

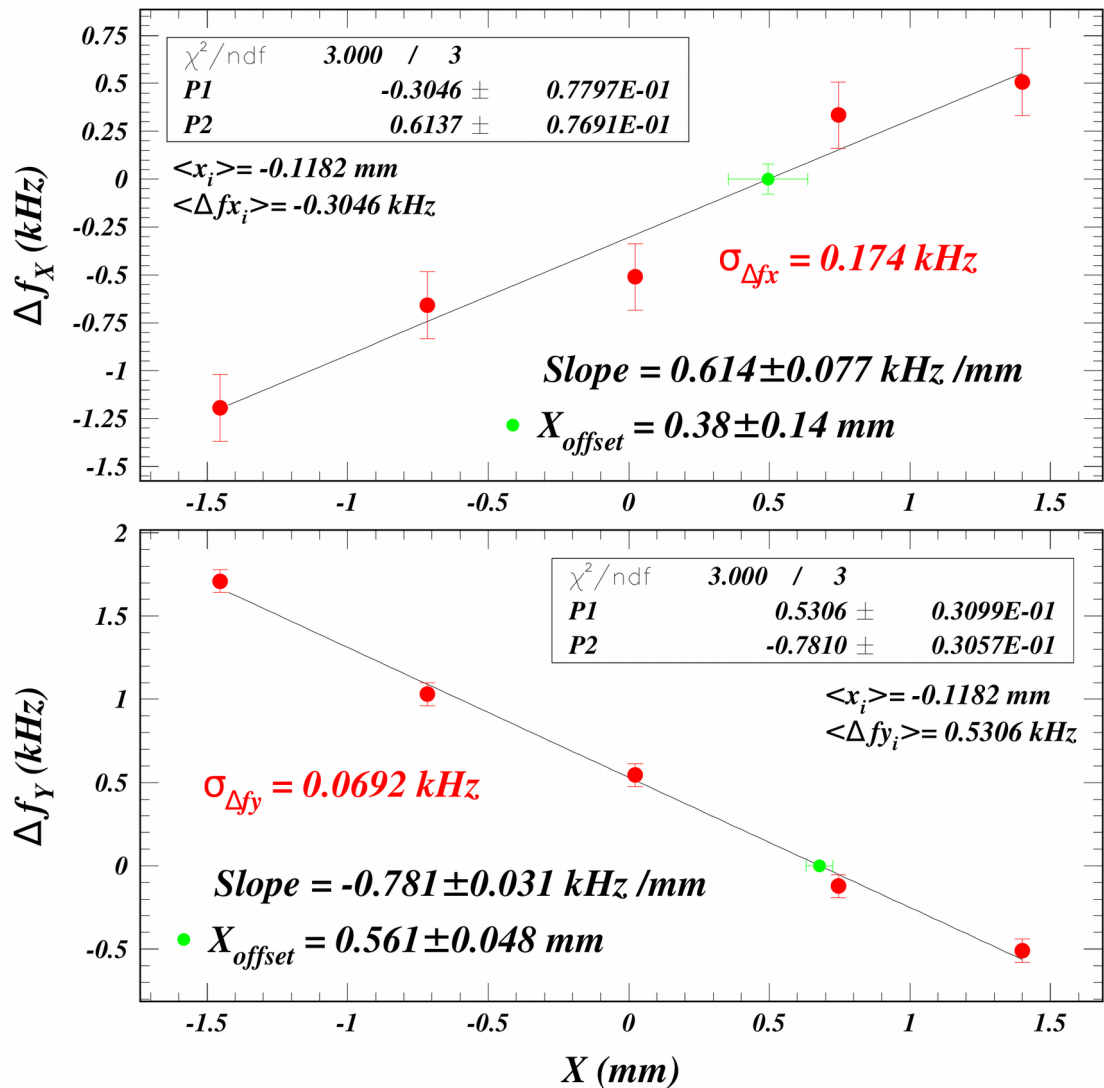


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Results for CESR sextupole calibration correction factors and horizontal offsets / IPAC22 poster

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The procedure developed for obtaining the calibration of each sextupole consisted of measuring the horizontal and vertical tune changes for a given change in k_2 for five beam positions set by a closed bump. For this analysis we neglect small corrections arising from the beam motion consequential to the beam size.

The linear fit is done to the X values with $\langle X \rangle$ subtracted so that the reported errors on the coefficients are uncorrelated. The error bars

$\sigma_{\Delta f}$ are adjusted to give

$$\chi^2/NDF = 1.$$

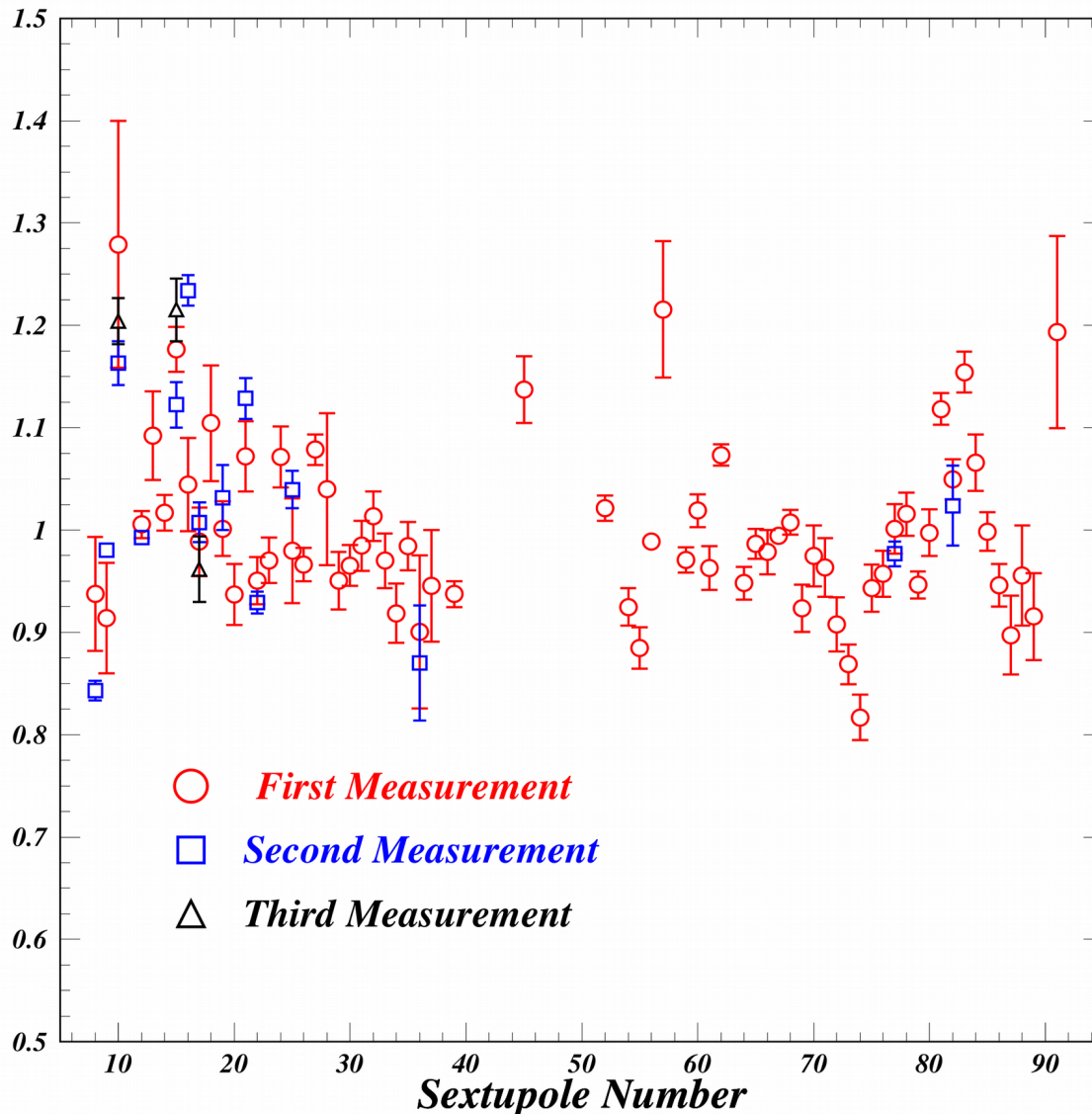
The slopes, which give the calibration correction factors when divided by the CESR model slopes, are determined to **14.3%** (f_x) and **2.0%** (f_y) accuracy.

The X value for which there is no tune change (X_{offset}) is determined with accuracy **140 μ** (f_x) and **48 μ** (f_y).

The two values agree within errors.



Measurement/theory ratio for beta-weighted tune difference



The calibration correction factor is derived from a measured/theory ratio for the beta-weighted tune shift differences, where the theory value assumes the nominal calibration value used for the sextupoles during operations.

A rough estimate of 5% for the variations due to construction tolerances was made during the initial field measurements in 1998.

Our measurements show an RMS deviation of 9.5% with a mean value of 1.009 ± 0.010 .

We found one sextupole with polarity opposite from expected (corrected here).

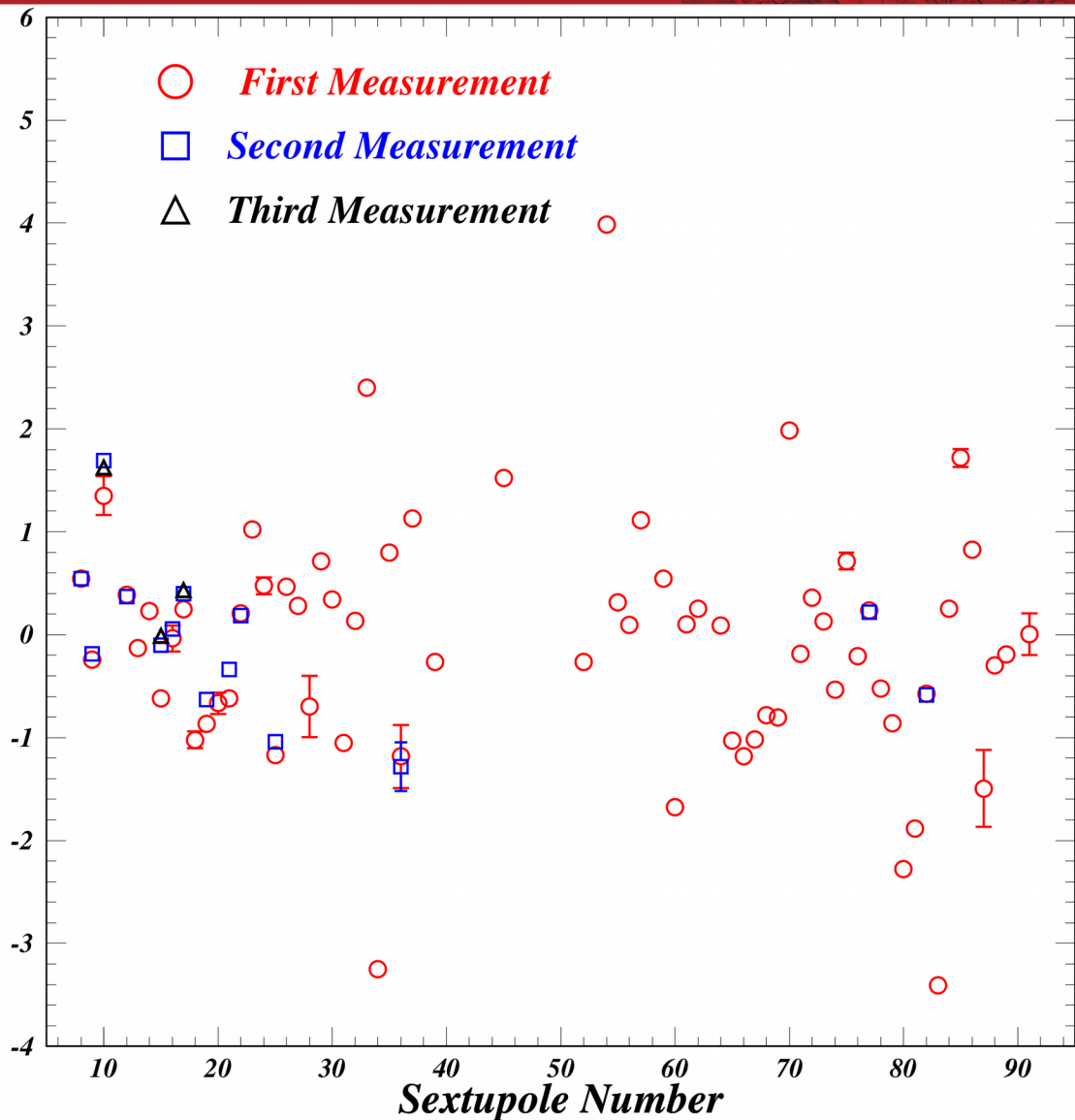
The uncertainties average 2.9% with an RMS spread of 2.0%.

The reproducibility for measurements two months apart is within uncertainties.



Horizontal offsets

Weighted average of offsets from H and V tunes (mm)



The values of the horizontal offsets relative to the quadrupole centers are obtained by identifying the horizontal beam position at the sextupole reconstructed from beam position monitor measurements which results in zero tune shift.

The weighted average of the two values shown in the example on slide 2 provides the values for each sextupole shown here.

With several exceptions, the RMS spread in the offsets is found to be 0.83 mm. The uncertainties average 43 microns with an RMS spread of 28 microns.