



Laboratoire d'Anecy-le-Vieux
de Physique des Particules

Discussion slides

Discussion on possible ideas of
vibration measurements on IP-BPM
optical table support and possible
interferometer measurements at KEK



In2p3



LAPP-CERN involvement



- Already done:
 - Purchase by LAPP of 15 Guralp 6T for 52 000€.
 - Purchase by CERN of special low noise long cables
 - DAQ system developed by CERN
- Still to do:
 - Instrumentation preparation by LAPP-CERN: if system with 15 sensors and signal quality OK
 - LAPP installation of cables, sensors and tests at KEK
 - Determine Labview-EPICS connection : CERN, Glenn and LAPP
 - Data handling CERN-LAPP

Absolute velocity/acceleration studied at LAPP:

Type of sensors	Electromagnetic geophone	Electrochemical geophone	Piezoelectric accelerometers		
Model	GURALP CMG-40T	SP500-B	Wilcoxon	393B12	4507B3
Company	Geosig	PMD Scientific		PCB Piezotronics	Brüel & Kjaer
Sensibility	1600V/m/s	2000V/m/s	10V/g	10V/g	98mV/g
Frequency range	[0.033; 50] Hz	[0.0167; 75] Hz	[0.01; 100] Hz	[0.05; 4000] Hz	[0.3; 6000] Hz
Measured noise (f > 5Hz)	0.05nm	0.05nm	0.25nm >50Hz: 0.02nm	11.19nm >300Hz: 4.8pm	100nm

Geophone

Guralp 3ESP

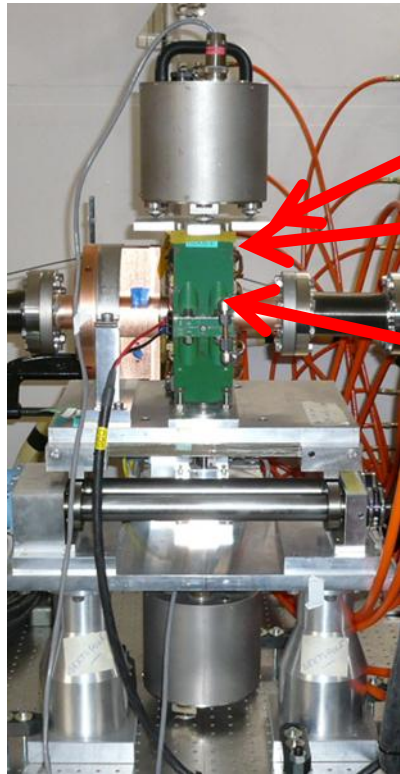
2000V/m/s
[0.03; 50]Hz



↑
Sub-nanometre measurements



Possible installation?



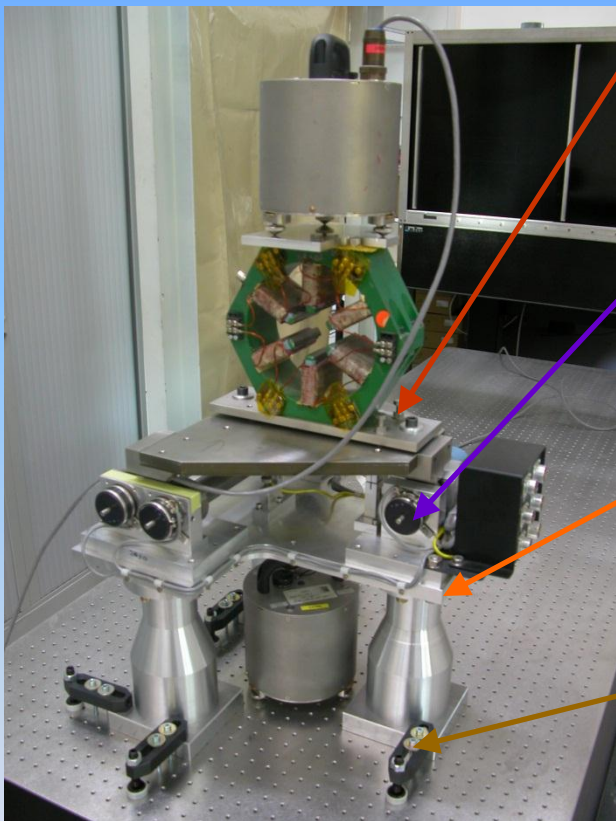
Extra plate

Beeswax

Thin sextupole

⁶ Vibratory study of an ATF2 sextupole with its supports

Experimental set-up

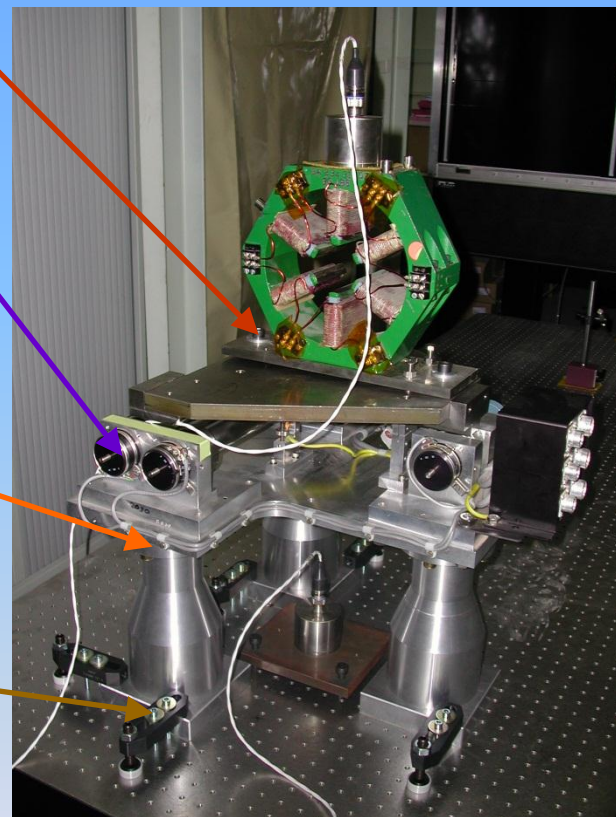


Setting of the magnet level

Movers for movement of the magnet around the beam axis

Insertion of spacers for coarse magnet alignment in the vertical axis

Coarse magnet alignment in the horizontal axis



GURALP geophones
(0.1Hz - 13Hz)

Problem of
GURALP rocking?

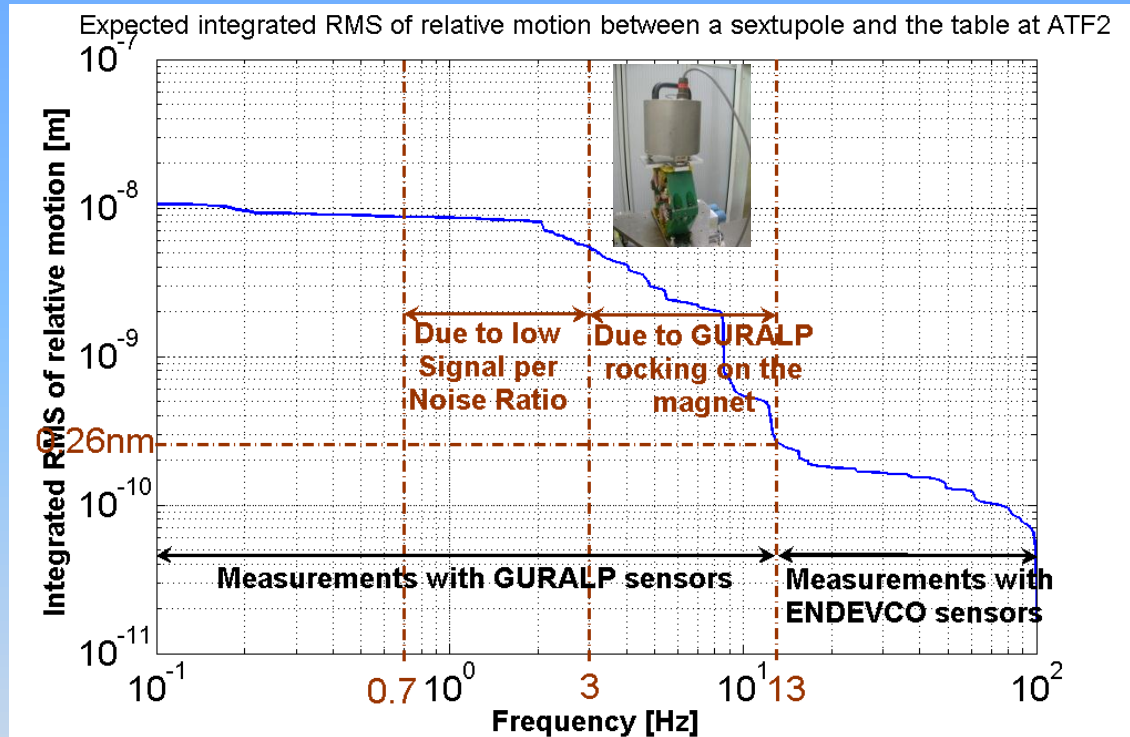
ENDEVCO 86 accelerometers
(13Hz - 100Hz)

GURALP positioning on a T-plate fixed with beeswax on the magnet



⁷ Vibratory study of an ATF2 sextupole with its supports

Integrated RMS of sextupole relative motion to the table

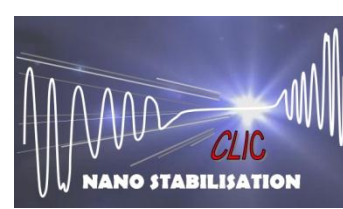


- ✓ **Between 0.7Hz and 13Hz:** inaccurate measurements (low Signal to Noise Ratios and GURALP rocking on the magnet)
- ✓ **Above 13Hz:** relative motion of 0.26nm

➤ **Very good compared to ATF2 tolerances (10nm)!!!** B.Bolzon 2008



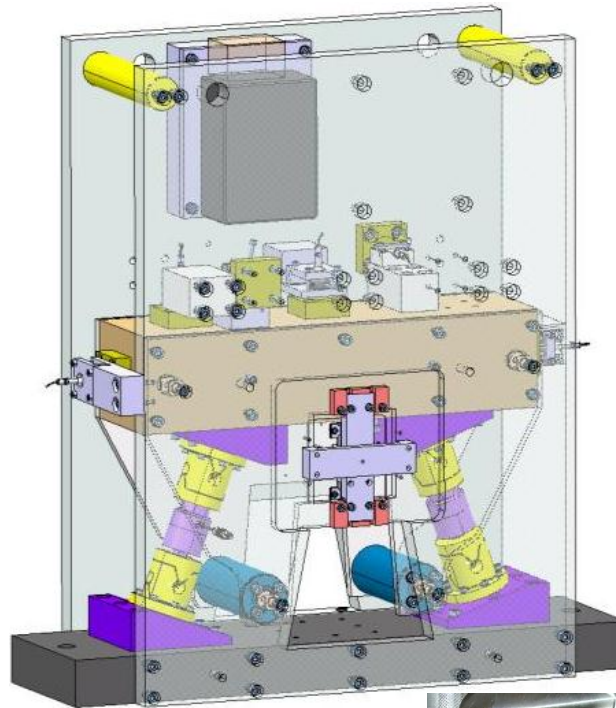
X-y prototype: Nano positioning Resolution, precision, accuracy



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Capacitive sensor

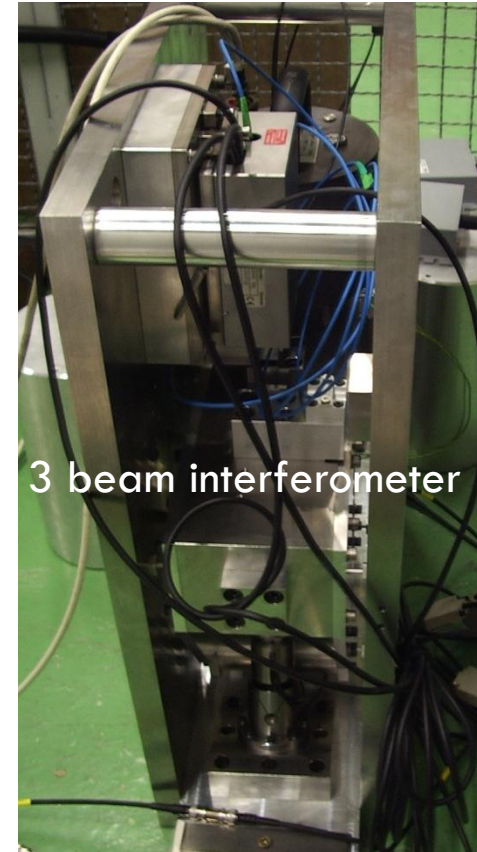


Irfu
cea
saclay

Actuators equipped
with strain gauges



Optical ruler



3 beam interferometer