Guidelines for MI60 Extraction with Three Kickers

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Assume all three kickers are downstream of Q602
Assume current instrumentation can be relocated
Assume downstream end of third kicker is ~7.5 meters downstream Q602
Vertical aperture of 3rd kicker must not be limiting aperture

Vertical design beta at QD location ~55 meters
Vertical ID of MI beam pipe ~ 1.88 " (47.75 mm)
Vertical beta at downstream end 3rd kicker ~25 meters
Minimum vertical aperture of 3rd kicker beampipe
1.88" * sqrt (25/55) => 1.27" **(32 mm)**

Vertical Acceptance of MI at 8 Gev: Use +/-4 σ to determine acceptance

47.75 mm / 8 => σ = 5.97 mm
Acceptance = $6(\gamma\beta)\sigma^2 / \beta$ => 36.8 π-mm-mr ~ **40 π-mm-mr**
If use +/2.45 σ => 95 π-mm-mr

Currently on stacking cycles $\varepsilon_H \sim 1.5 * \varepsilon_V$ ($\varepsilon_V \sim 15$ π-mm-mr)

Horizontal Acceptance limited by field free aperture in Lambertson.

W ~ MI beam pipe width/2 => 60 mm
Acceptance = $6(\gamma\beta)\sigma^2 / \beta$ => 58 π-mm-mr ~ **60 π-mm-mr**

Assume blow up beam emittance in each plane by factor 2 at 120 Gev, the emittance at 120 Gev to determine apertures should be

ε_H => 120 π-mm-mr
ε_V => 60 π-mm-mr
