Sensitivity Studies

Estimation of Possible Systematic Error in Zero Offset Trials

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October 1, 2014

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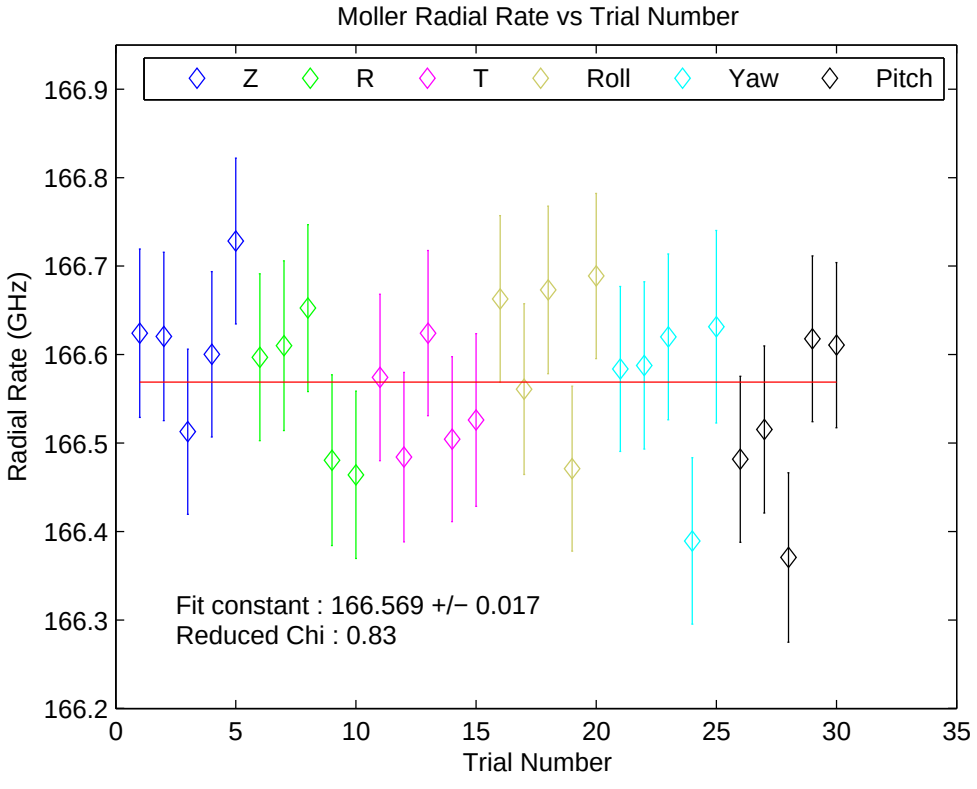
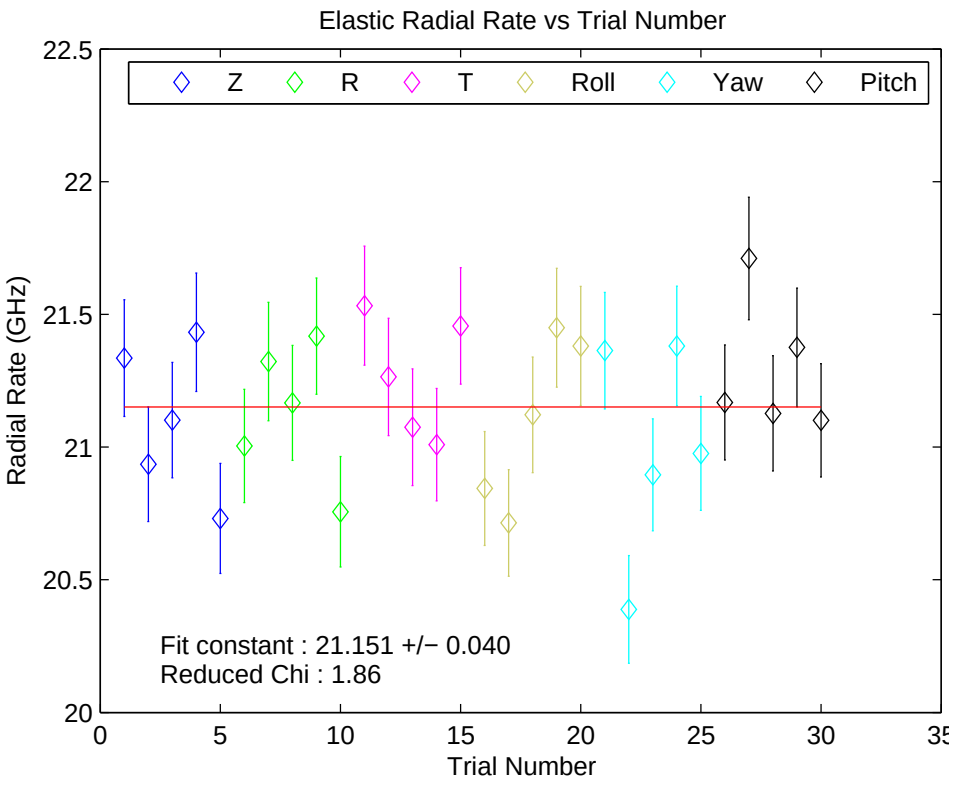
Introduction

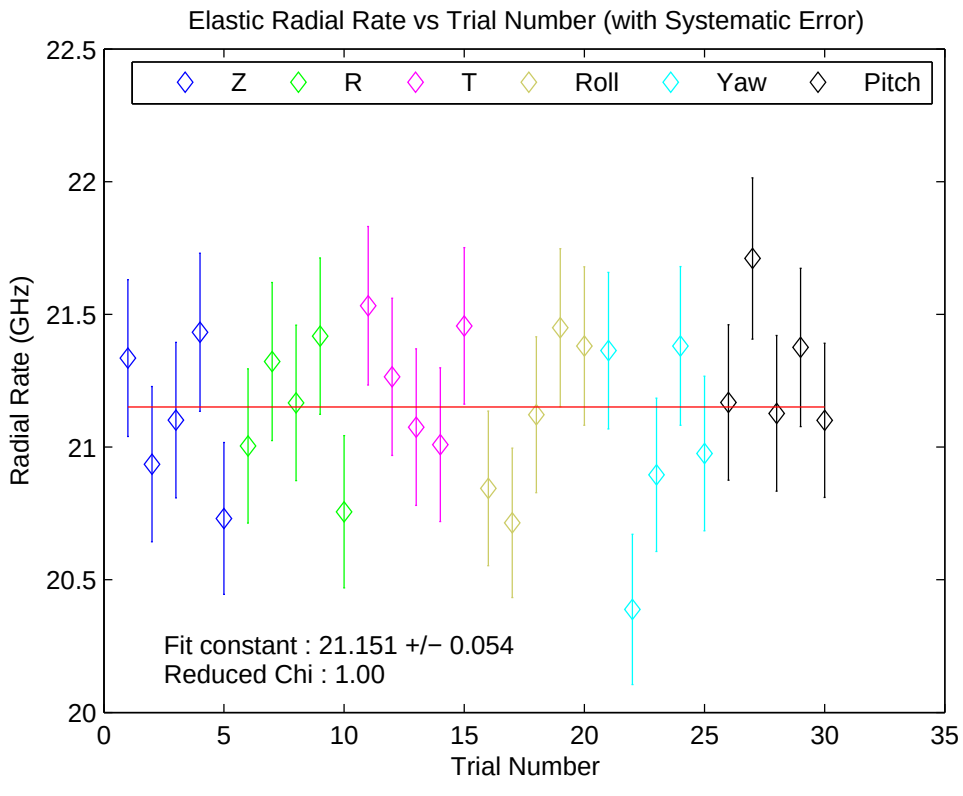
- **Sensitivity Studies :** Variation in Remoll results with respect to Z, R, Theta, Roll, Pitch and Yaw offset of a single coil of the spectrometer.
- Some trials indicated that the propagated error might be underestimated.
- 5 trials each consisting of 10 million events was run per offset type for zero offset.
- The obtained results were fitted with a constant and the reduced chi squared χ_0^2 was calculated.
- A constant additional error was added in quadrature to the propagated error to make $\chi_0^2 = 1$ where it was > 1.

Moller Radial Rate

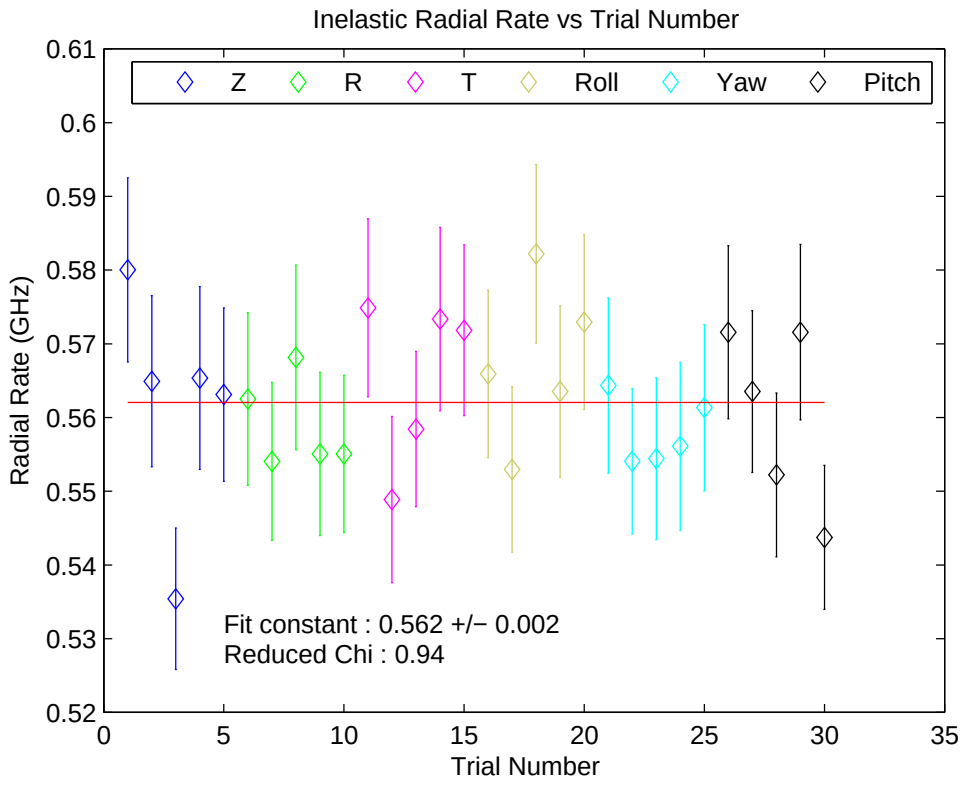


Elastic Radial Rate

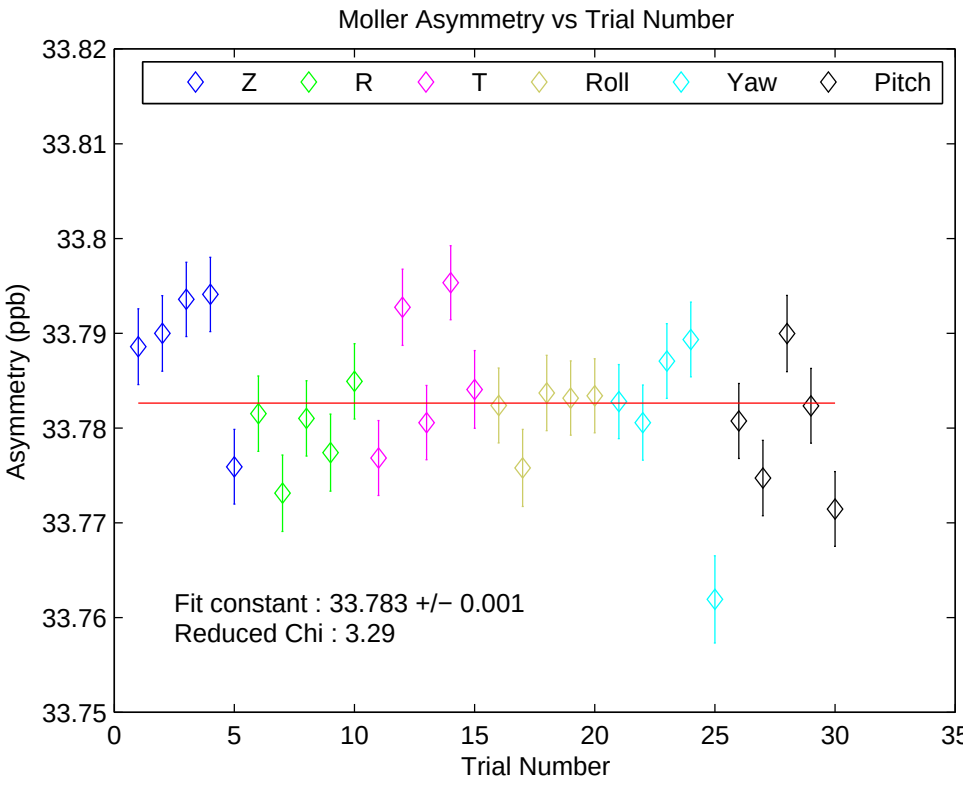


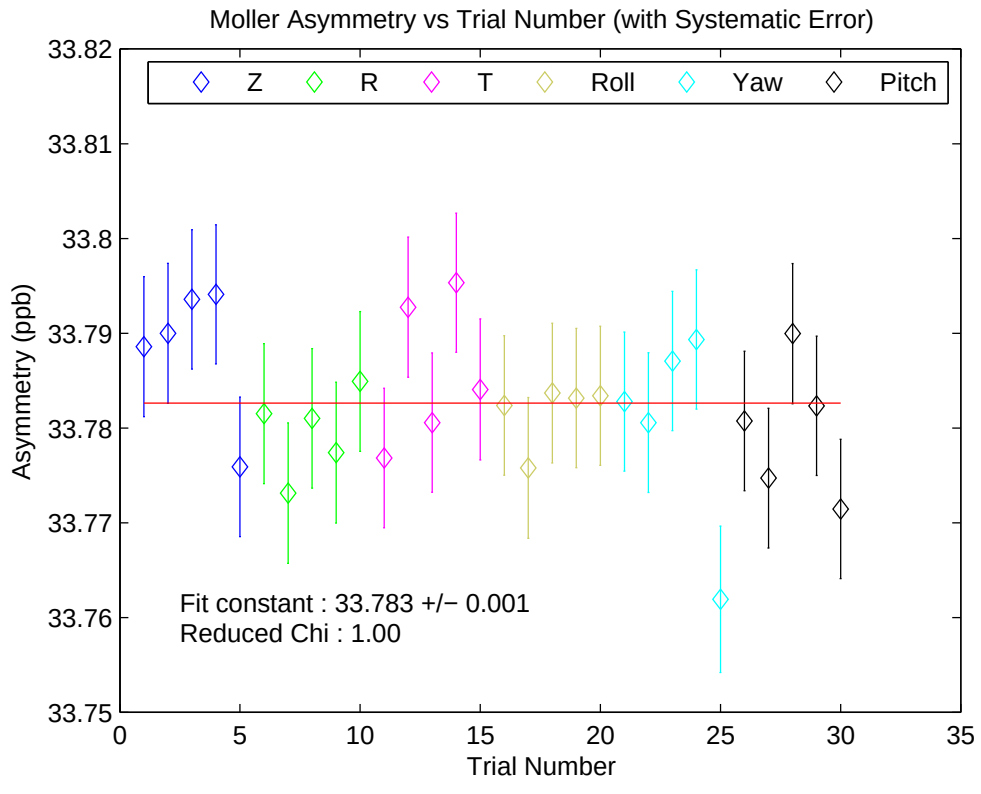


Inelastic Radial Rate

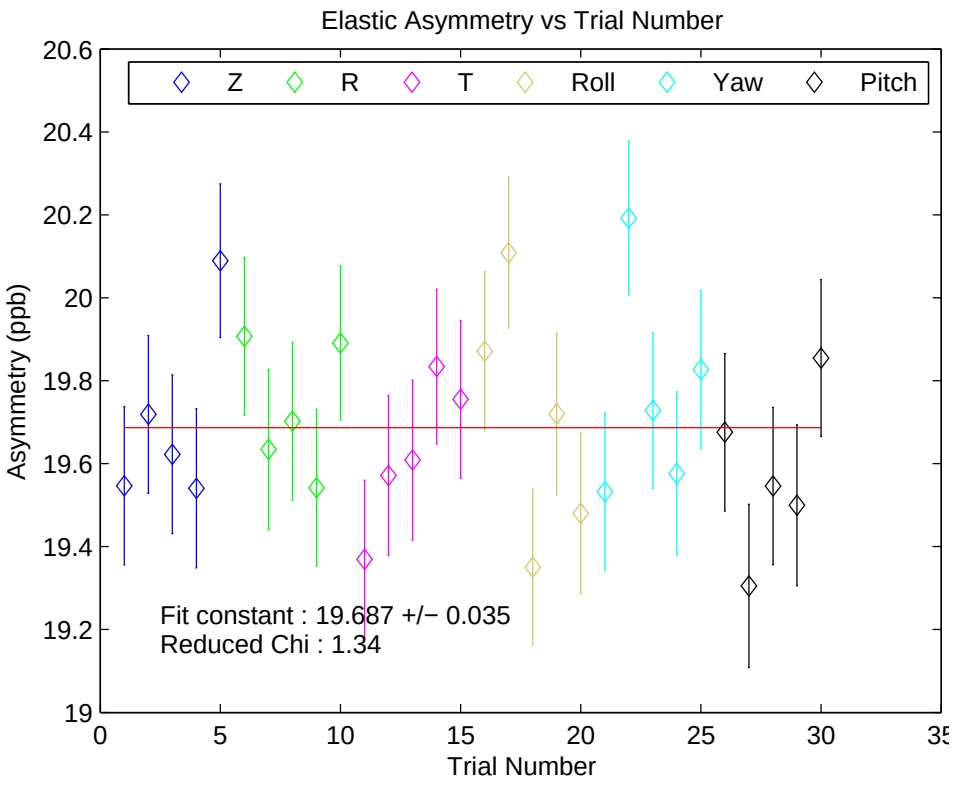


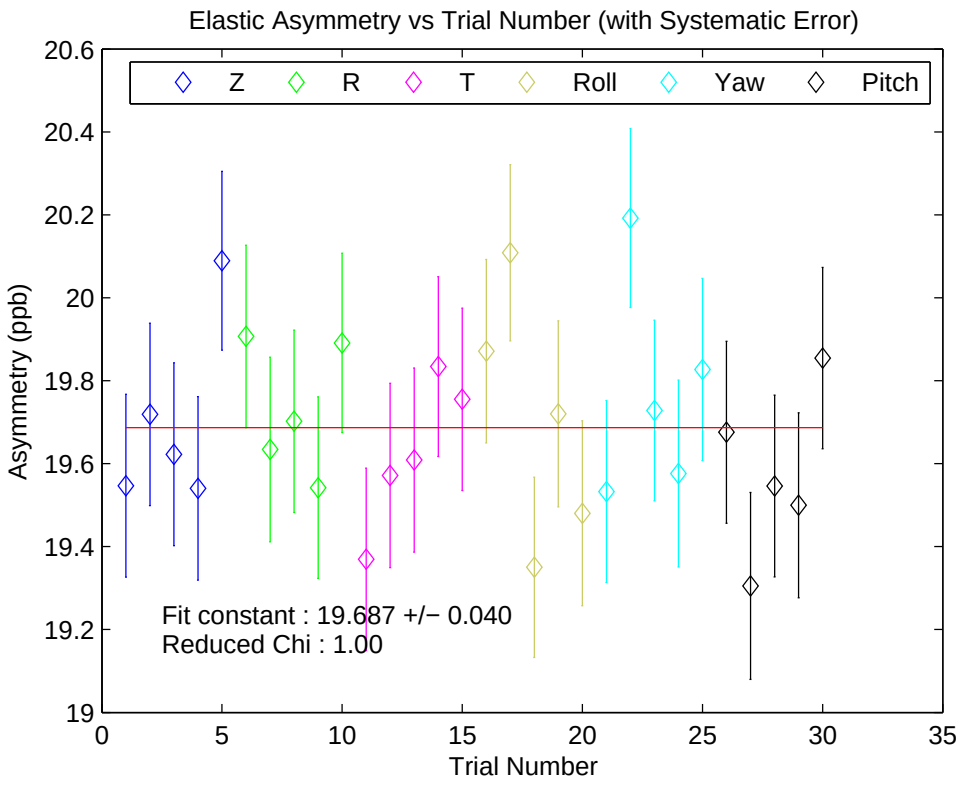
Moller Asymmetry



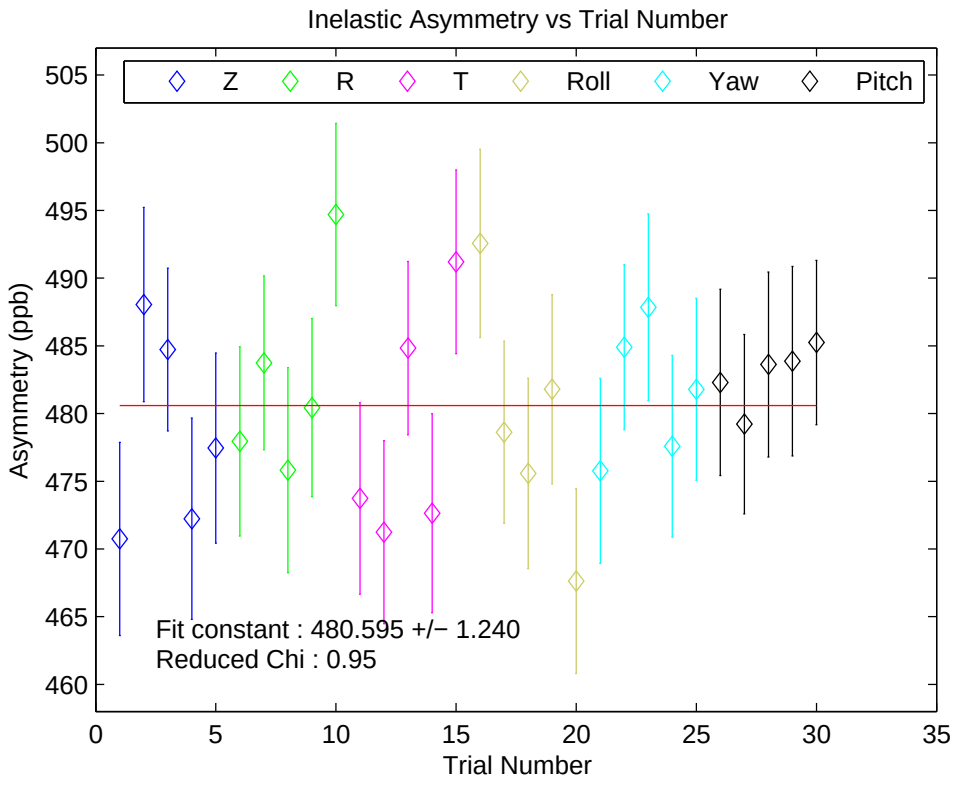


Elastic Asymmetry

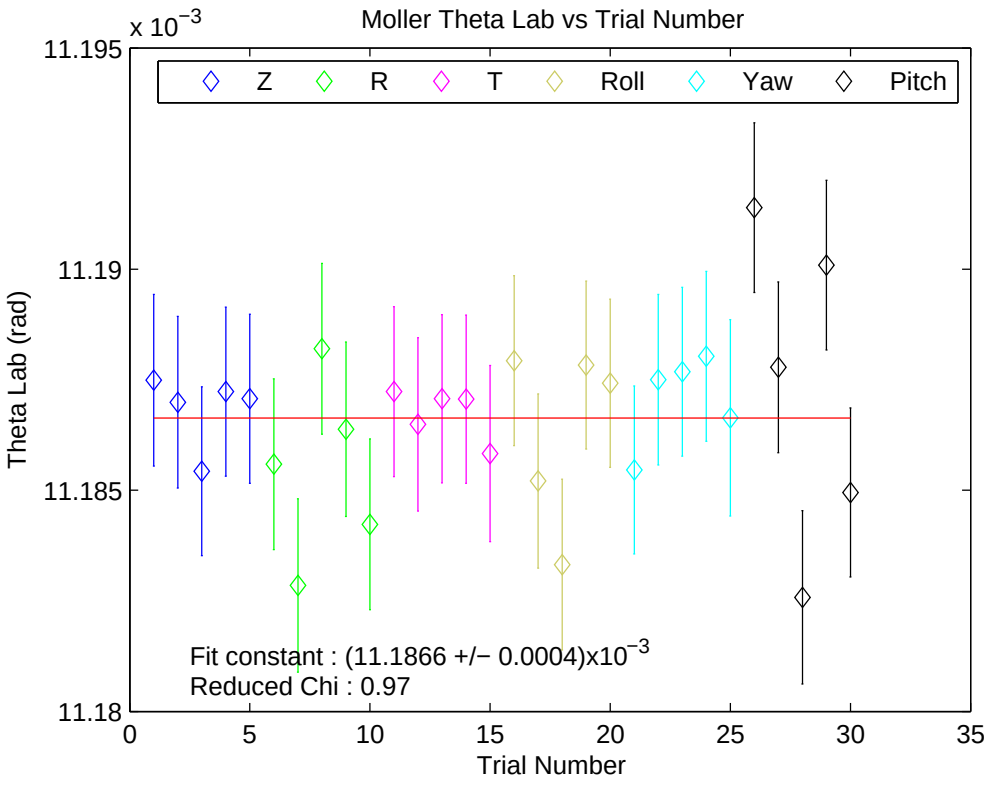




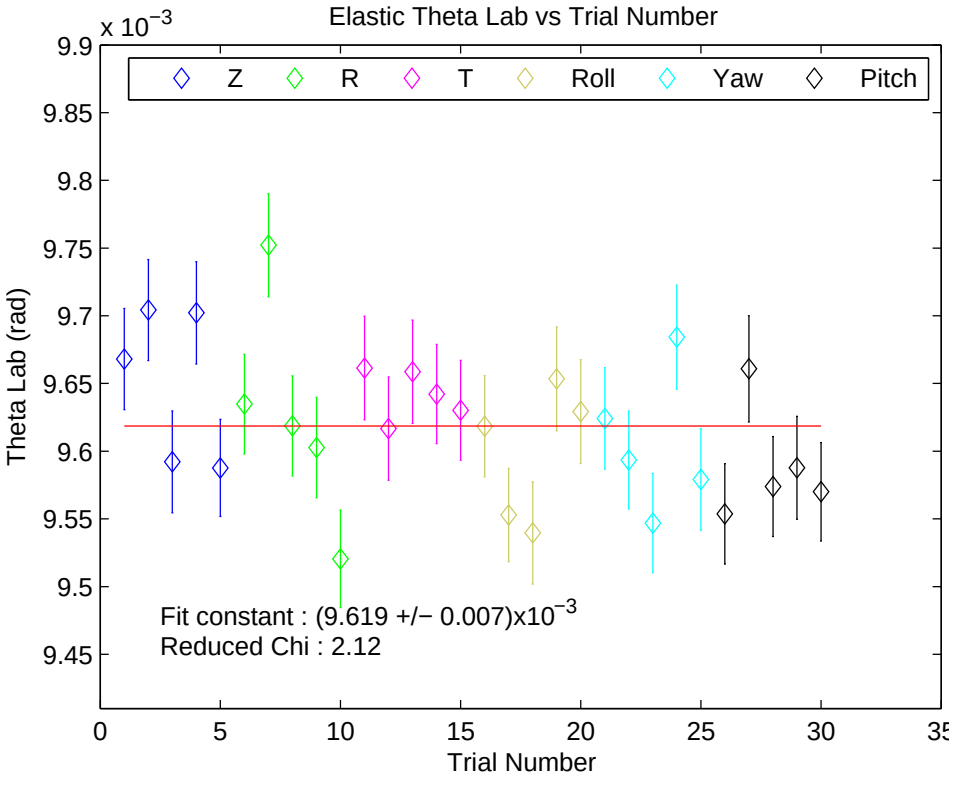
Inelastic Asymmetry

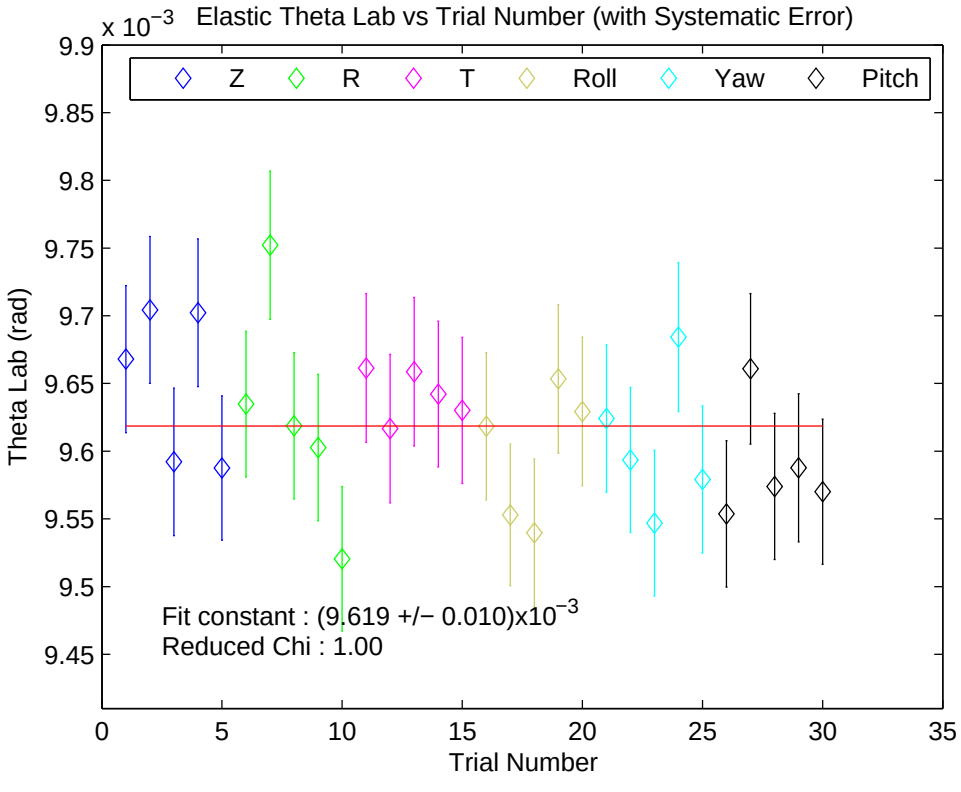


Moller Theta Lab

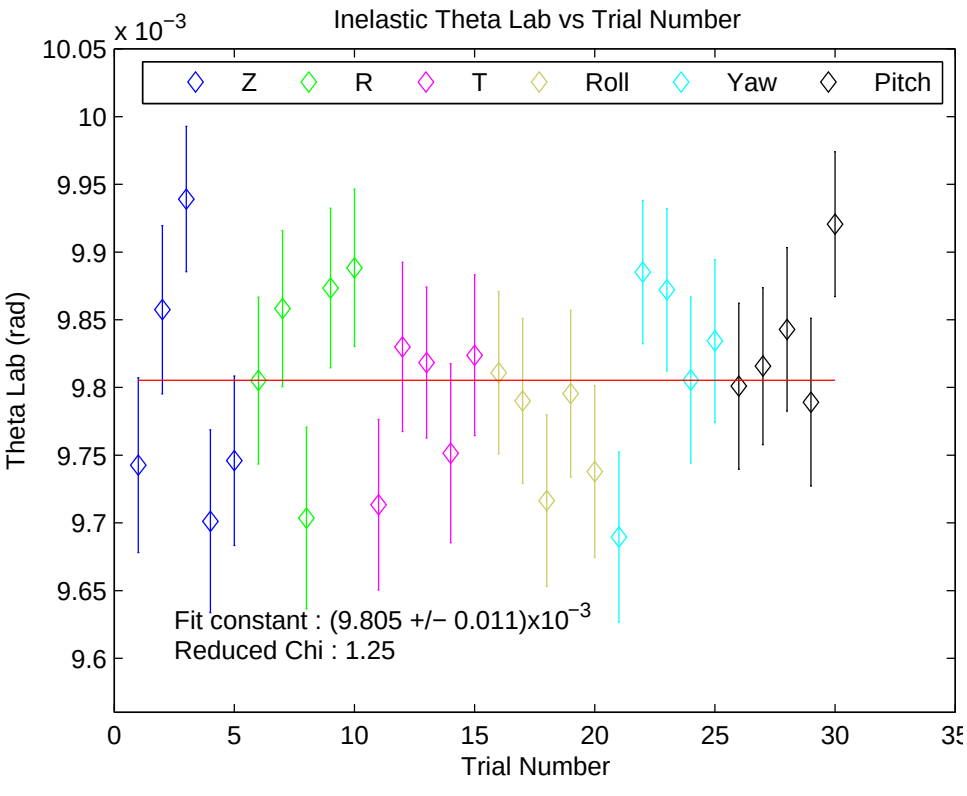


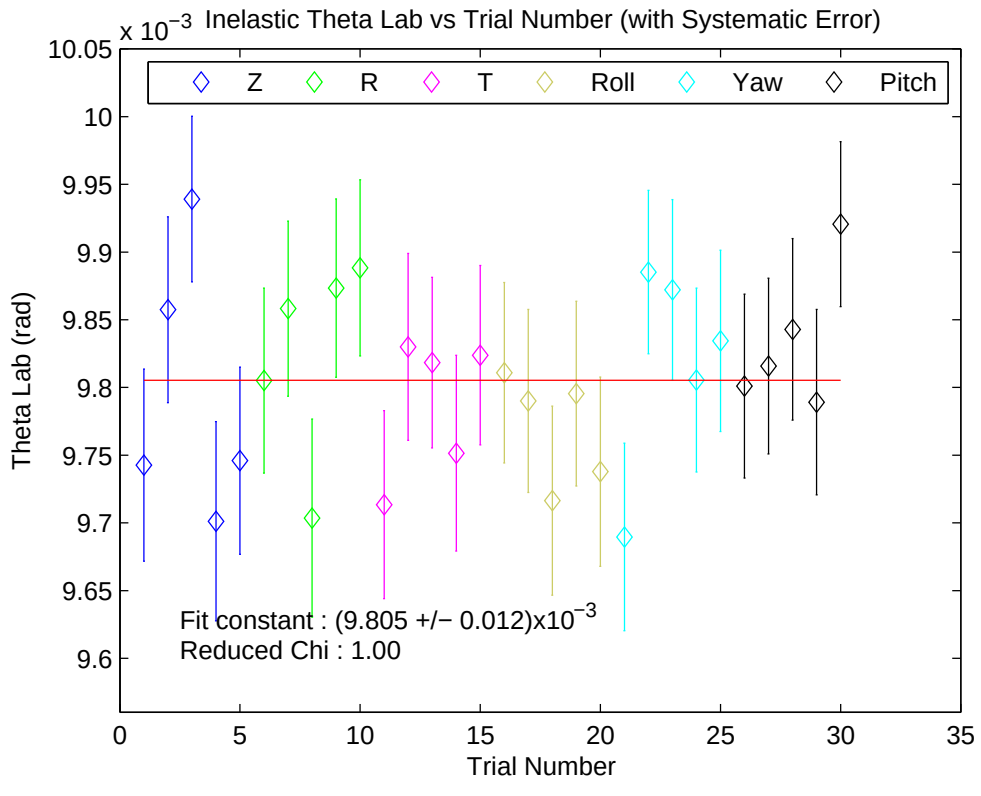
Elastic Theta Lab



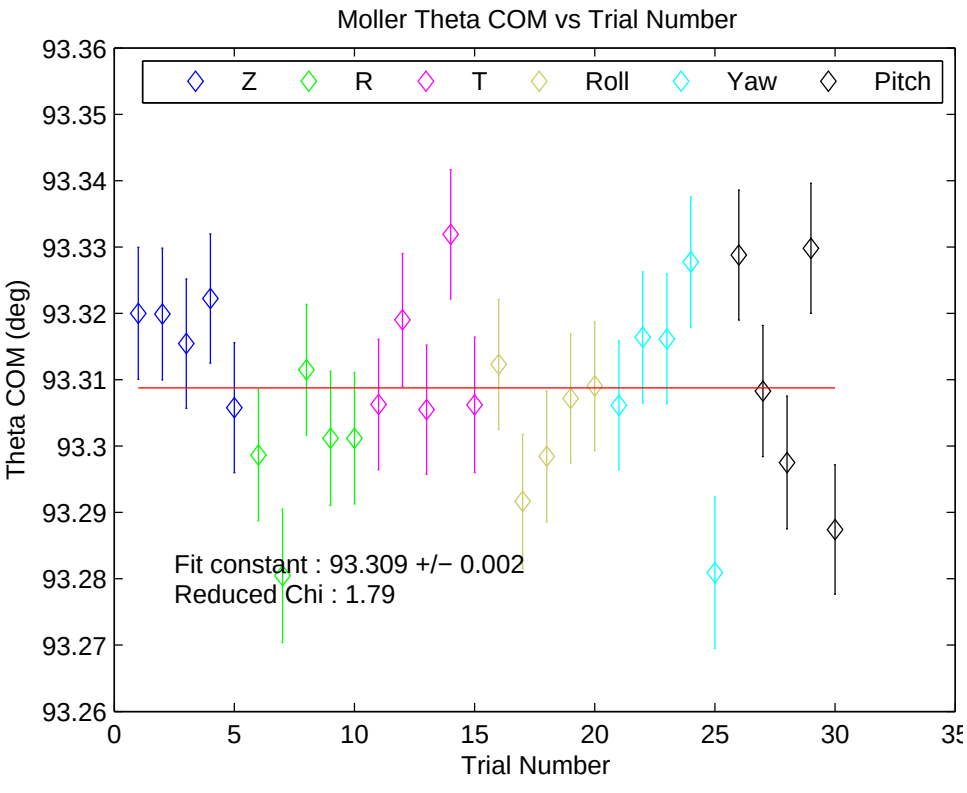


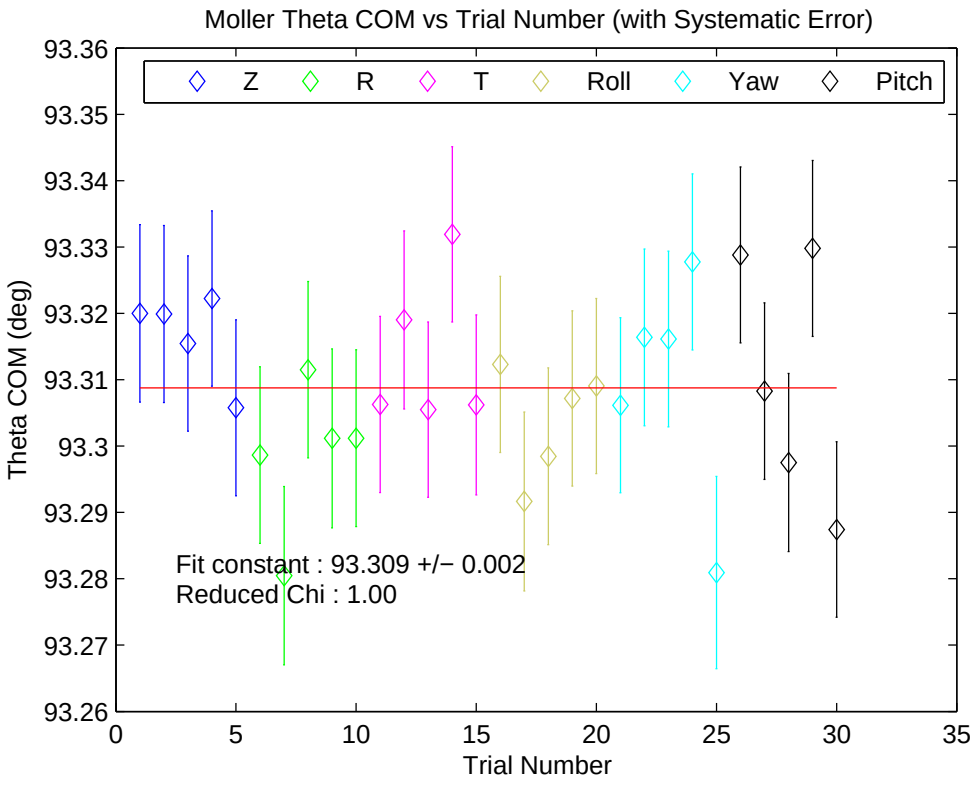
Inelastic Theta Lab





Theta Com


Moller Theta COM vs Trial Number
Z
R
T
Roll
Yaw
Pitch
Theta COM (deg)
Trial Number
Fit constant : 93.309 +/− 0.002
Reduced Chi : 1.79


Moller Theta COM vs Trial Number (with Systematic Error)
Z
R
T
Roll
Yaw
Pitch
Theta COM (deg)
Trial Number
Fit constant : 93.309 +/− 0.002
Reduced Chi : 1.00

Estimated Systematic Error

Type	Average Propagated Error, P.E.	Estimated Systematic Error, S.E.	$\frac{S.E.}{P.E.}$
Moller Radial Rate (GHz)	0.0949	0	0
Elastic Radial Rate (GHz)	0.2173	0.1970	0.9
Inelastic Radial Rate (GHz)	0.0114	0	0
Moller Asymmetry (ppb)	0.0040	0.0062	1.6
Elastic Asymmetry (ppb)	0.1904	0.1101	0.6
Inelastic Asymmetry (ppb)	6.8197	0	0
Moller Theta Lab (rad)	0.000002	0	0
Elastic Theta Lab (rad)	0.000037	0.000039	1.1
Inelastic Theta Lab (rad)	0.000068	0.000029	0.4
Moller Theta COM (deg)	0.0099	0.0089	0.9