
Magnetic Alignment

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Soft-edge mode Matrix

- ▶ Offset calculation caused by magnet misalignment

Initial setting: input beam $[x, x', y, y'] = [0, 0, 0, 0]$

Each time set one misalignment value

Solenoid setting : innerRadius=100mm Length=1000mm

Thickness=20mm currentDensity=100A/mm²

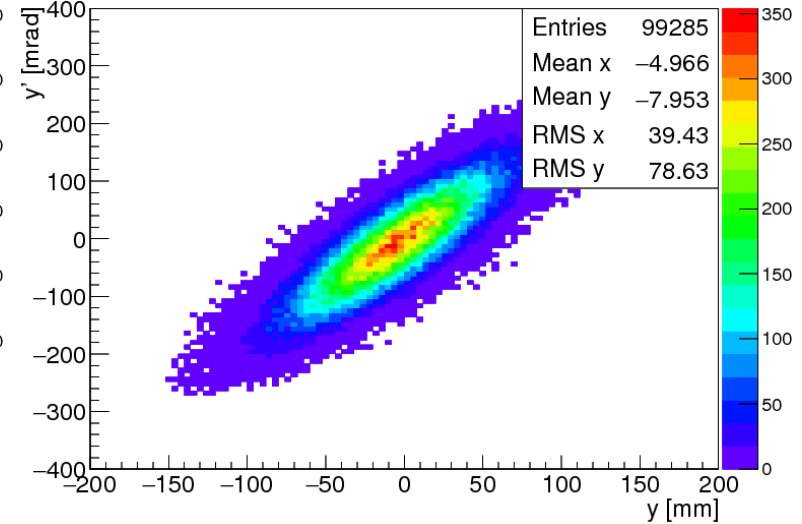
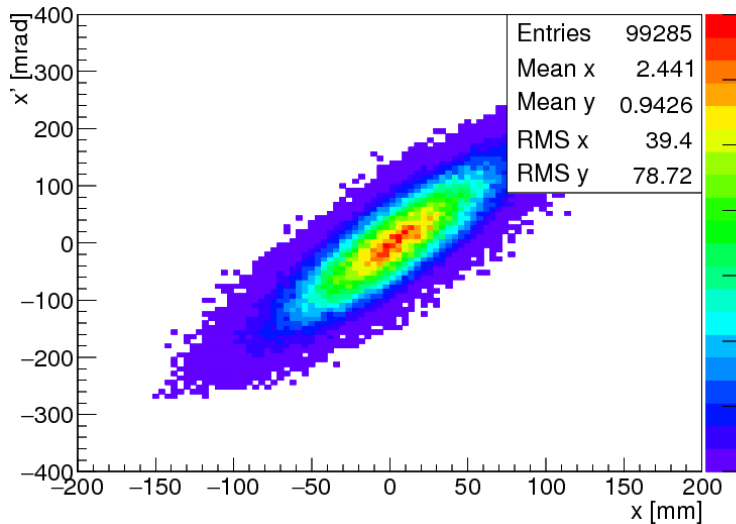
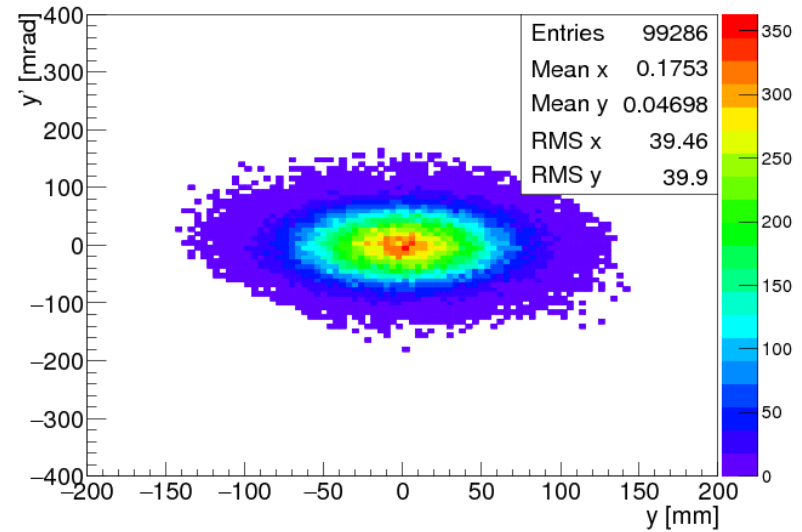
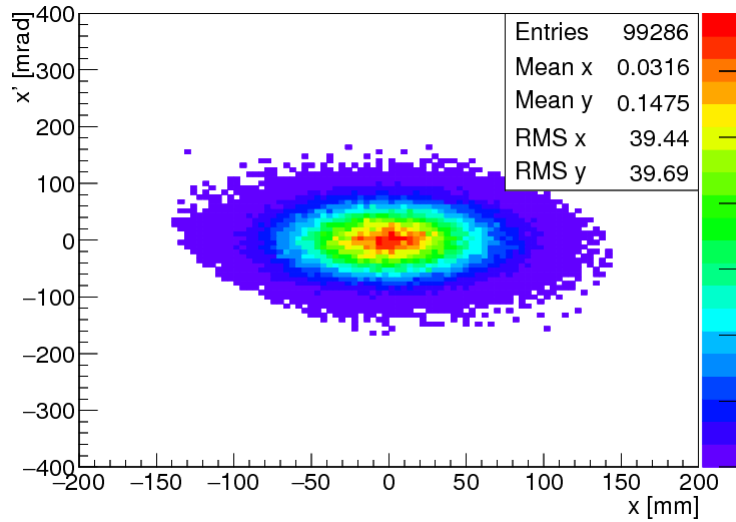
		x (mm)	y (mm)	x' (mrad)	y' (mrad)	all
Error setting		2	2	2	2	2
formula method	Offset_x	1.388	2.001	1.900	2.581	7.871
	Offset_y	-2.001	1.388	-2.581	1.900	-1.295
G4BL simulation	Offset_x	1.388	2.001	1.931	2.623	7.837
	Offset_y	-2.001	1.388	-2.623	1.931	-1.291

► The beam center offset sources

- Initial offset
- Element misalignment
- Beam scraping
- High-order aberrations

Error setting	error type	x (mm)	y (mm)	x' (mrad)	y' (mrad)	Beam offset
Error setting1	magnet	2	2	2	2	X: 7.862 Y: -1.300
	beam	0	0	0	0	
Error setting2	magnet	0	0	0	0	X: 1.276 Y: -1.978
	beam	-2	0	-2	0	
Error setting3	magnet	2	2	2	2	X: 9.146 Y: -3.275
	beam	-2	0	-2	0	
Error setting3 (1+2)	The offsets are calculated by adding setting 1 and setting 2 results up together.					X: 9.138 Y: -3.278

► Phase space (upper: input lower: output)



► Beam center offset calculation with different beam emittance

If there is particle loss during the propagation, the offsets should be corrected by doing simulation with survived particles, also taking into the initial offsets caused by beam scraping.

