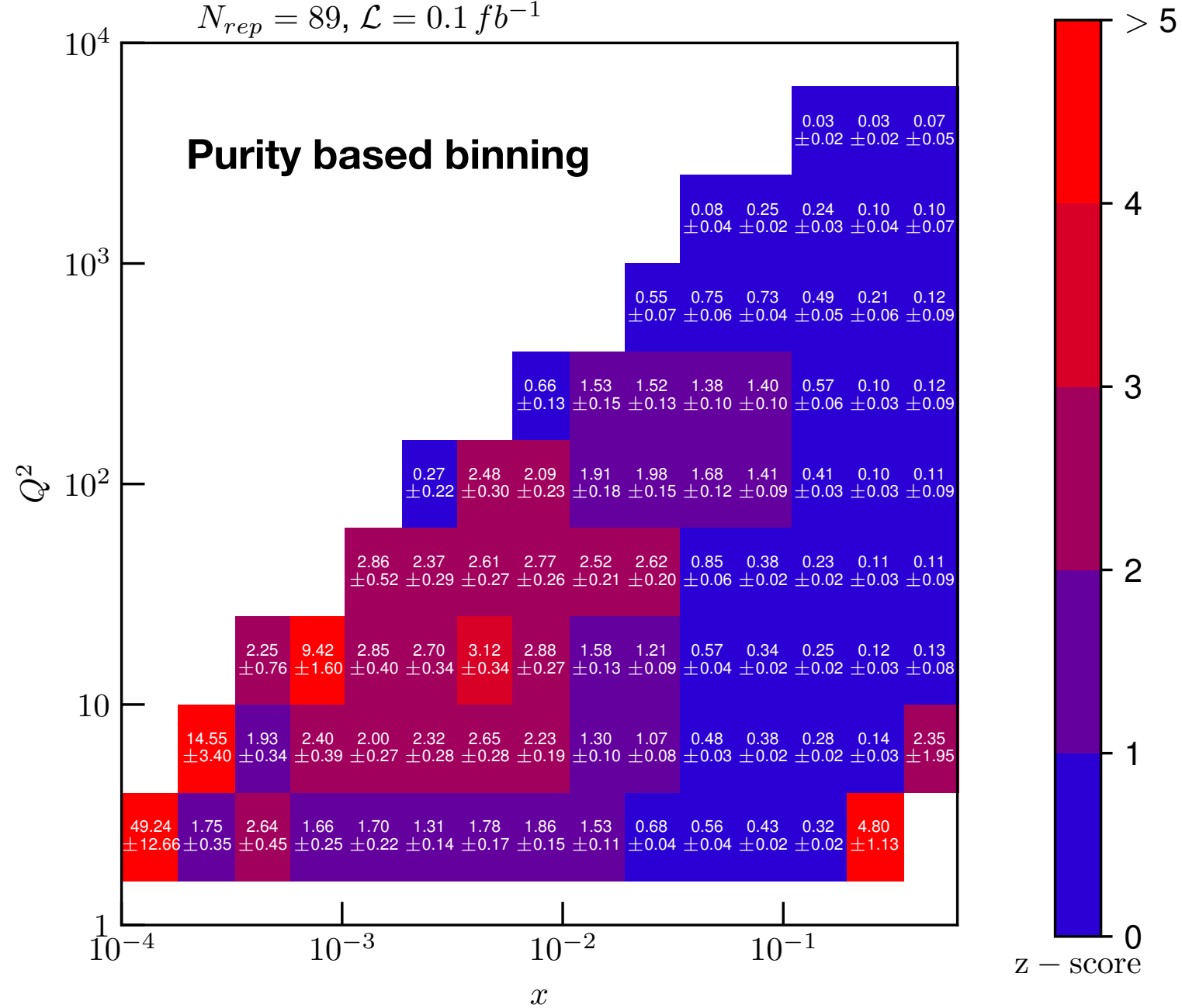
Z-score

For some (x, Q^2) bin

PDF rep = 1 **PDF rep = 2**

$$< Z > = \sum_i^{PDF_{rep}} Z_i$$

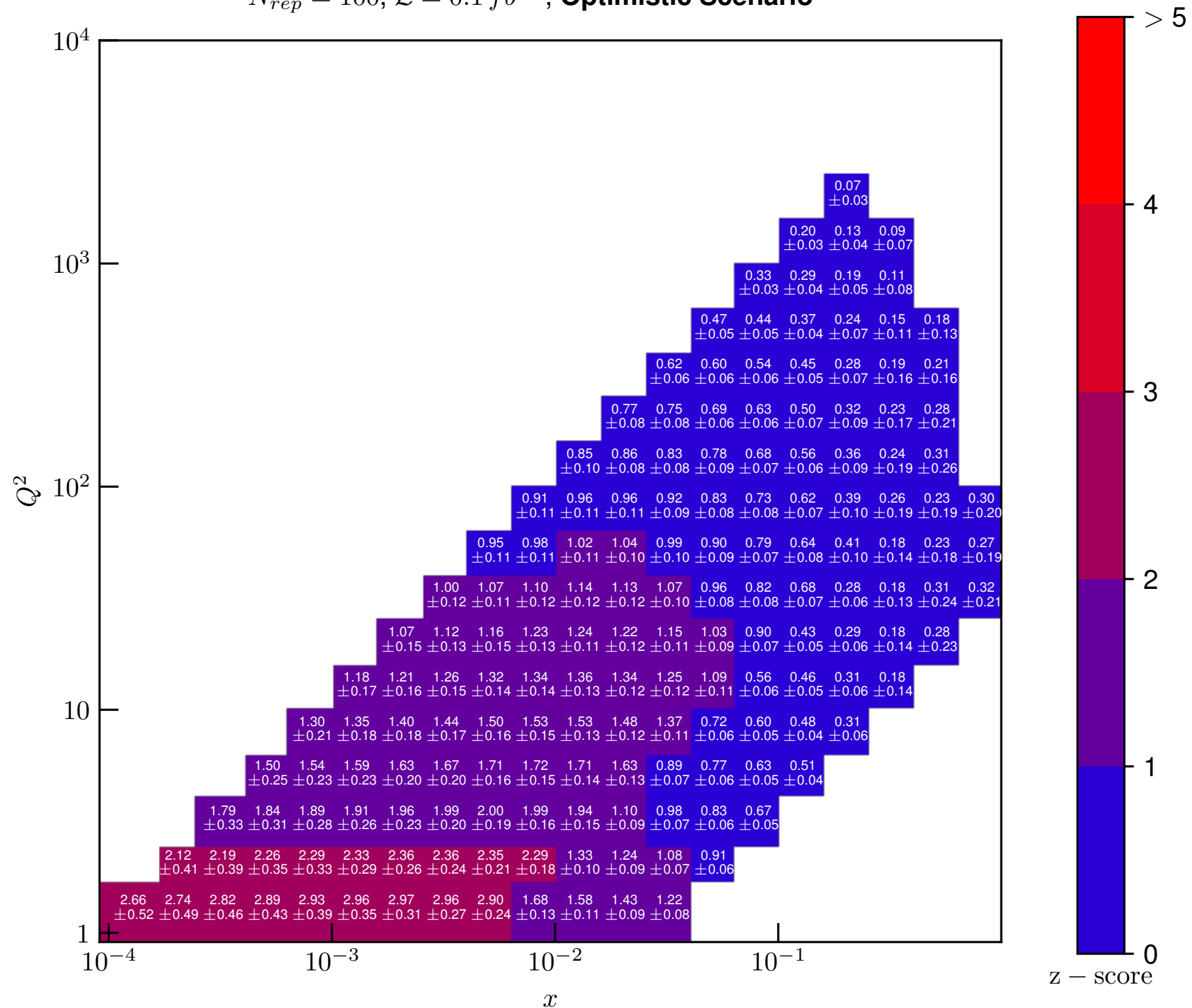$$\delta_Z = \sum_i^{PDF_{rep}} \sqrt{(Z_i - <Z>)^2}$$

First estimate of systematics

min: NNPDF31_nnlo_pch_as_0118_rs_0.5_SF,
max: NNPDF31_nnlo_pch_as_0118_rs_1.0_SF,
$N_{rep} = 89, \mathcal{L} = 0.1\ fb^{-1}$

Purity based binning

New (based on Barak's) Optimistic (Preliminary)

min: NNPDF31_nnlo_pch_as_0118_rs_0.5_SF,
max: NNPDF31_nnlo_pch_as_0118_rs_1.0_SF,
$N_{rep} = 100$, $\mathcal{L} = 0.1\ fb^{-1}$, **Optimistic Scenario**

New (based on Barak's) Pessimistic (Preliminary)

min: NNPDF31_nnlo_pch_as_0118_rs_0.5_SF,
max: NNPDF31_nnlo_pch_as_0118_rs_1.0_SF,
$N_{rep} = 100$, $\mathcal{L} = 0.1\ fb^{-1}$, **Pessimistic Scenario**