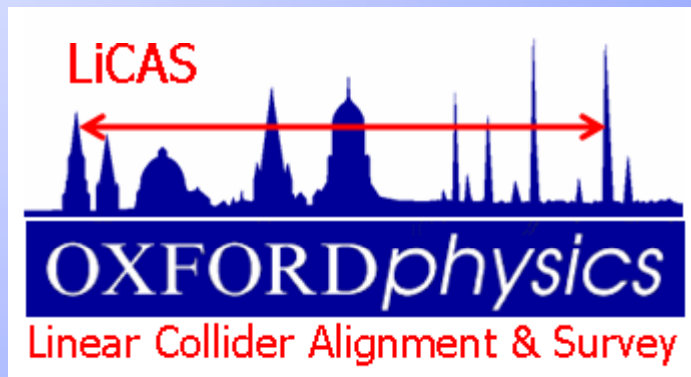


The LiCAS FSI Subsystem Current Status and Initial Measurements

John Dale for the LiCAS Collaboration
IOP HEP April 2008



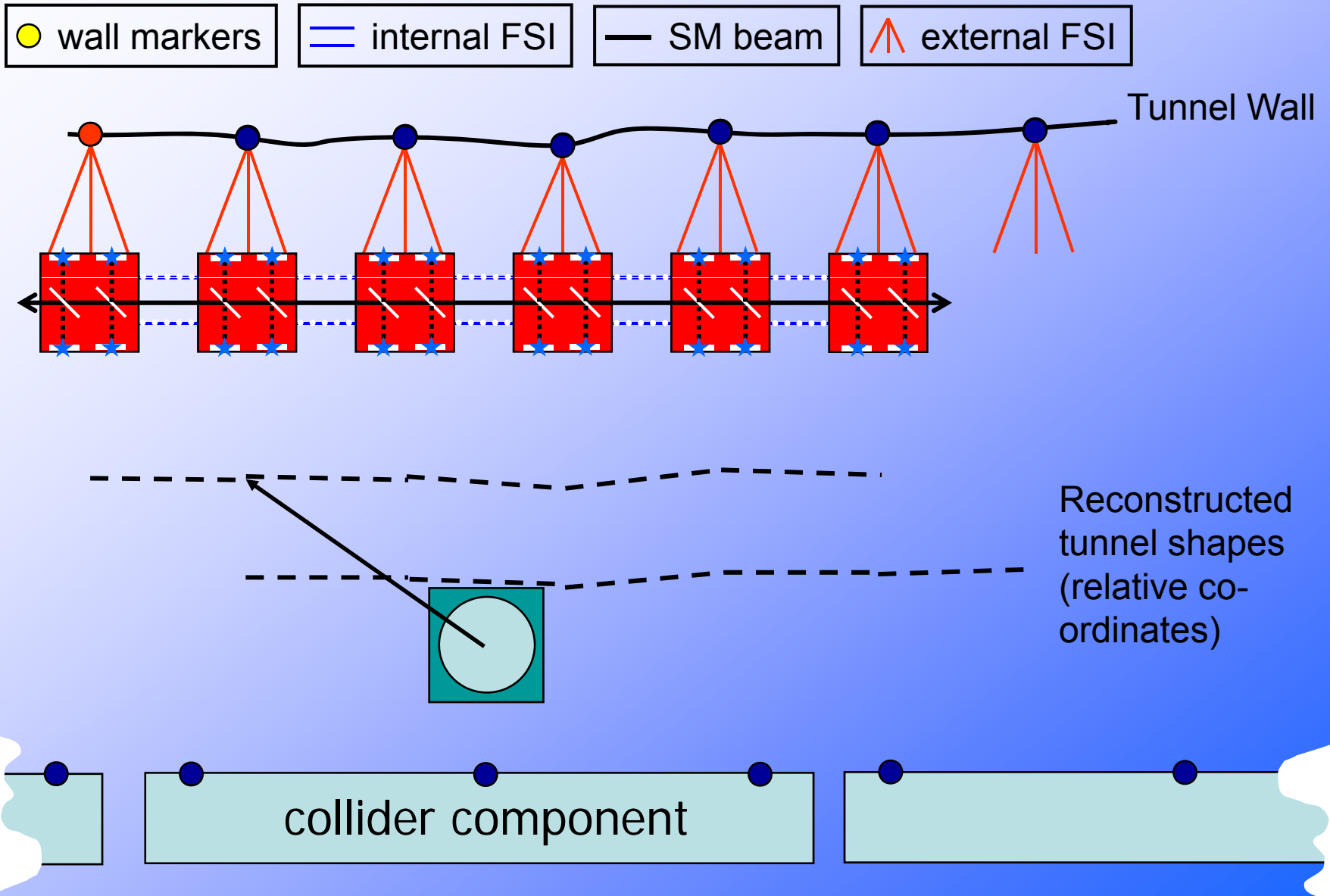
Introduction

- ILC Alignment Requirements
- Linear Collider Alignment and Survey (LiCAS) Rapid Tunnel Reference Surveyor (RTRS)
 - concept
 - prototype current status
- External and Internal FSI Subsystems
 - Frequency Scanning Interferometry (FSI)
 - Concept/design
 - Precision measurements

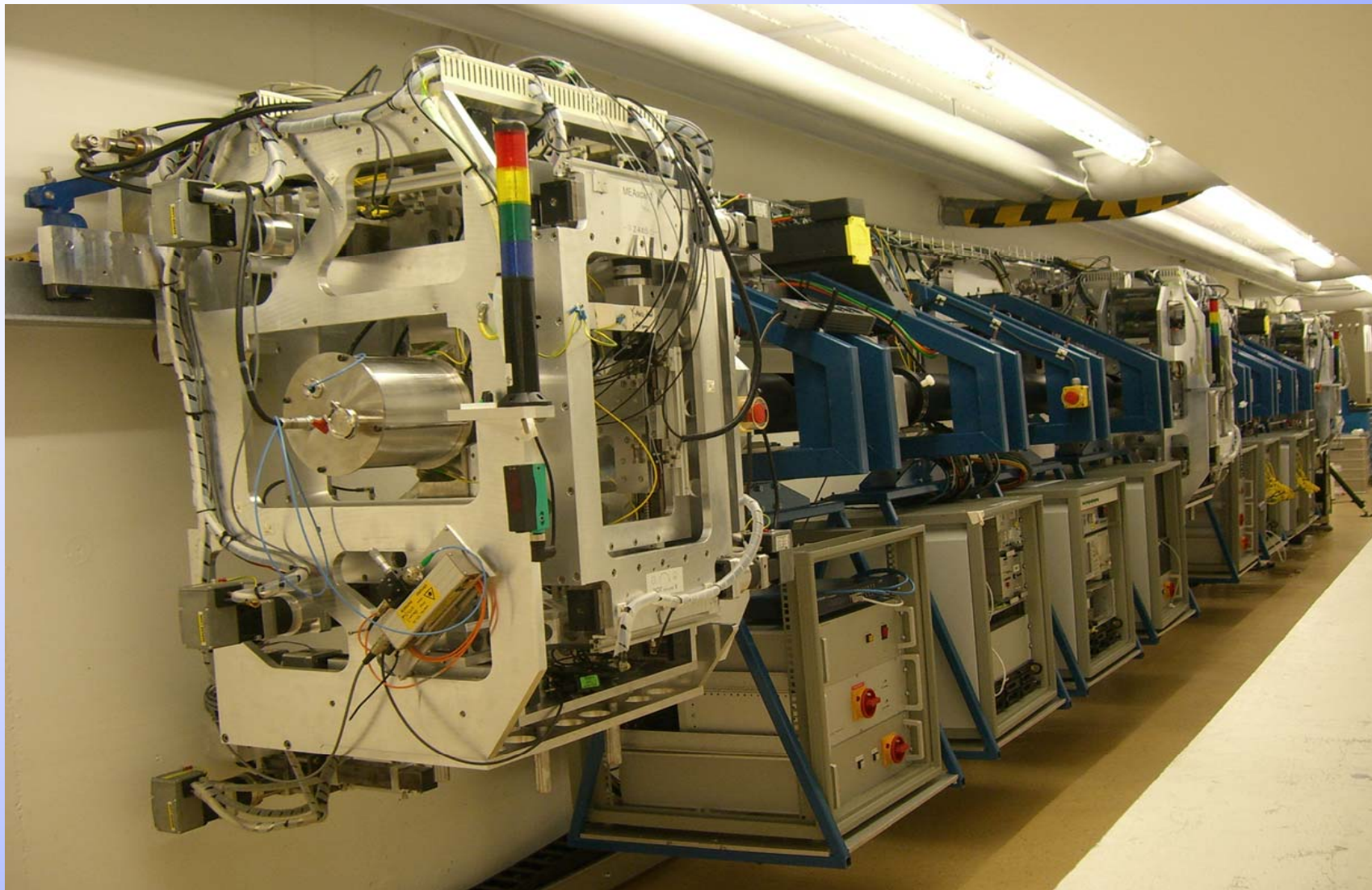
ILC Alignment Requirements

- Alignment of the ILC effects collider luminosity
- Main Linac has ~30km tunnel to survey
- Needs to be surveyed quickly and effectively
 - Reduce down time
 - Reduce labour cost
- Required Accuracy
 - 200 μm over 600m vertically (a betatron wavelength)
 - 500 μm over 600m horizontally
- Difficult using conventional surveying techniques

LiCAS RTRS Concept

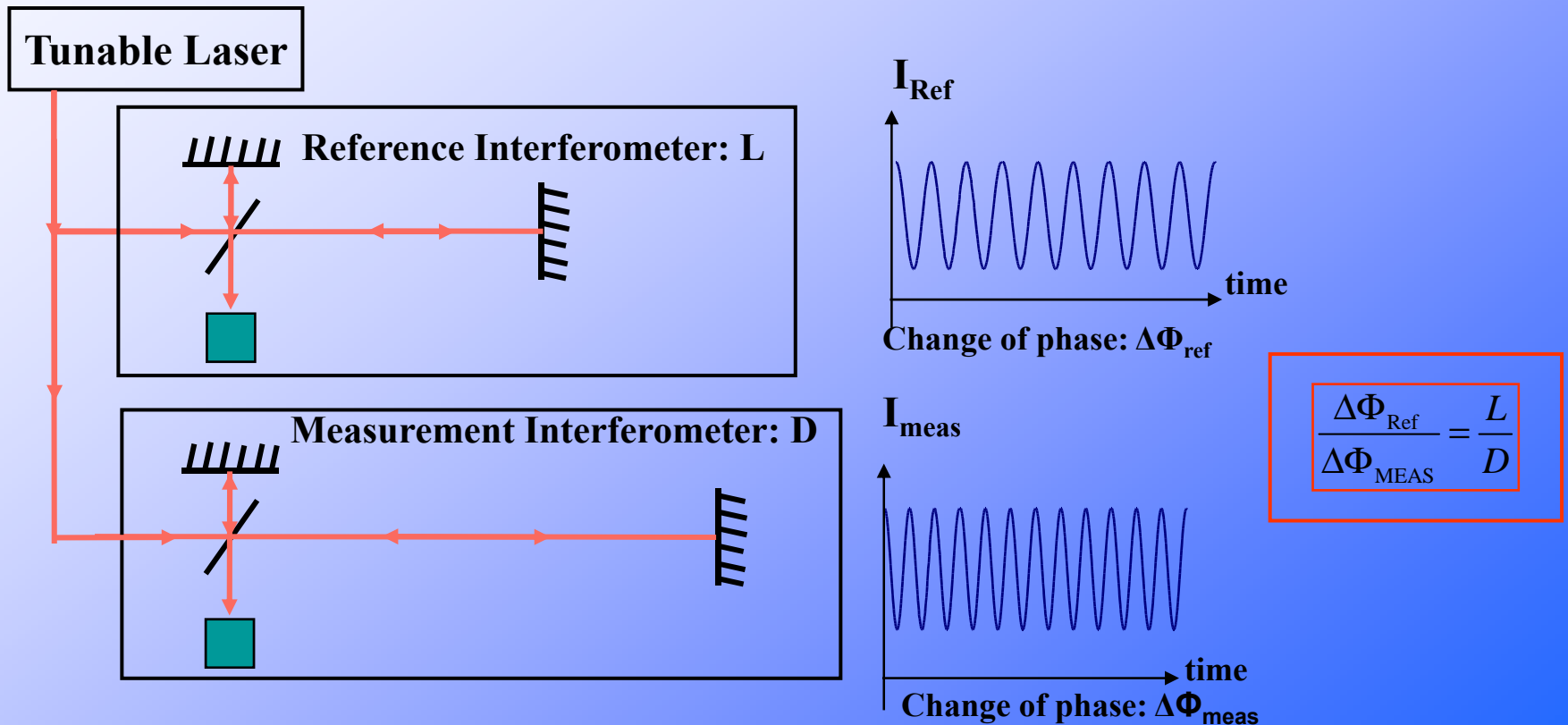


LiCAS RTRS Prototype Current Status

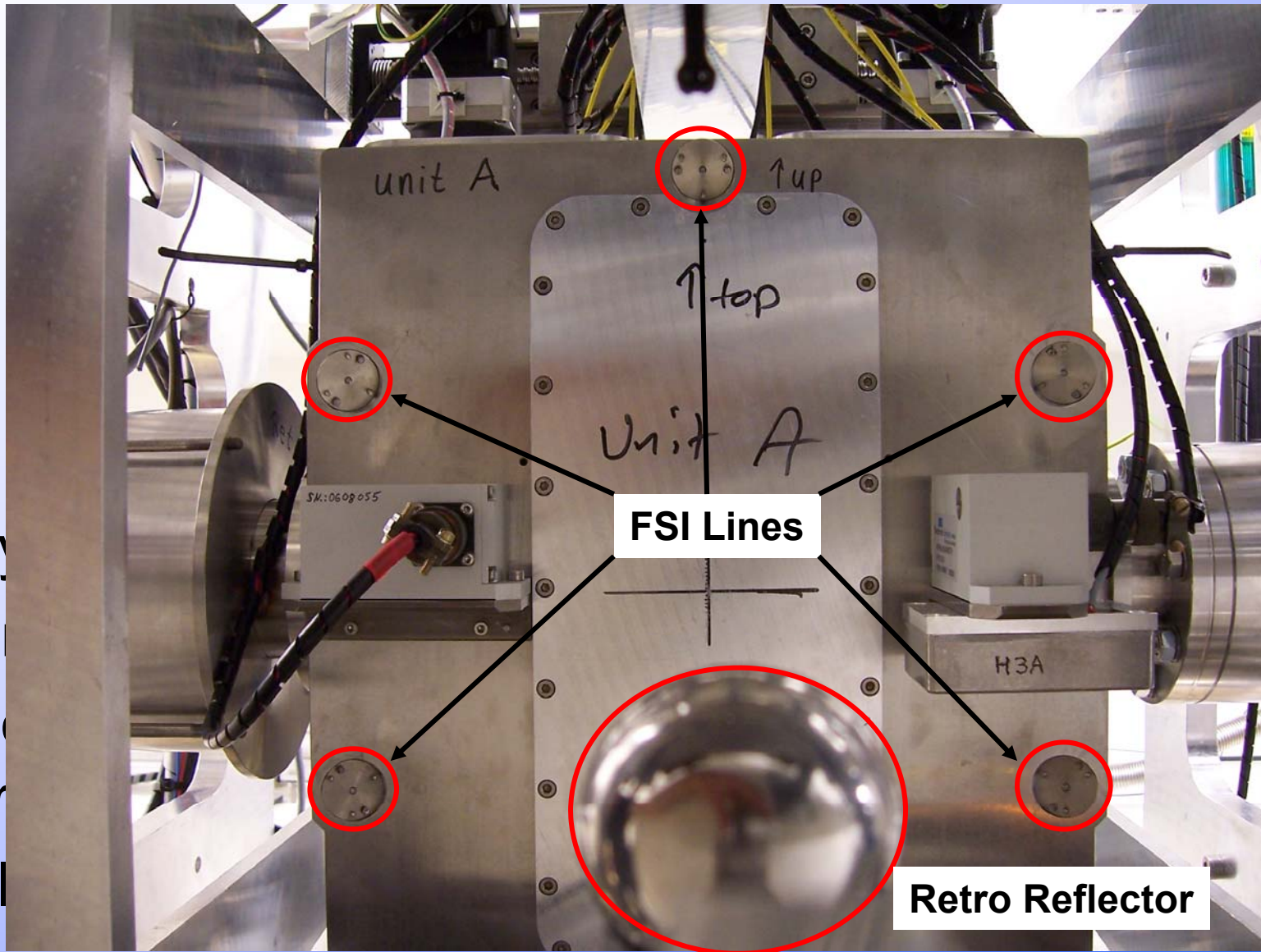


Frequency Scanning Interferometry

- Idea is adapted from the Michelson interferometer
- Instead of moving the mirror we change the frequency of the laser

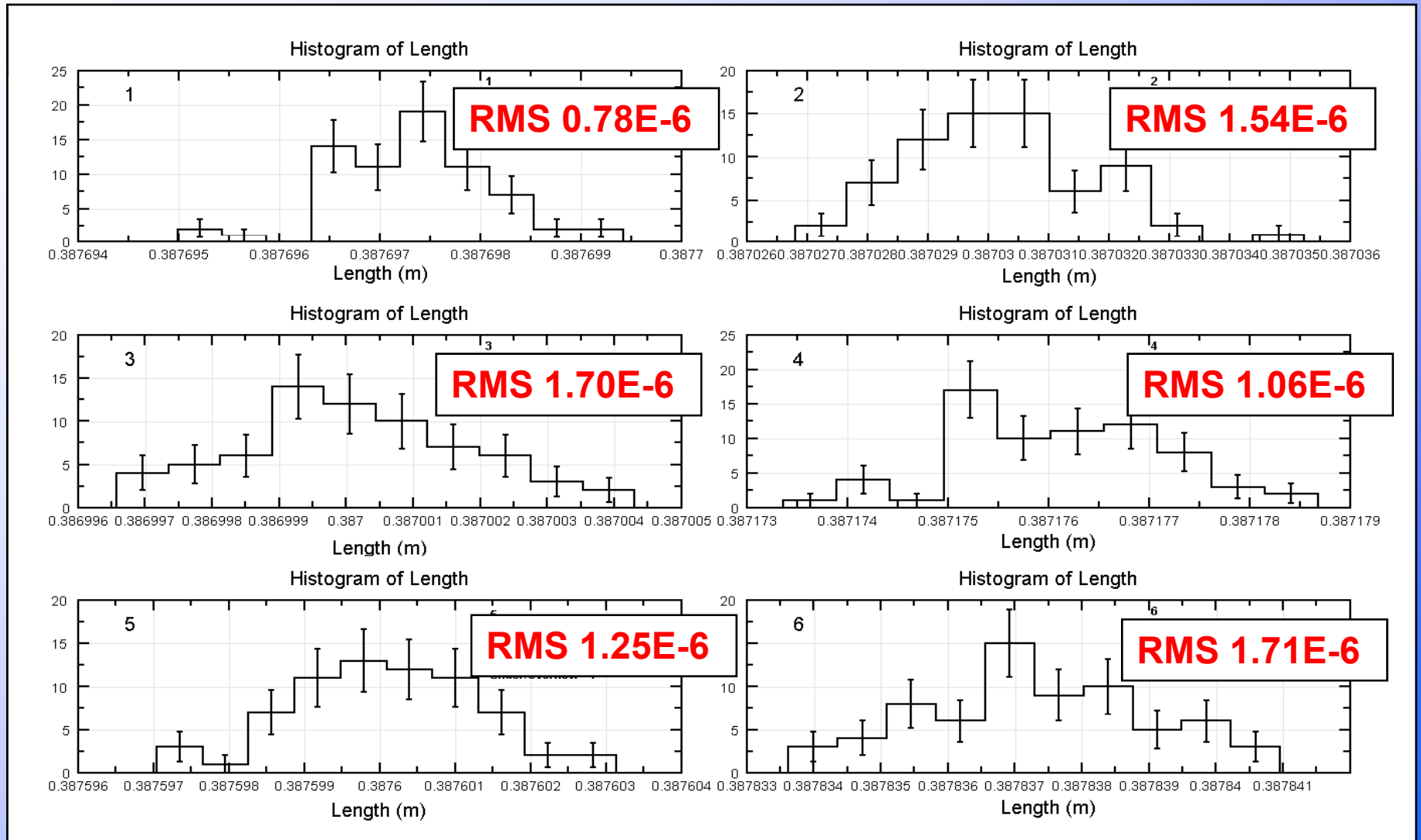


External FSI Sub-System

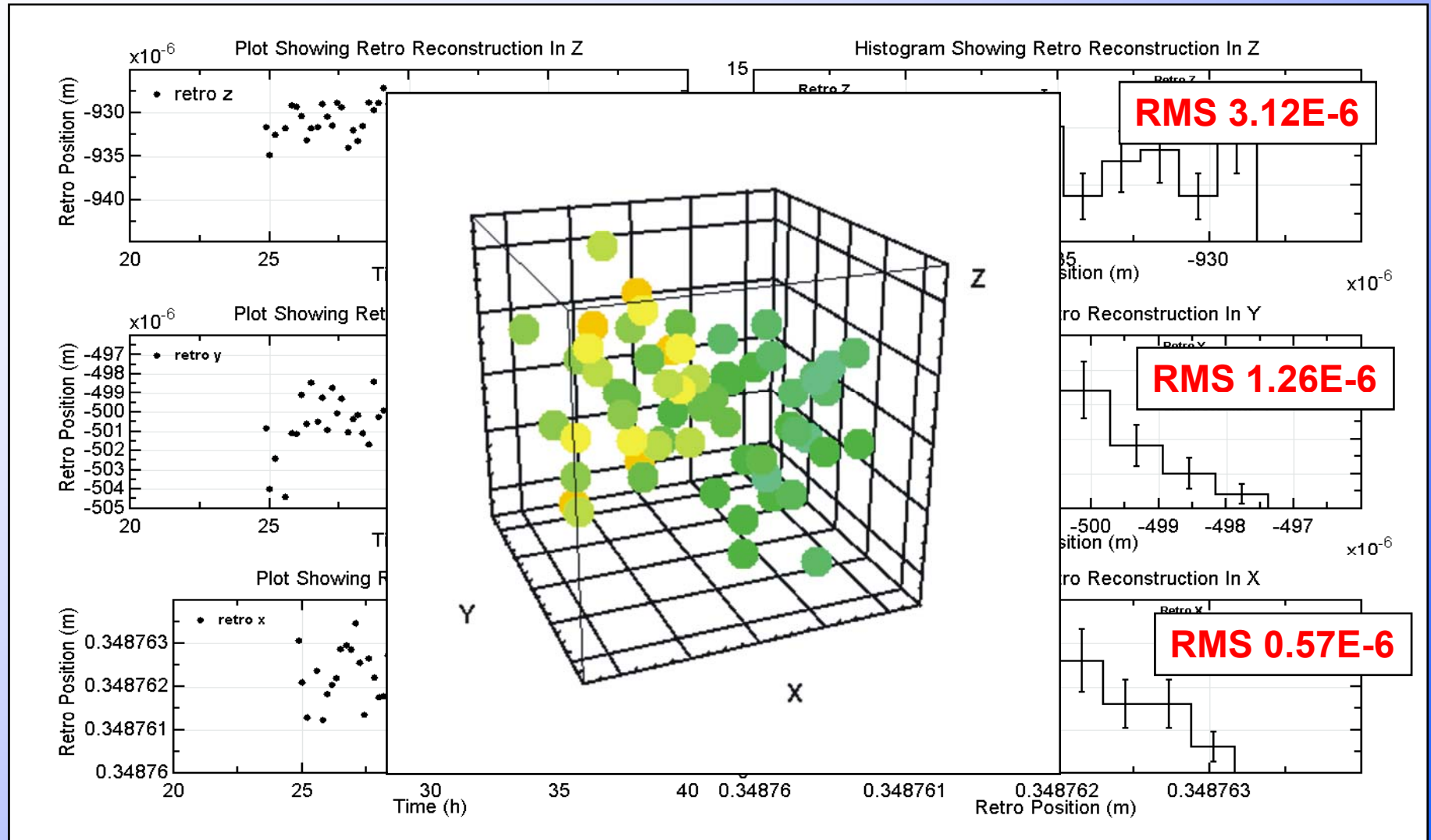


- SY
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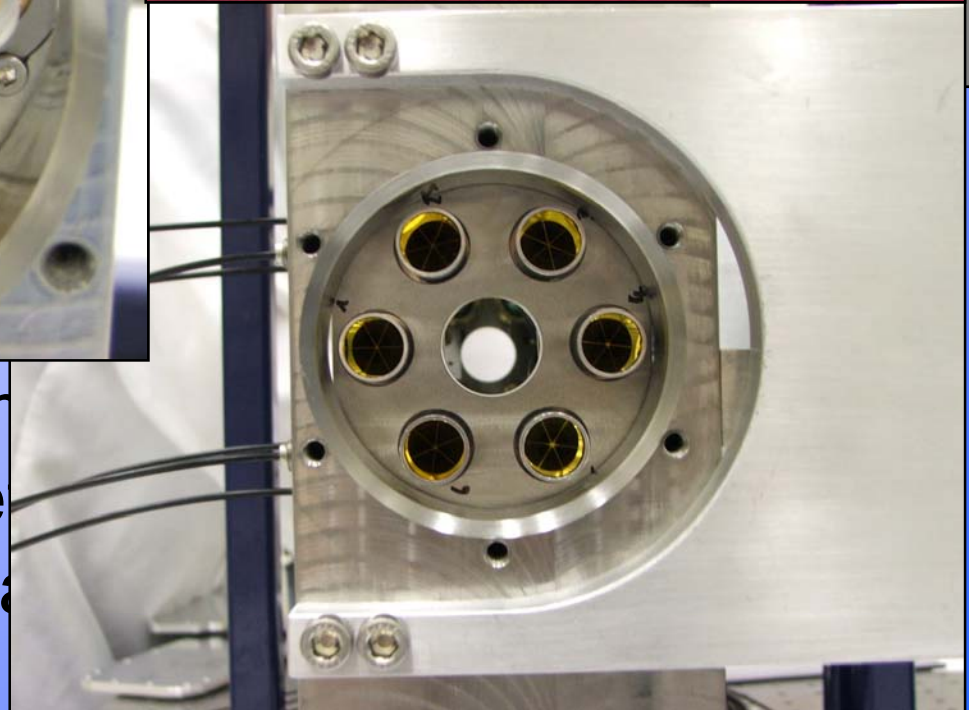
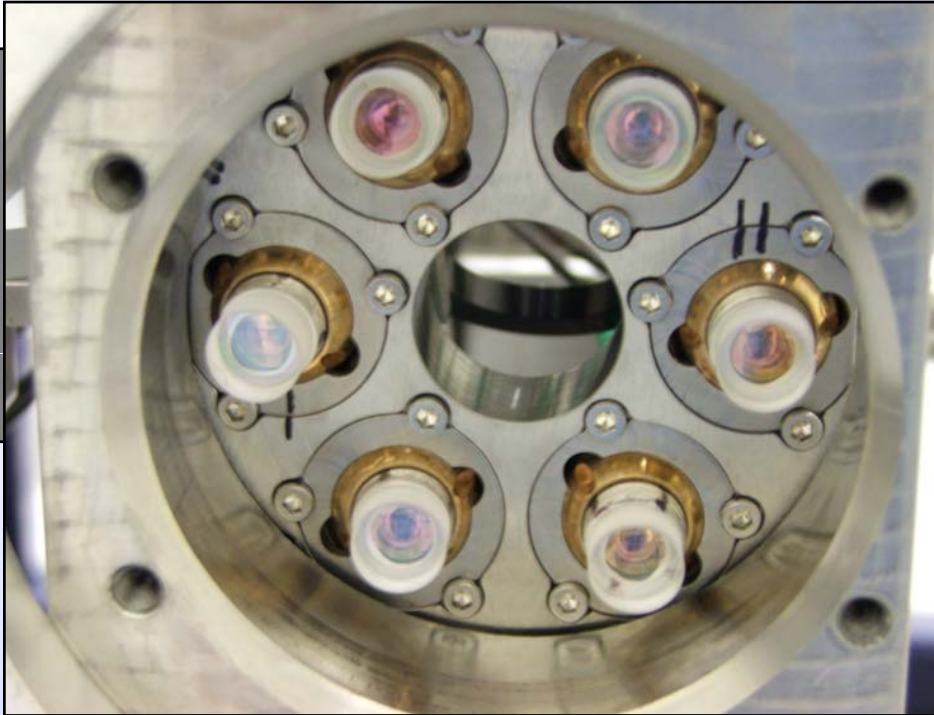
Initial Stability of External FSI Sub-System



External Marker Reconstruction Using External FSI Lines

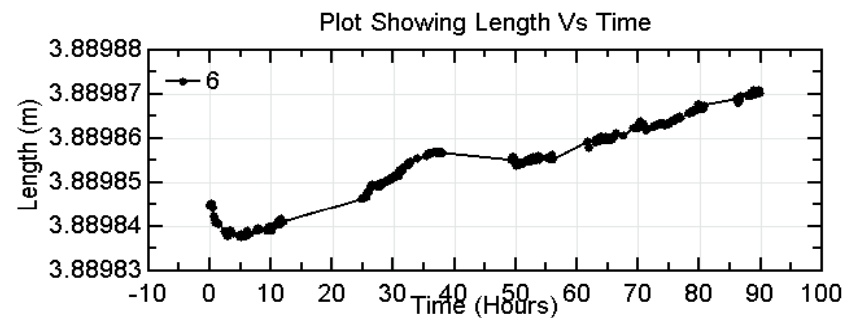
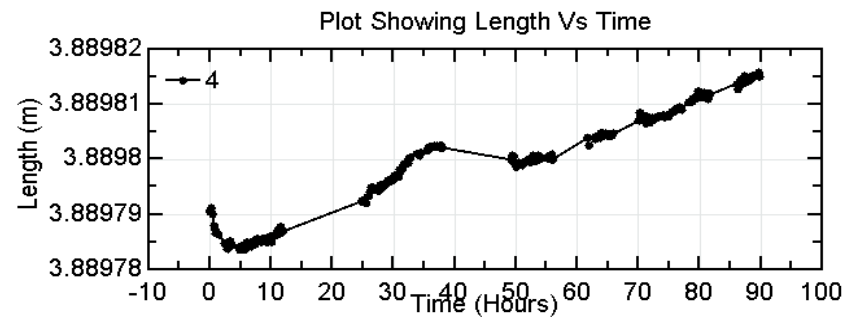
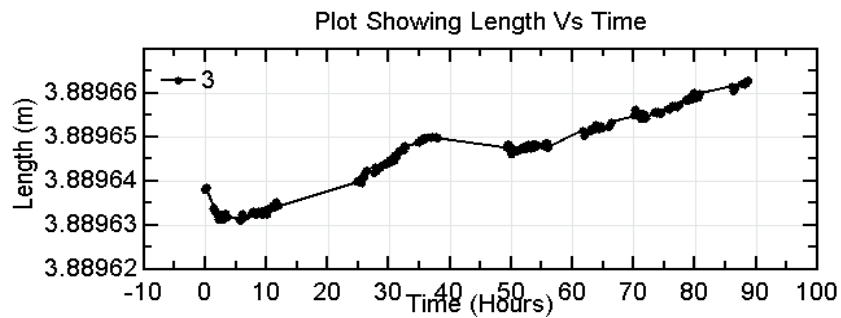
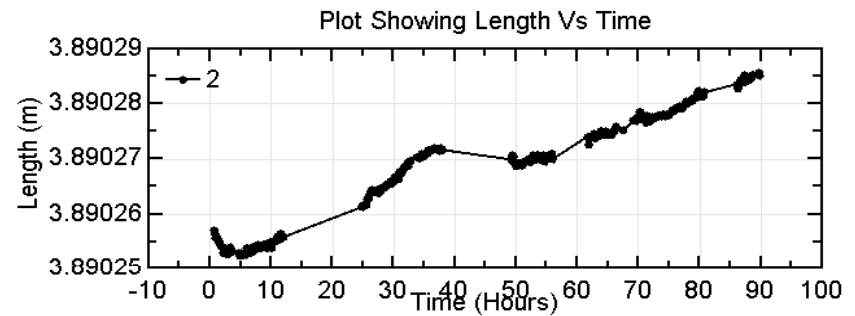
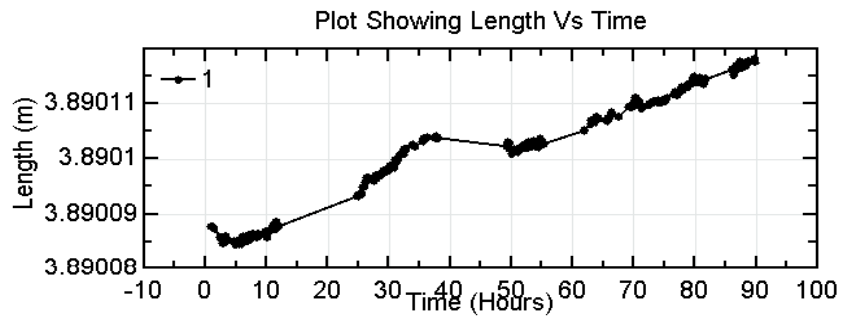


Internal FSI Sub-System

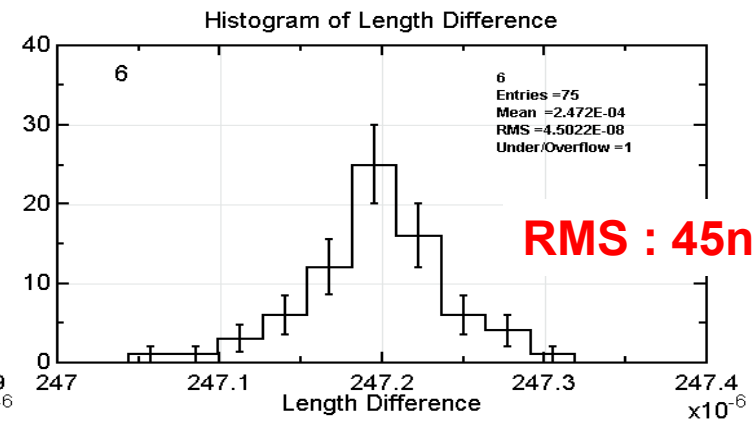
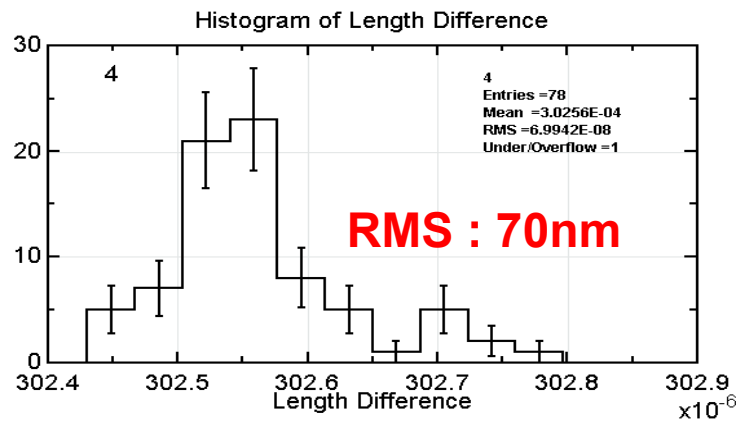
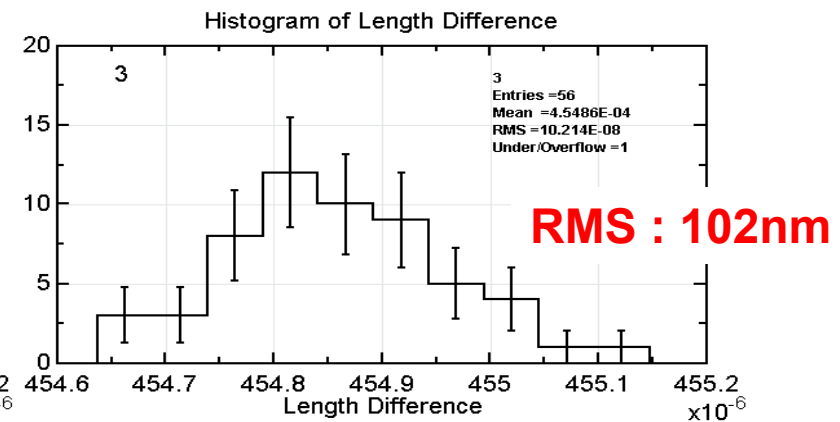
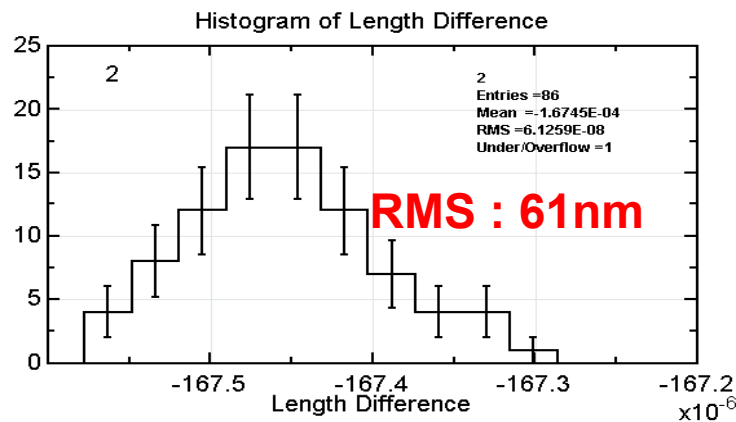


- First Unit has 6 collim
- Second Unit has 6 re
- Each Fibre Monitors a

Initial Stability of Internal FSI Sub-System



Initial Stability of Internal FSI Sub-System



Summary

- Prototype RTRS is constructed and entering calibration phase
- External FSI System is giving precision of 1-1.5 μm
- We have the ability to reconstruct wall marker positions to a precision of order 1.5 μm
- Internal FSI System giving precision of 45 -100 nm