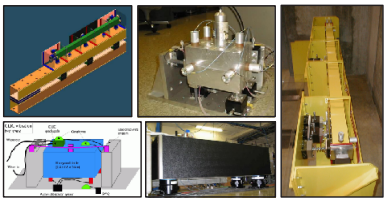
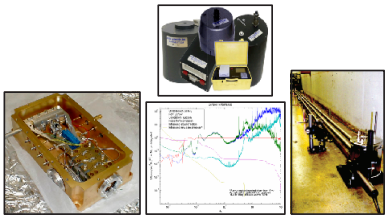
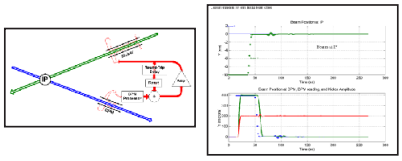
Stable Interaction Region



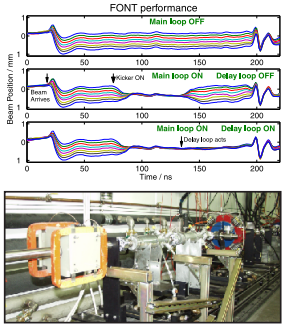
Stability Studies at CERN, KEK and SLAC:
Sub-nm stability achieved in tests with commercial equipment.
Current R&D on more realistic objects and sensors compatible with constricted location and detector magnetic field.



Multiple Routes to Required Accuracy in Magnetic Field:
SLAC-built inertial sensor has required performance.
Electrochemical seismometers also meet specs.
Optical interferometers resolve sub-nm.

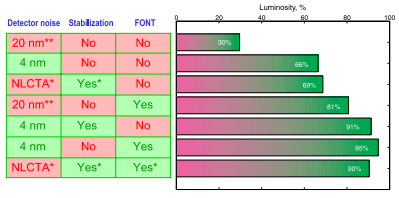


Intra-train feedback with delay loop compensation
brings beams into collision in simulation.



FONT (Feedback On Nanosecond Timescale) measured response
showing expected latency and delay loop compensation (UK–SLAC).

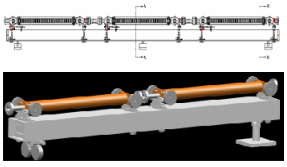
Multiple techniques to provide Collision stability
Luminosity > 90% if rely on 2 out of 3 strategies,
and >66% if rely on one strategy only
Measurement-based result: 90%



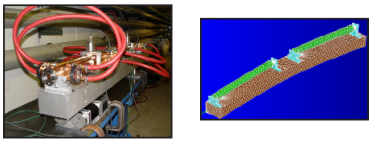
Detector noise	Stabilization	FONT
20 nm**	No	No
4 nm	No	No
NLCTA*	Yes*	No
20 nm**	No	Yes
4 nm	Yes	No
4 nm	No	Yes
NLCTA*	Yes*	Yes*

* Based on measured performance
** 20 nm measured on SLD; NLCTA floor is similar

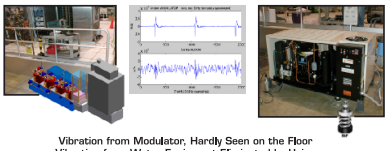
Stable Linac



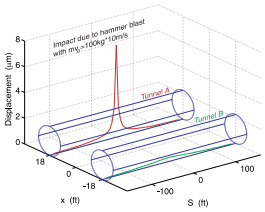
NLC Girder Prototype Design at Fermilab



Vibration measurement setup and Finite Element Analysis

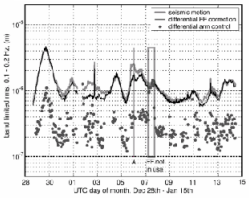


Vibration from Modulator, Hardly Seen on the Floor
Vibration from Water Equipment Eliminated by Using
Inexpensive Standard Passive Spring Isolators

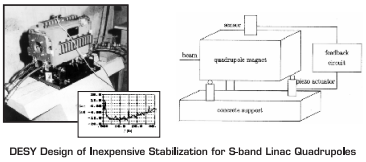


Transmissibility Between Tunnels was Measured in LA
Metro in Similar Twin Tunnel Configuration
and Modeled with 3D Finite Element Code

Accessibility of Linac Quads Allows Many Possible Remediation Paths if Vibration is too Large or Tighter Specs are Needed (e.g. for multi-TeV)
Passive Techniques: APS, ESRF, etc.
Active Stabilization: DESY, CERN, KEK, SLAC
Feedforward: LIGO, ...



LIGO Results with Microseismic Feedforward Correction
Based on Additional Seismometers



DESY Design of Inexpensive Stabilization for S-band Linac Quadrupoles