BCM Calibrations for XEM

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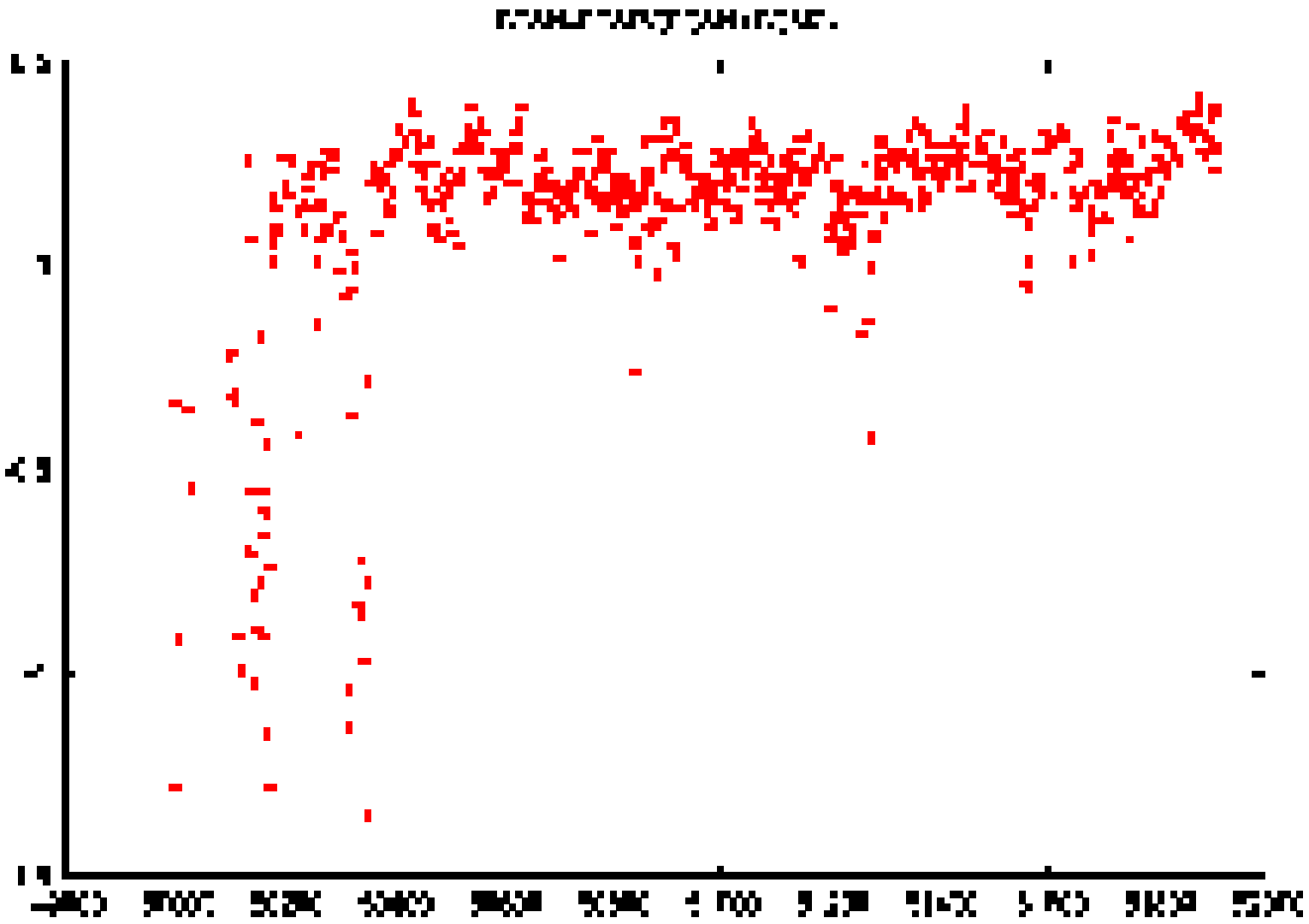
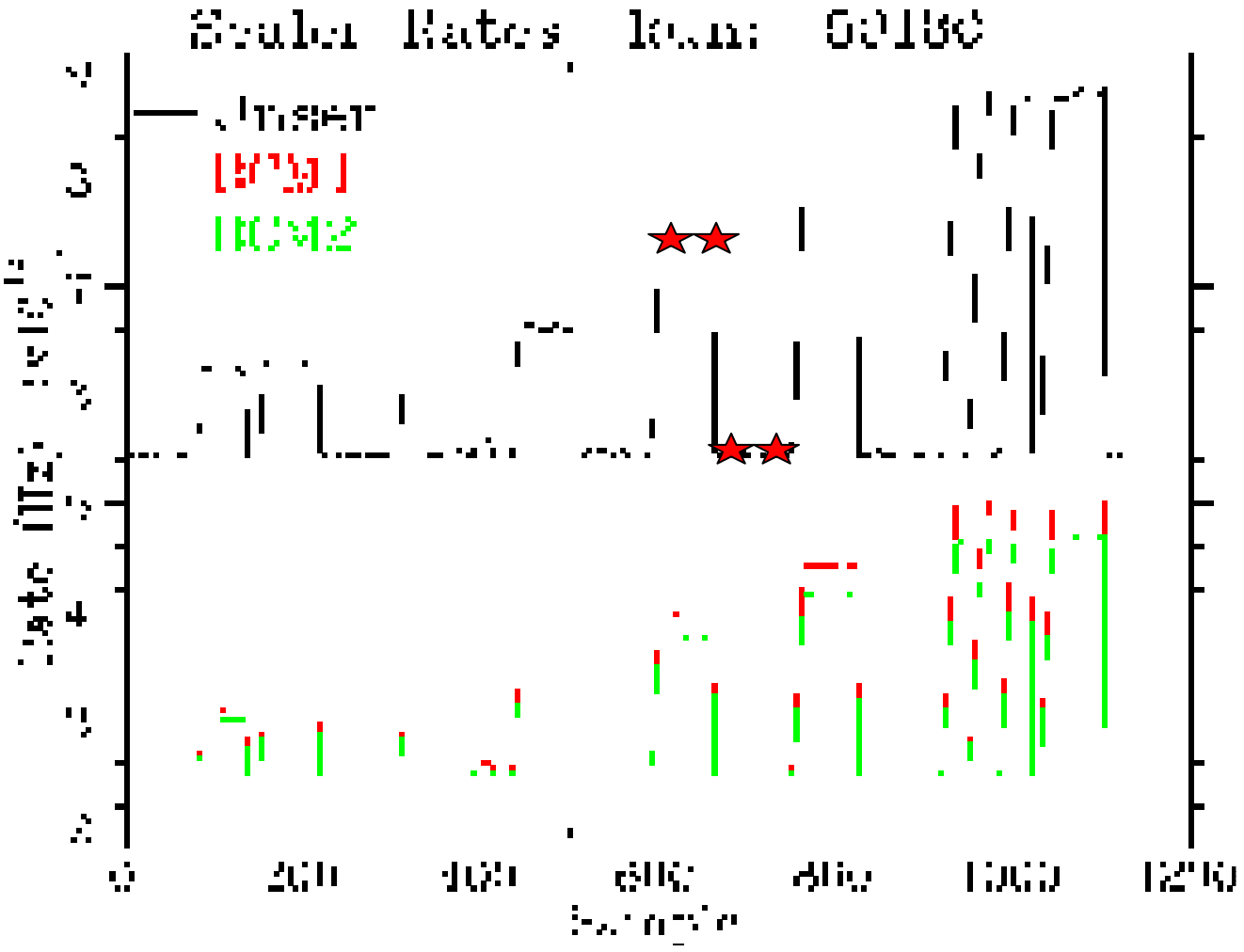
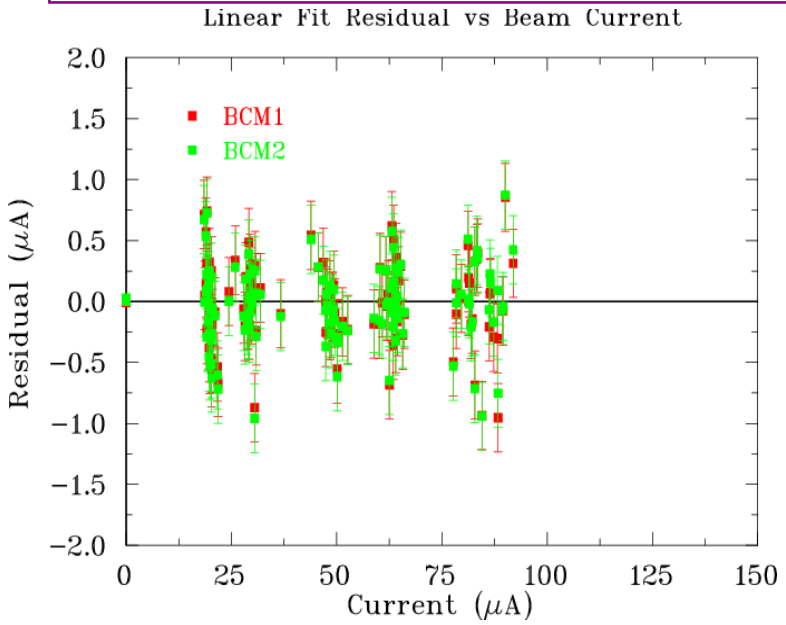
BCM Stability

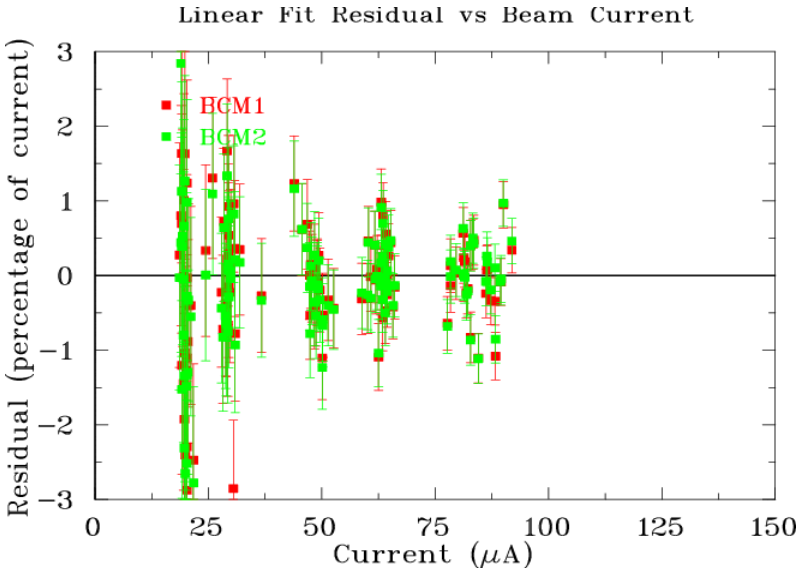


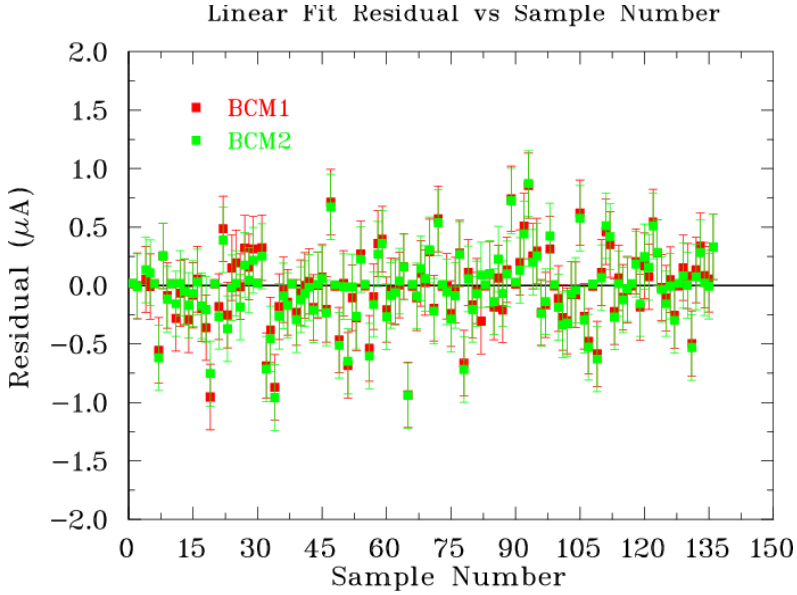
BCM Calibration Example

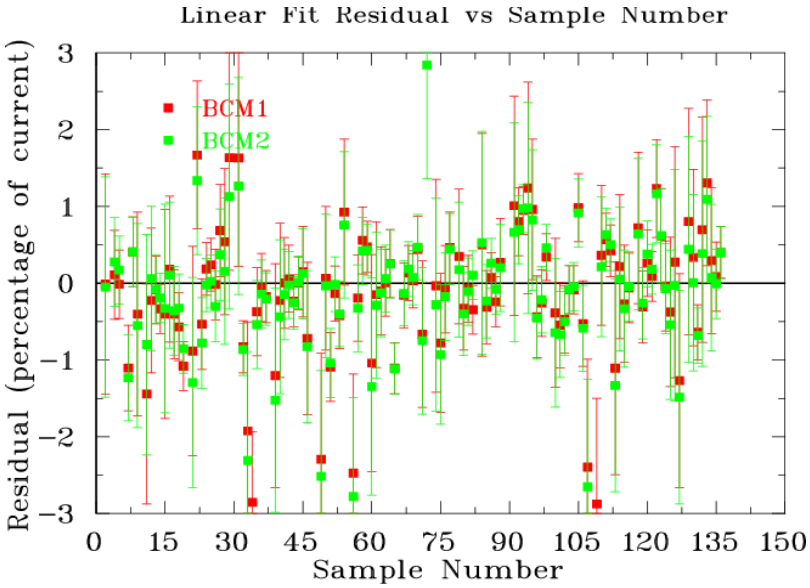


BCM Calibration 1.0

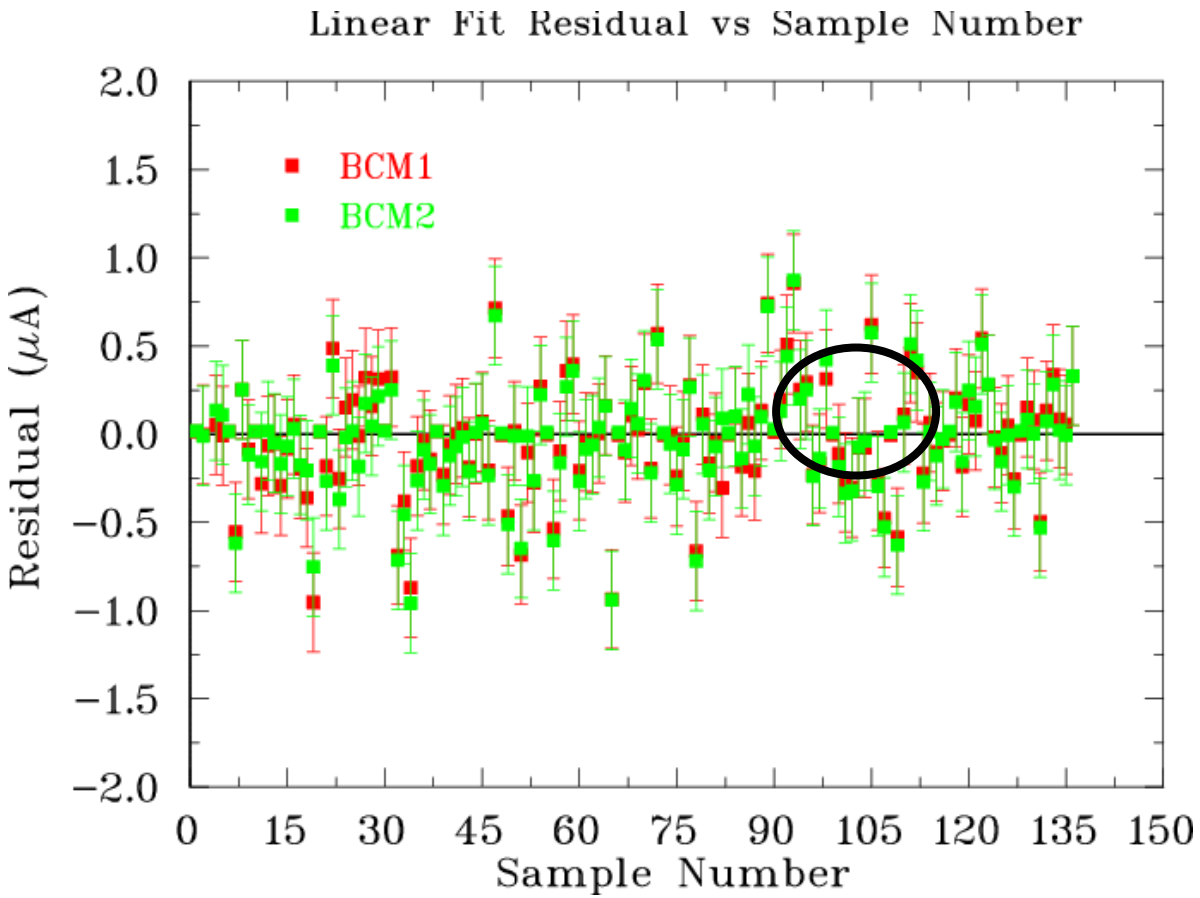








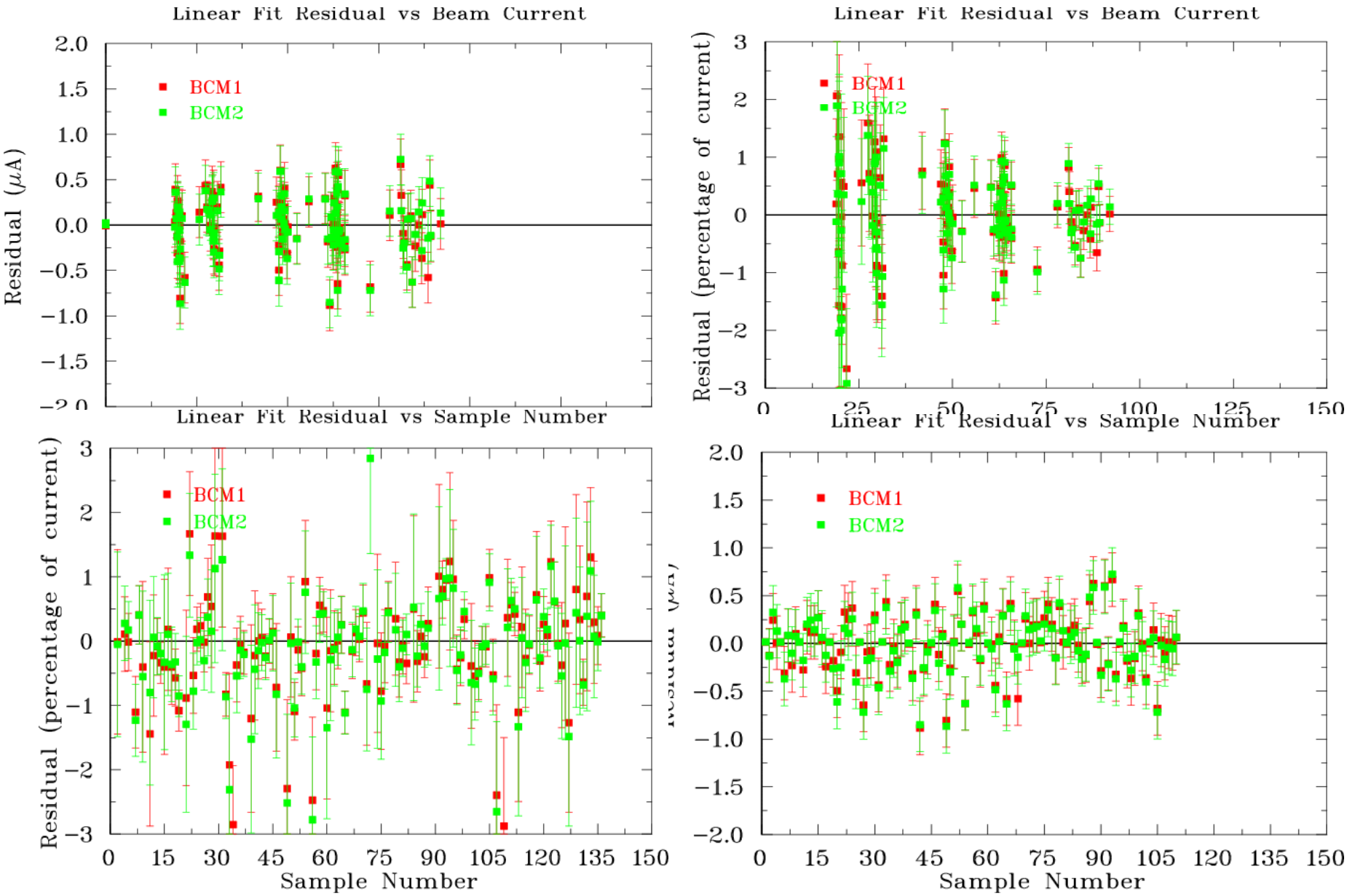
Possible Drifting of the UNSER zero



Ideally, instead of calculating an average UNSER zero for the whole calibration run, we should try to use a local zero.

First solution: choose an equal number of beam on and beam off periods, and use an “off” period that’s the closest to the “on” period as its zero.

BCM Calibration 2.0



BCM Calibration improvement

While there doesn't appear to be an unser zero drift anymore, or any other non-random scatter, the final calibration numbers hardly changed from the first attempt.

Gain factors for three cavity monitors (original)	**Gain factors for three cavity monitors (redone with #beam_offs=#beam_ons)**
gbcm1_gain = 0.00032889 ; microA/Hz gbcm2_gain = 0.00038301 ; microA/Hz zero offsets for BCM s gbcm1_offset = 250507. ; Hz gbcm2_offset = 250517. ; Hz	gbcm1_gain = 0.00032893 ; microA/Hz gbcm2_gain = 0.00038307 ; microA/Hz zero offsets for BCM s gbcm1_offset = 250510. ; Hz gbcm2_offset = 250522. ; Hz

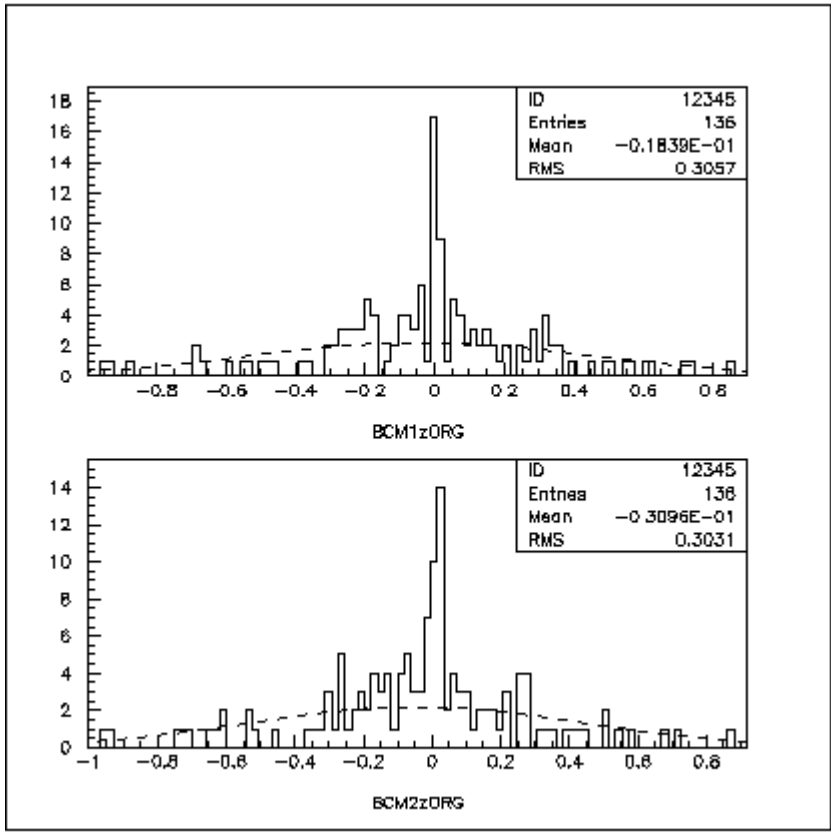
EXAMPLE: 454000 Hz for BCM2=~ 80uA

$BCM2_{orig}$=(454,000-50,517)*.0038301=77.936uA	$BCM2_{redone}$=(454,000-250,522)*.0038307=77.946uA

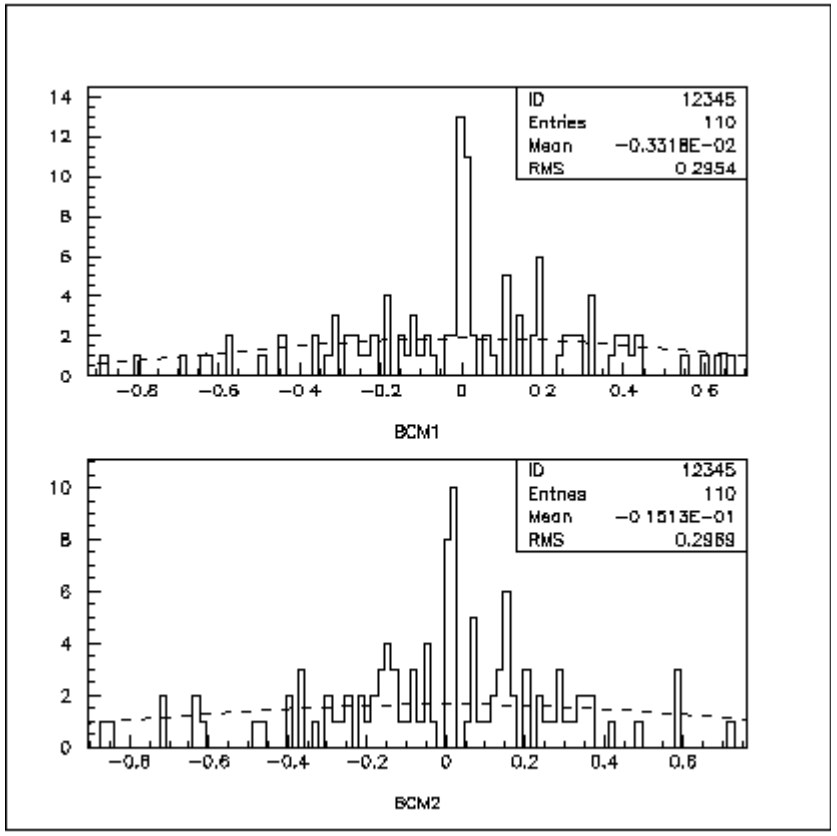
δBcm2=0.01%

BCM residuals comparison

Orignial calibration



Local zero calibration



No clustering or unusual distribution here, everything’s okay.

Summary

While some of the calibrations runs tend to be long (~2 hours) and the UNSER zero does drift during that time, the BCM calibration procedure does not yield very different results with the use of local UNSER zeroes.