Alternative kinematic acceptance cuts
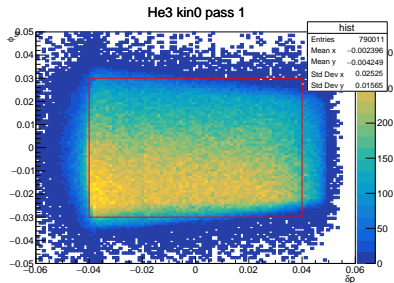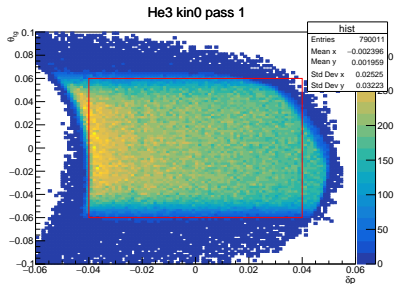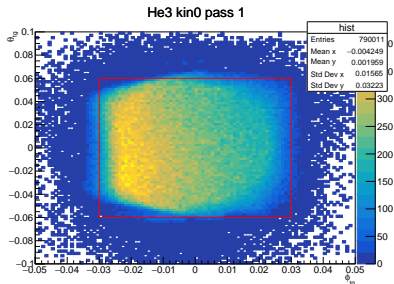
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Motivation

- Do current 1D acceptance cuts exclude edge of HRS acceptance?
- Are 2D cuts required to account for variable correlations?
- Do the distributions change with kinematic setting?
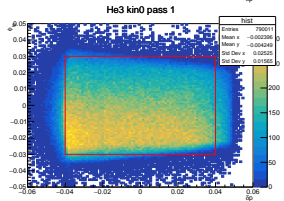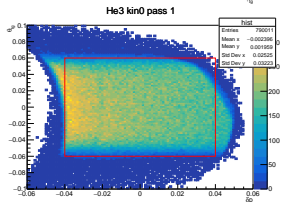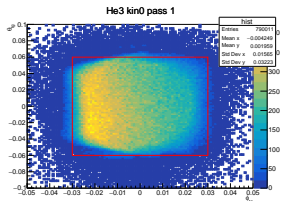
Current cuts

He3 kin0 pass 1

He3 kin0 pass 1

He3 kin0 pass 1

Previous cuts:

$$|\theta| < 0.06$$
$$|\phi| < 0.03$$
$$|\delta p| < 0.04$$
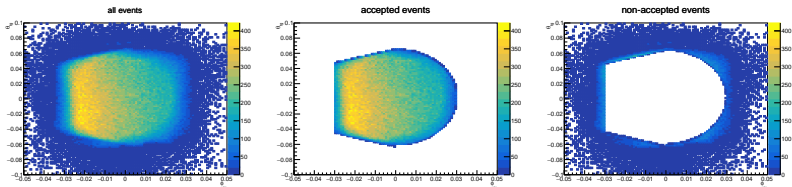
Possible alternative cuts

- $\phi > 0.03$
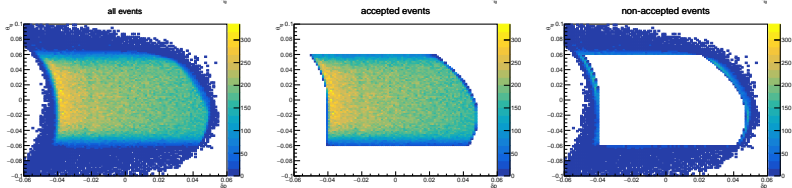
- $\theta < 0.065 + 0.6\phi$

- $\theta > -0.0625 - 0.6\phi$

- $\left(\frac{\theta - 0.0025}{0.0625}\right)^2 + \left(\frac{\phi}{0.03}\right)^2 < 1 \qquad (\phi > 0)$

- $|\theta| < 0.06$

- $\delta p > \begin{cases} -0.04 & (\theta < 0) \\ -0.04 - 2.61\theta^2 & (\theta > 0) \end{cases}$

- $\delta p < 0.046 - 0.17\theta - 3.88\theta^2$

- $\delta p > -0.042$

- $\delta p < 0.047$

- $\phi < 0.0271 - 0.13\delta p$
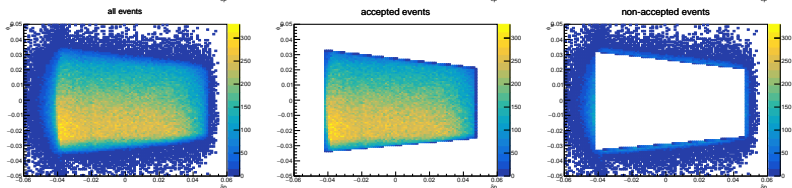
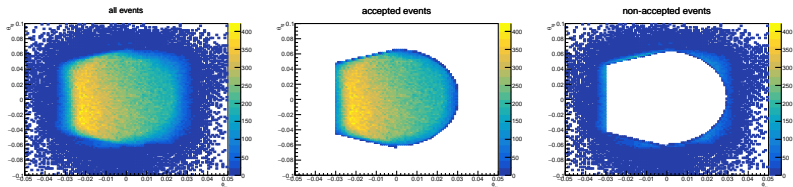- $\phi > -0.0293 + 0.1\delta p$

Alternative cuts on ^{3}He, kin0

^{3}He
kin0

^{3}He
kin0

^{3}He
kin0

Do distributions change with kinematic setting?

Kinematic comparison (θ vs. ϕ)

^{3}He
kin0

^{3}He
kin1

^{3}He
kin2

Kinematic comparison (θ vs. ϕ)

Kinematic comparison (θ vs. δp)

Kinematic comparison (θ vs. δp)

^{3}He
kin0
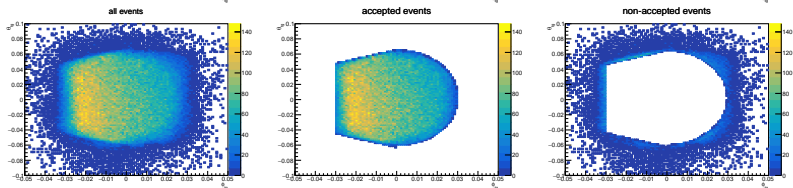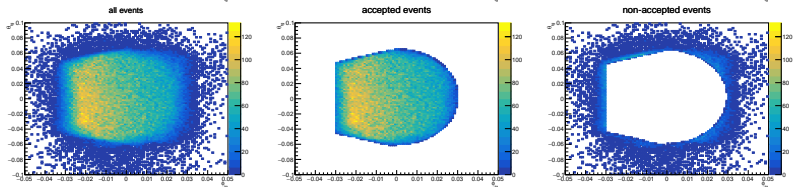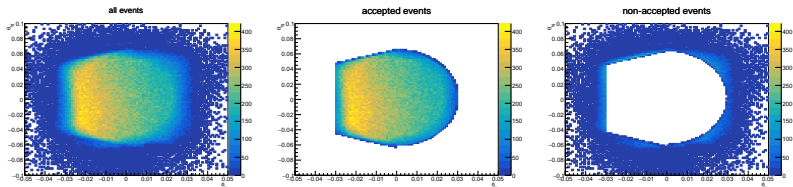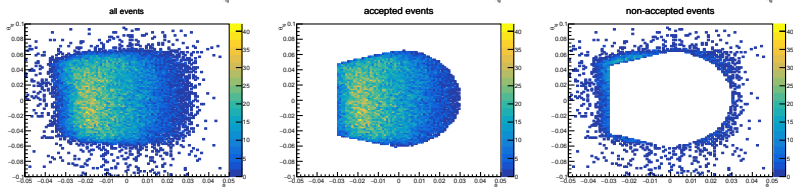
^{3}He
kin5

^{3}He
kin15

Kinematic comparison (ϕ vs. δp)

^{3}He kin0

^{3}He kin1
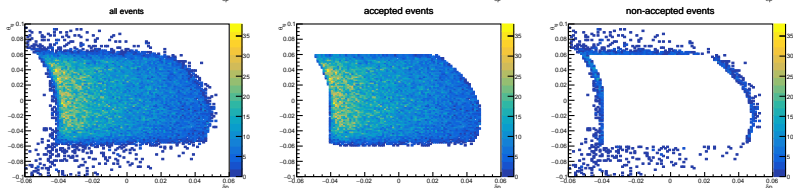
^{3}He kin2

Kinematic comparison (ϕ vs. δp)
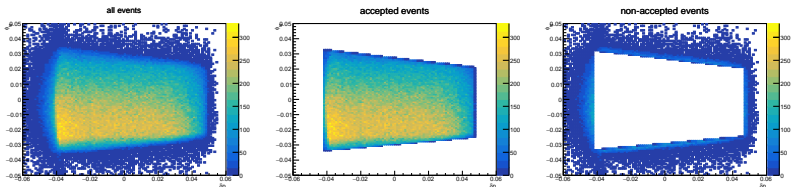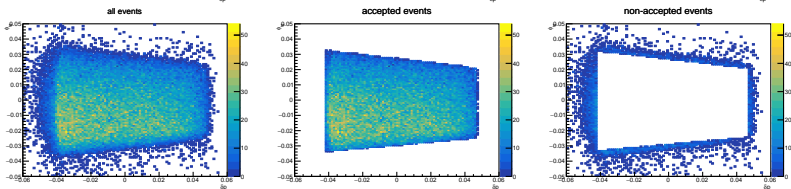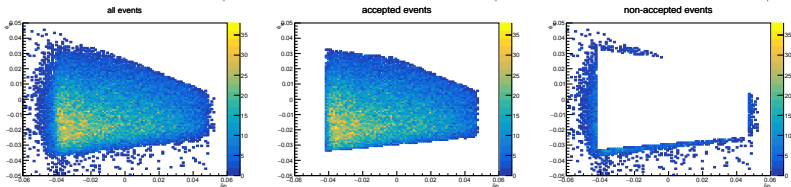
${}^3\text{He}$
kin0
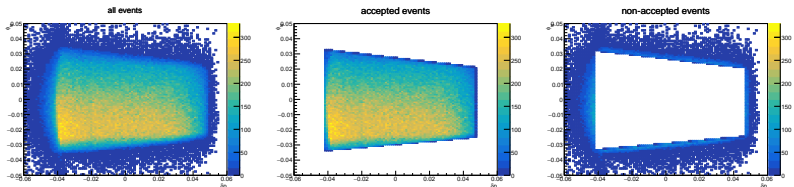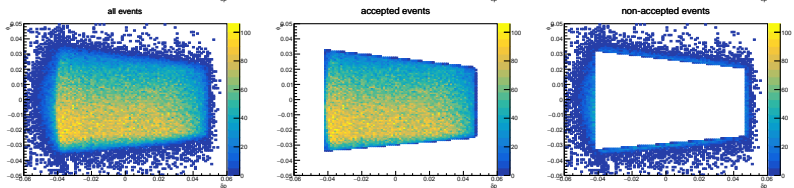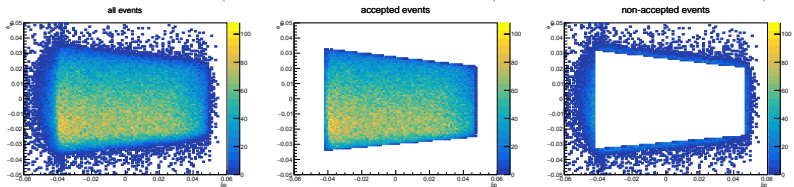
${}^3\text{He}$
kin5

${}^3\text{He}$
kin15

Comments

- To maximize acceptance while avoiding edge, 2D cuts are needed.

- However, perhaps 1D cuts are fine for MARATHON...this is at least an alternative to consider so a final decision can be made.

- Possible clipping at high kinematic settings? Need to investigate.