

Pion Cherenkov kinematic coverage

	Option 1	Option 2	Option 3	Option 4	Option 5
Refraction Index	1.002 (1.5atm C4F10)	1.005 (3.5atm C4F10 or aerogel)	1.008 (aerogel)	1.01 (aerogel)	1.02 (aerogel)
e threshold	0.008	0.005	0.004	0.0035	0.0025
pi threshold	2.2	1.4	1.1	1.0	0.7
pi limit	2.5	1.6	1.3	1.2	0.9
k threshold	7.7	5	4	3.5	2.5
K limit	7.5	4.8	3.8	3.3	2.3

aerogel Cerenkov idea:

- 30cm deep and 8m² area
- 2 or 3 row of MAPMT at outer radius (180cm)
with 450 or 675 MAPMTs for \$1.4M or \$2M

SoLID Baseline SIDIS

at different pion kinematic coverage

Pion momentum coverage

- ① 2.5 ~ 7.5 GeV
- ② 1.6 ~ 4.8 GeV
- ③ 1.3 ~ 3.8 GeV
- ④ 1.2 ~ 3.3 GeV

SIDIS rate

cuts:

$$Q^2 > 1 \text{ GeV}^2$$

$$W > 2.3 \text{ GeV}$$

$$W' > 1.6 \text{ GeV}$$

$$0.3 < z < 0.7$$

option	11GeV ³ He	8.8GeV ³ He	11GeV NH ₃	8.8GeV NH ₃
1.0–7.5GeV (enhanced)	2.34/1.55	1.74/1.13	0.36/0.23	0.23/0.12
①	1.31/0.86	0.46/0.28	0.20/0.13	0.064/0.036
②	2.12/1.40	1.33/0.86	0.32/0.20	0.181/0.098
③	1.99/1.33	1.57/1.02	0.31/0.19	0.210/0.113
④	1.75/1.18	1.55/1.01	0.27/0.17	0.206/0.110

π^+/π^- rate, unit:
kHz

Distributions: Baseline vs. Enhanced

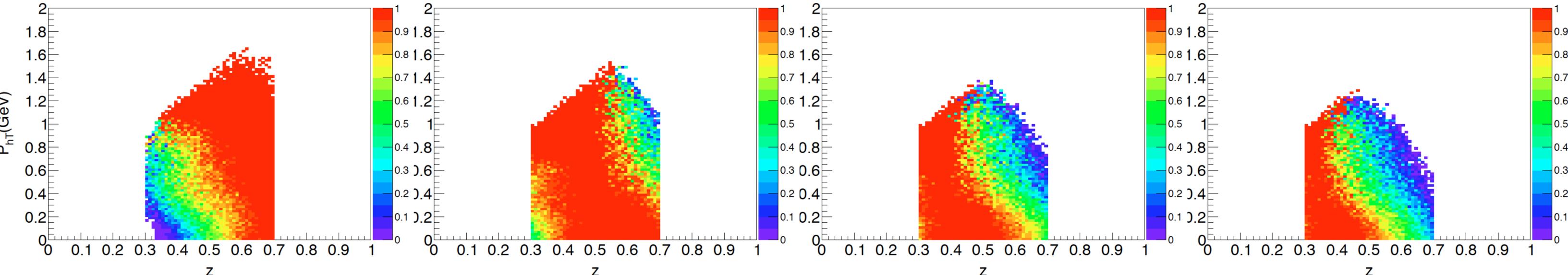
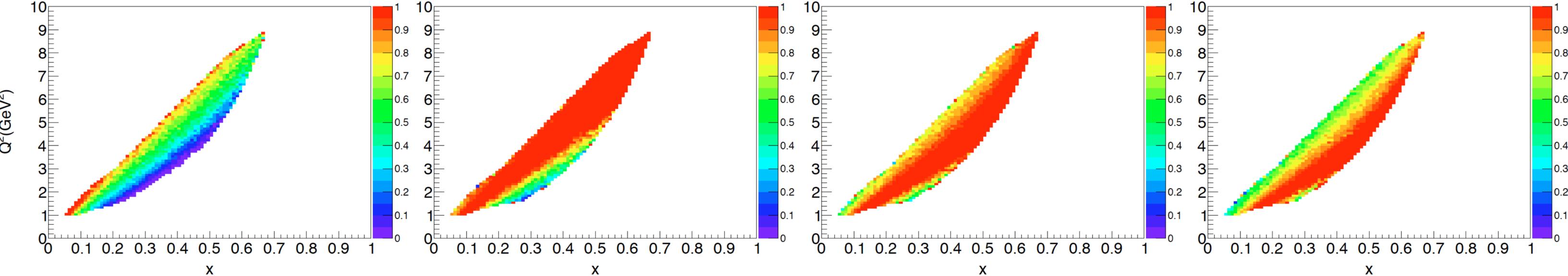
11 GeV, ${}^3\text{He}$, π^+

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

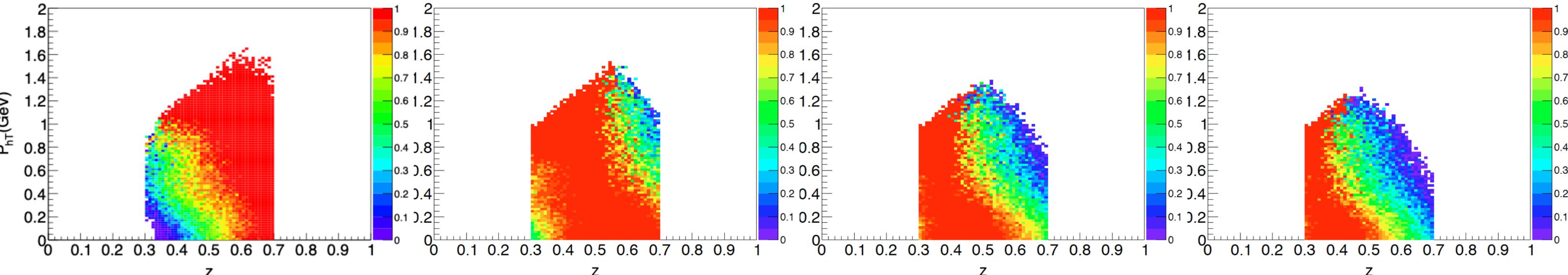
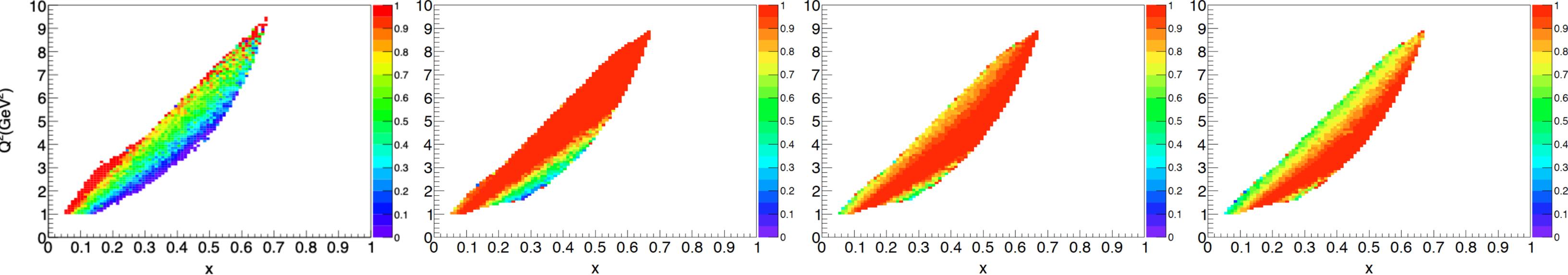
11 GeV, ${}^3\text{He}$, π^-

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

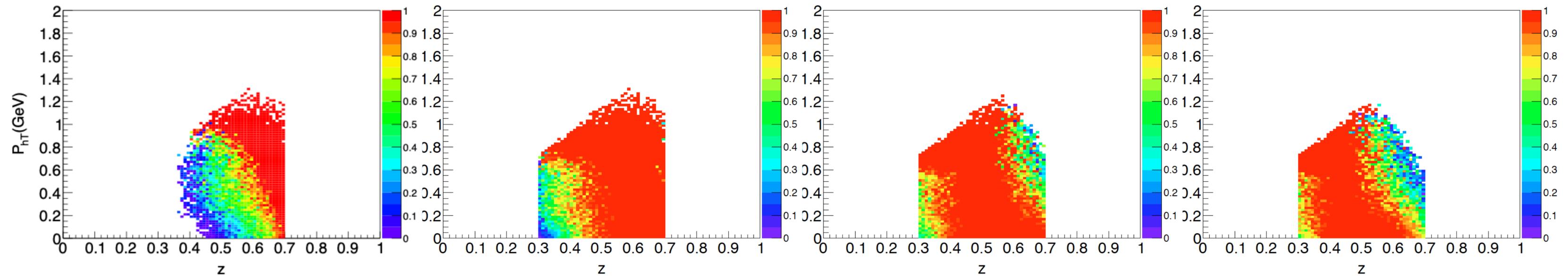
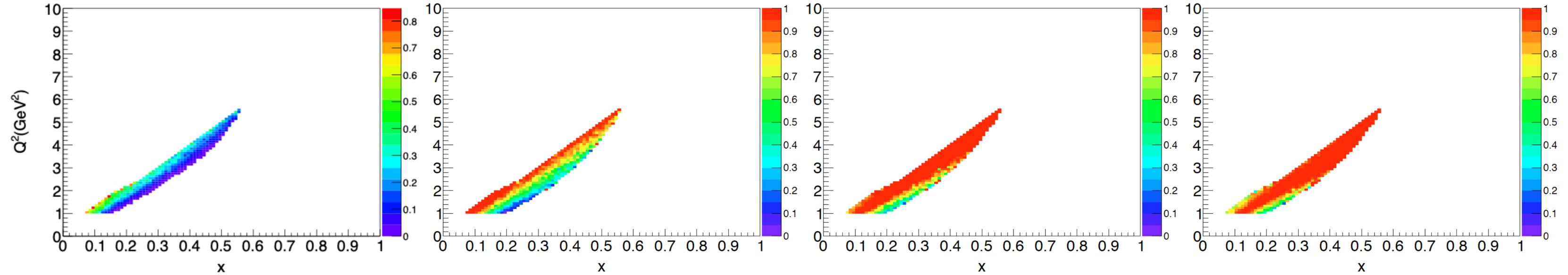
8.8 GeV, ${}^3\text{He}$, π^+

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

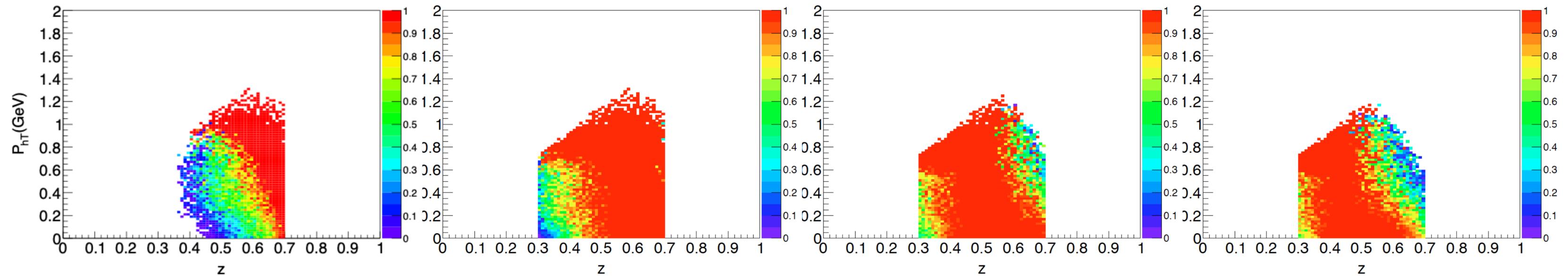
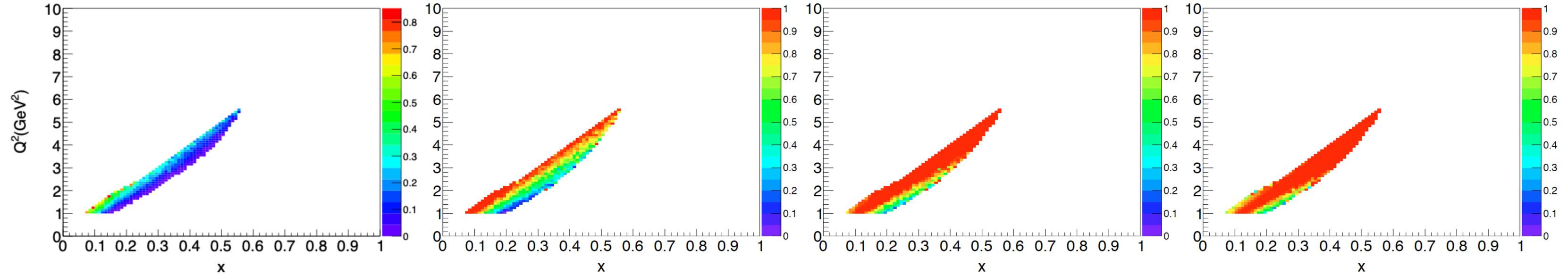
8.8 GeV, ^3He , π^-

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

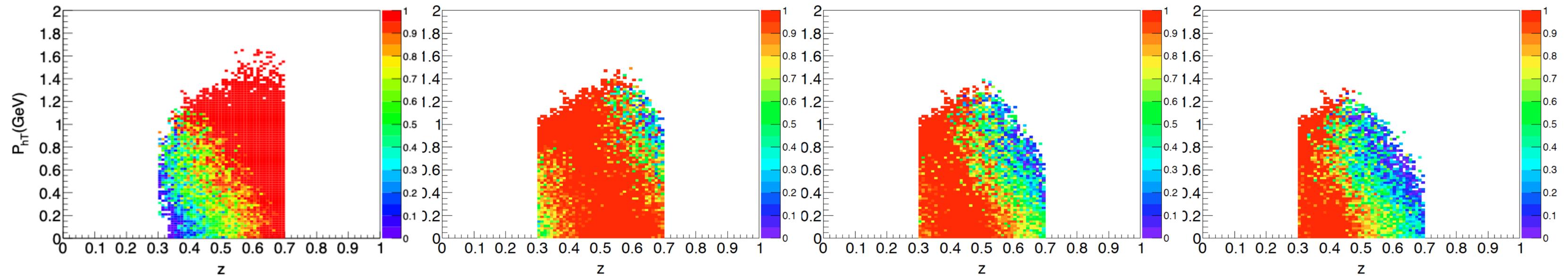
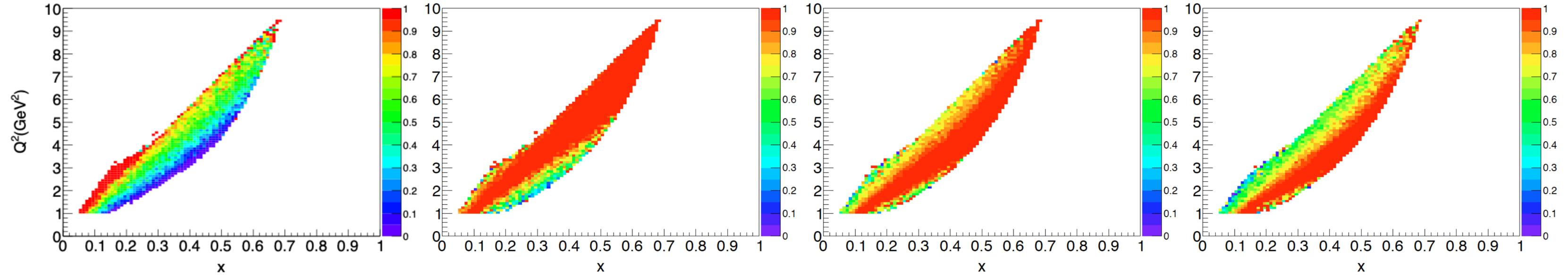
11 GeV, NH_3 , π^+

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

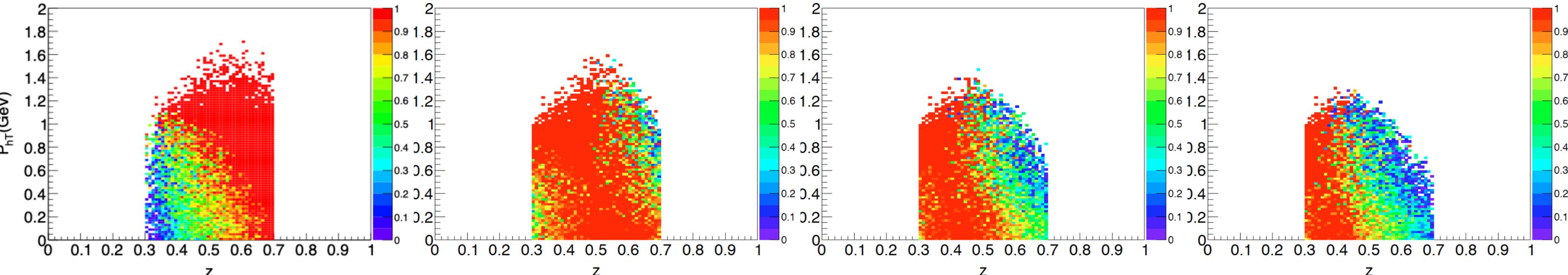
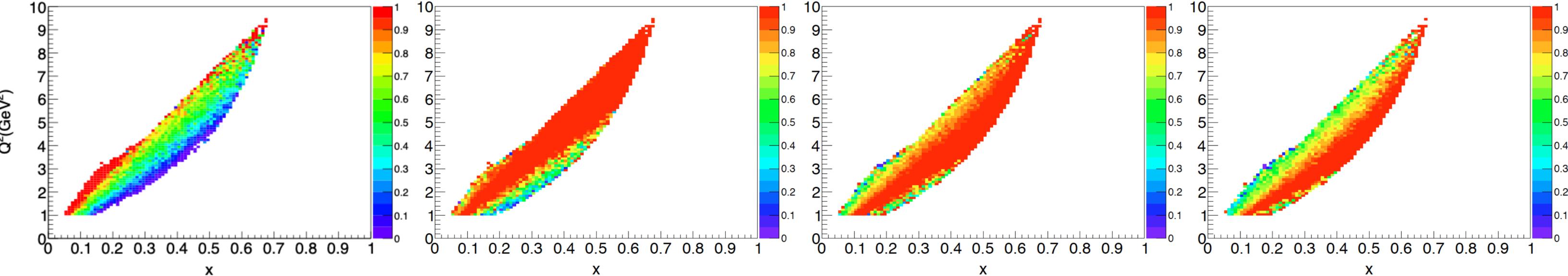
11 GeV, NH₃, π⁻

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

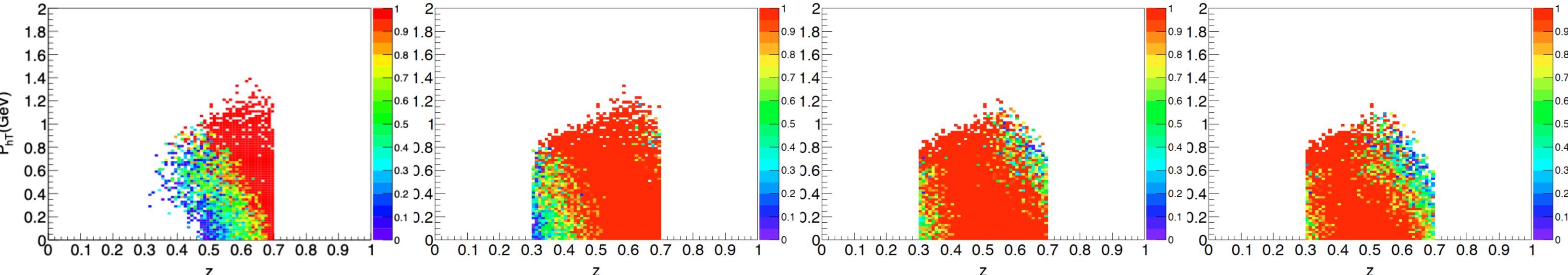
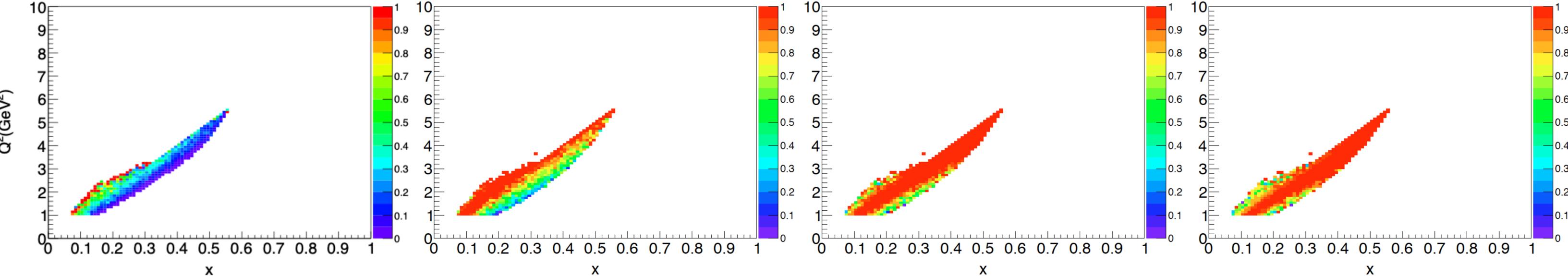
8.8 GeV, NH_3 , π^+

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Distributions: Baseline vs. Enhanced

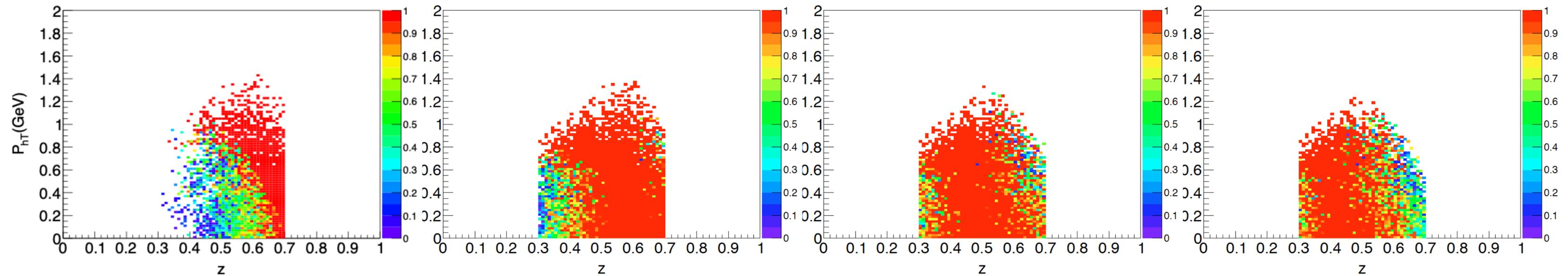
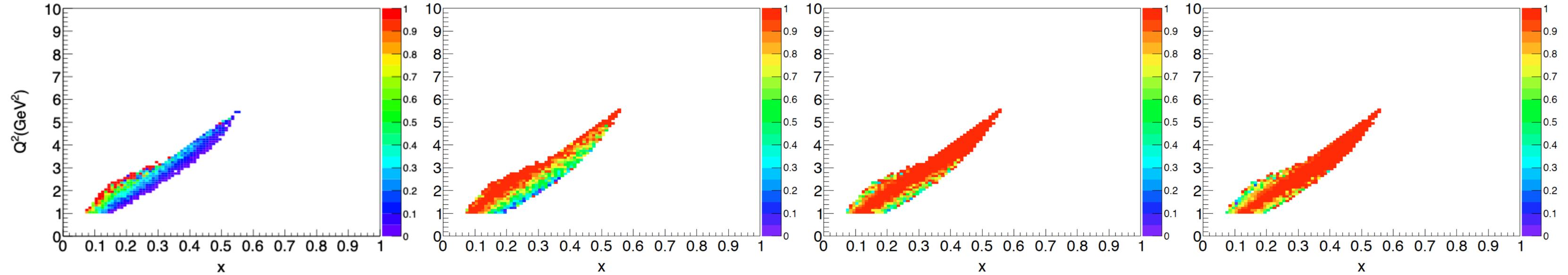
8.8 GeV, NH_3 , π^-

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV



Physics Impact

Transversity

Enhanced

[2.5, 7.5] GeV

[1.6, 4.8] GeV

[1.3, 3.8] GeV

[1.2, 3.3] GeV

