Effect of BPM gain calibration and quadrupole offset correction on sextupole misalignment measurement: 26W

Sextupole 26W is of interest due to an anomalously large vertical offset measured in 2021.

22 February 2021: X_{off} = 0.170 ± 0.022 mm Y_{off} = -2.923 ± 0.092 mm

2 November 2021: X_{off} = 0.285 ± 0.025 mm Y_{off} = -4.093 ± 0.041 mm

Summer 2023: 26W is not in the list of surveyed/moved quadrupoles.

1 October 2023: X_{off} = 2.002 ± 0.071 mm Y_{off} = -3.550± 0.061 mm

2 October 2023: 26W BPM button gains and quad centering were measured and corrected.
3 October 2023: 32W, 34E processors swapped during access.

4 October 2023: X_{off} = 0.108 ± 0.006 mm Y_{off} = -3.300± 0.019 mm

4 October 2023: X_{off} = 0.153 ± 0.011 mm Y_{off} = -3.371± 0.028 mm (K2 setting order reversed)

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CESR Accelerator Study Group Meeting

8 November 2023 (Updated 9 November 2023)

	X_{offset}	X_0 from b_1 kick	X_0 from tunes	X_{sext}	X^{26W}_{bpm} (model)	X^{26W}_{bpm} (data)
1 Oct 2023:	2.0	-2.0	-2.1	-0.03	-0.03	0.35
4 Oct 2023:	0.11	-0.7	-0.9	-0.60	-0.60	-0.53
4 Oct 2023:	0.15	-0.7	-0.9	-0.60	-0.60	-0.35

Reminder: X_0 is the distance from the beam to the center of the sextupole derived from the quad kick.

$$X_{offset} = X_{sext} - X_0$$

Button offsets: -0.18   2.19   0.0   0.0 (10/21/2020) → -0.11   2.48   0. 0   0.02 (10/2/2023)

Why did the offset change from -2.0 mm to 0.13 mm?
Because of the quadrupole term change, not because of the orbit.

The button offset values changed little compared to the quad contribution change.

How accurate is the model derived from the fit to phase, coupling and orbit?
The residual at the BPM was reduced from 0.35 to 0.08 mm. Yay, button gains & quad centering.