Stable support for FD

A.Jeremie, B.Bolzon, N.Geffroy

Outline

- Measurements on table
- Work done by G. Durand with drawings
- Discussion on table length

Measurements on table
(since ATF2 meeting in Hamburg)

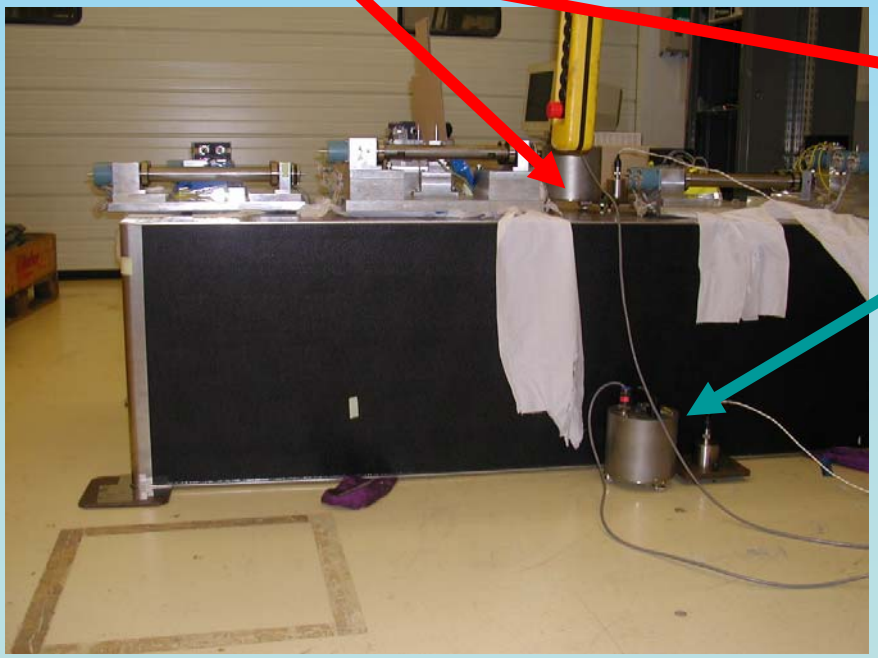
Andrea JEREMIE

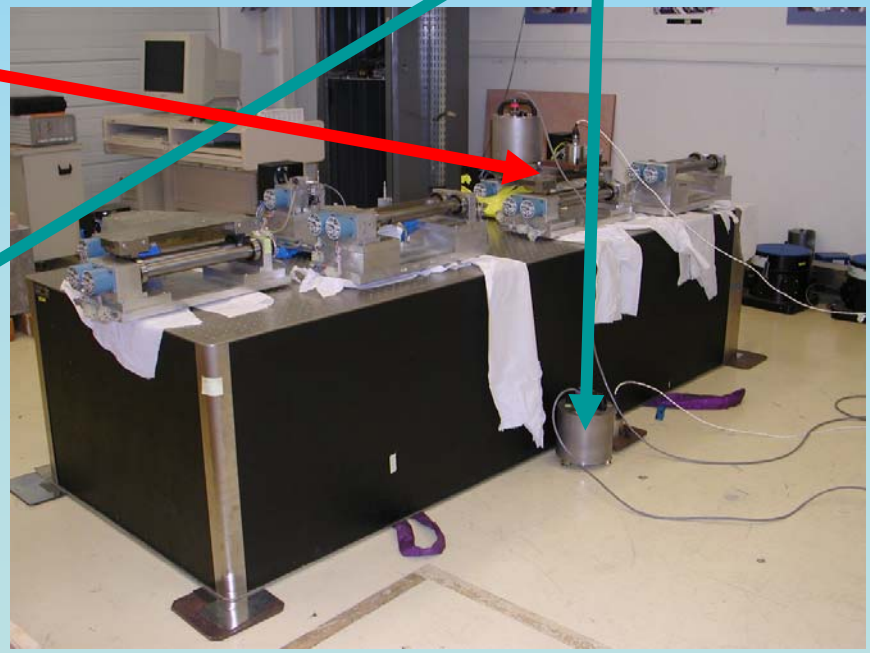
Set-up

- Empty table on four supports
- FFTB Movers just put on table, not fixed (~162kg)
- Measurements on FFTB movers

No mass yet

Guralp seismometer and Endevco accelerometer one each on the floor and on the table (or mover)





✓ NI PCI-6052 Multifunction DAQ

PCI-6052E	Quantity	Resolution	Rate	Conversion	Range	Noise
Analog Input	8 Differential/ 16 Single-ended	16bits	Up to 333kS/s	Successive approximation	±0.05 to 10V	60uV from DC to 1MHz
Analog output	2 Single-ended	16 bits	333kS/s	Successive approximation	±10V	

Fast card **Low noise card**

➢ Compatible Matlab/Simulink (Softwares used for the algorithm)

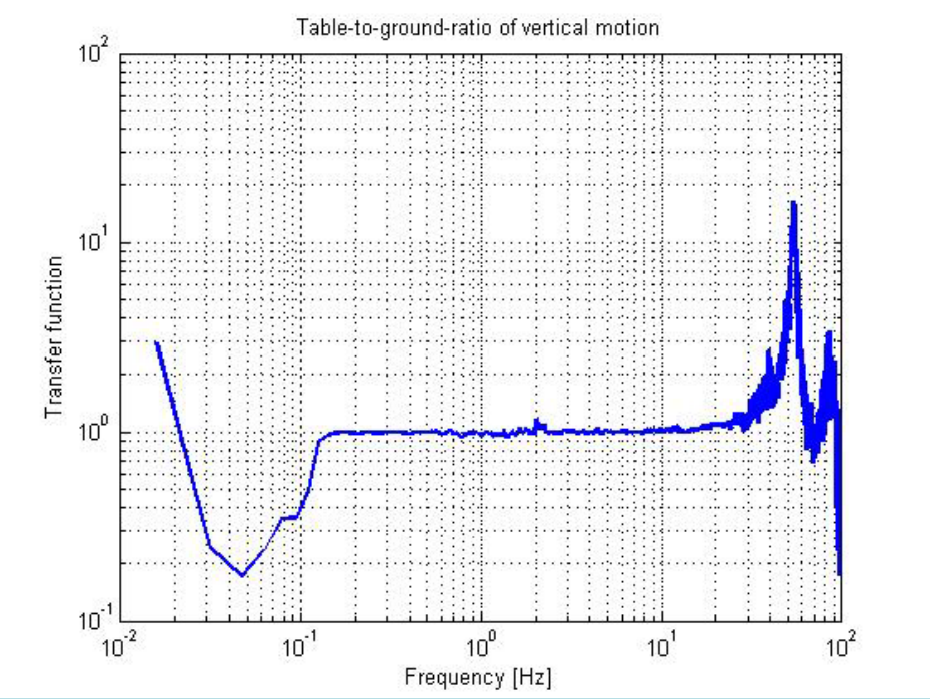
Sensors	SP500B	ENDEVCO86
		
Sensitivity	2000V/m/s	10V/g
Frequency range	0.0167 – 75Hz	0.01 – 100 Hz
Integrated electronic noise above 4Hz	0.085nm	0.6nm
Quantity	2	2

Sensors	VE-13	Guralp CMG-40T	SP400U	GSV-320	ENDEVCO 86
Sensitivity	1V→1 mm/s	1V→0.625mm/s	1V→1 mm/s	1V→0.5 mm/	1V→0.1g
Garanteed frequency range	1 - 315 Hz 	0,033 - 50 Hz 	0,1-50 Hz 	1 - 315 Hz 	1-100 Hz 
Quantity	2	2	2	2	2

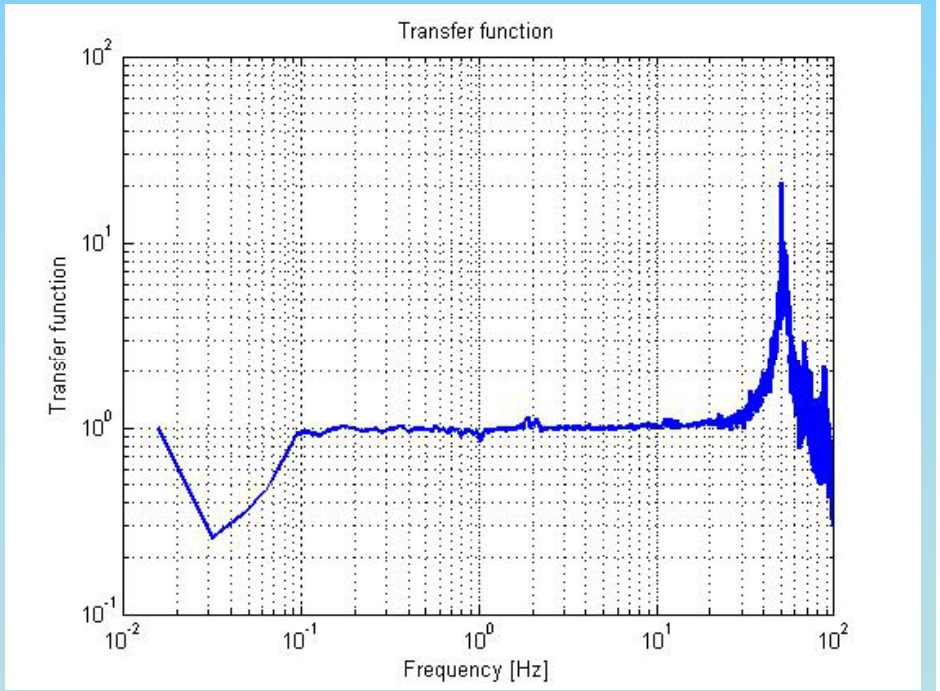
nm stabilisation equipment exists

Transfer function on table

Empty table



With movers



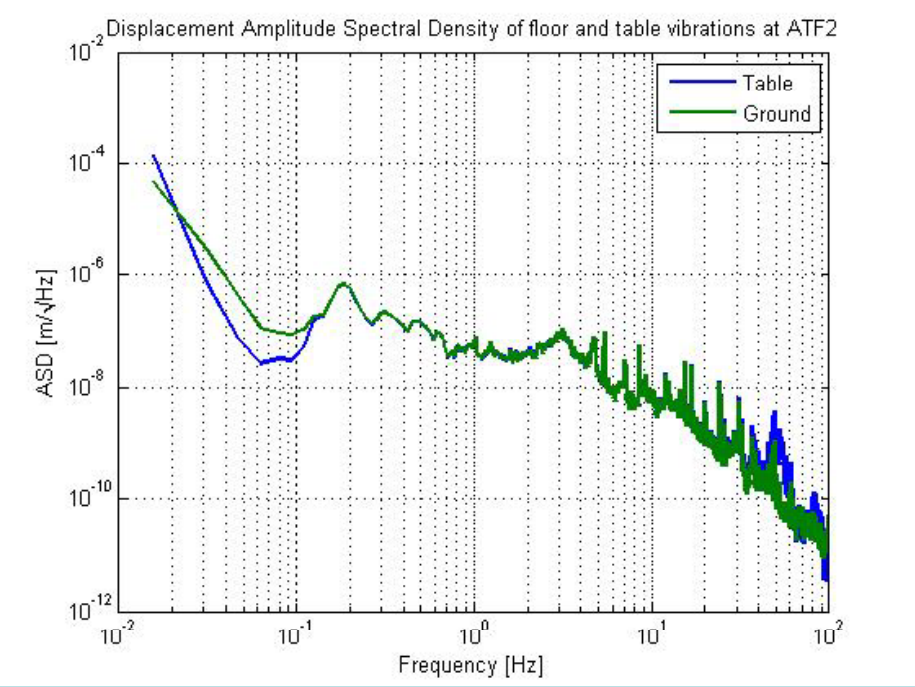
Main peak slightly above 50Hz

Andrea JEREMIE

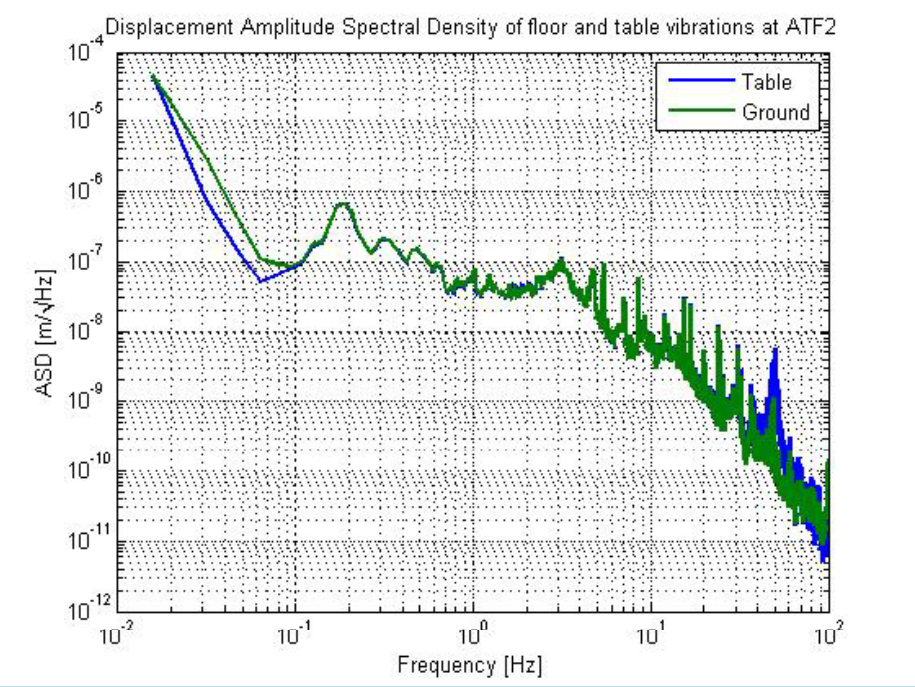
Amplitude spectral density on ATF2 floor

Ground motion measurements done on ATF floor by KEK colleagues

Empty table

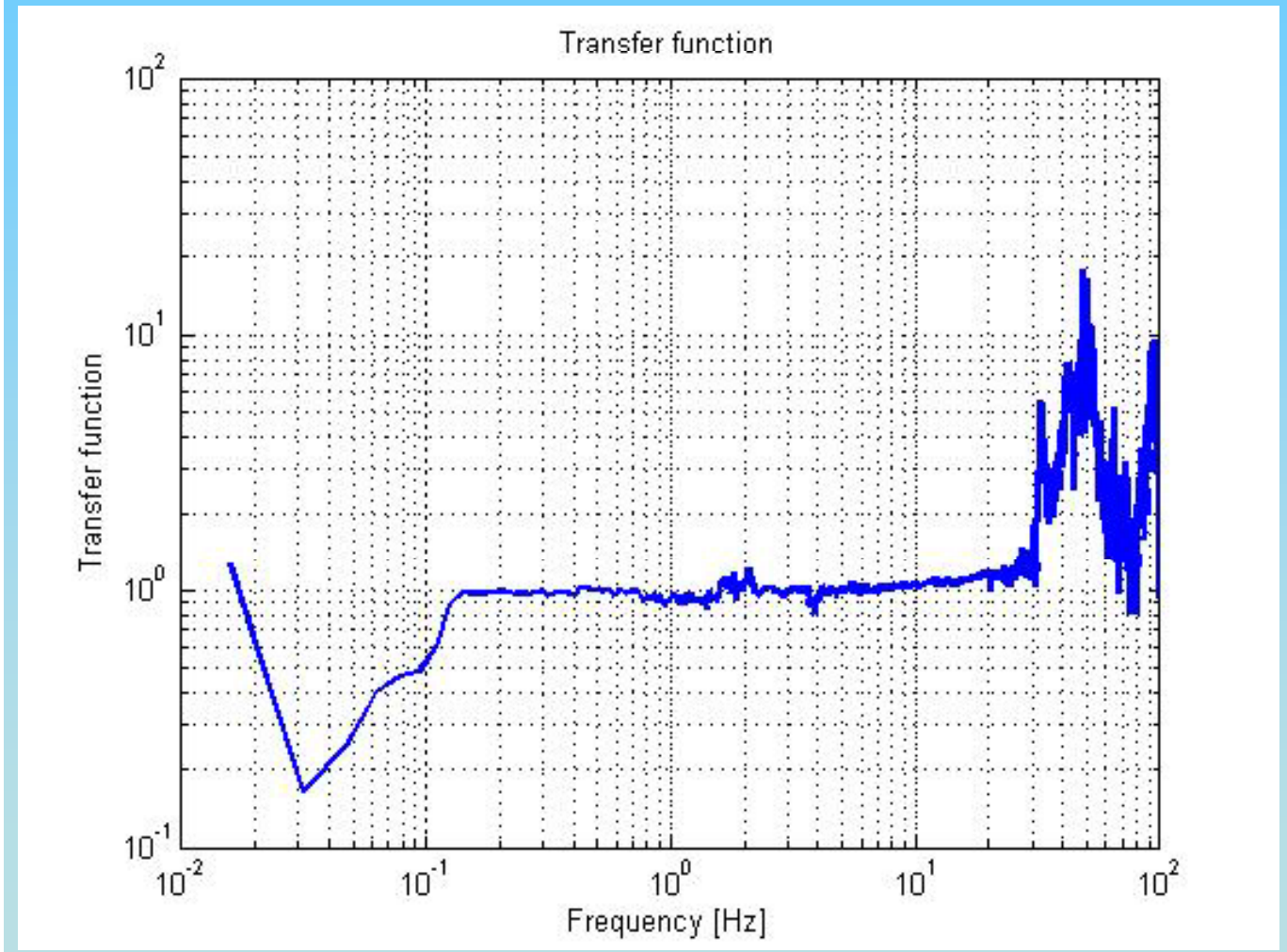


With movers



Andrea JEREMIE

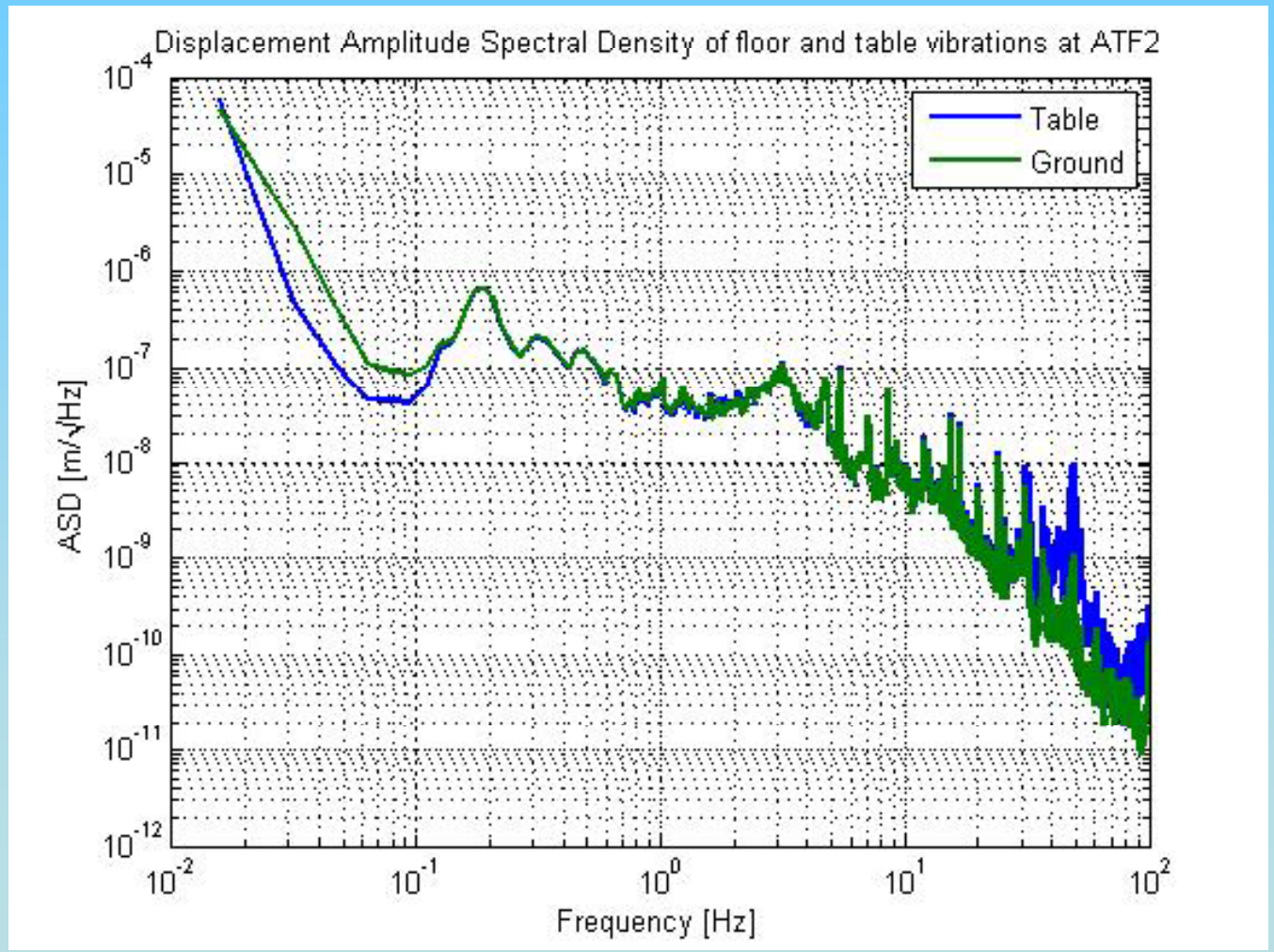
Transfer function on mover

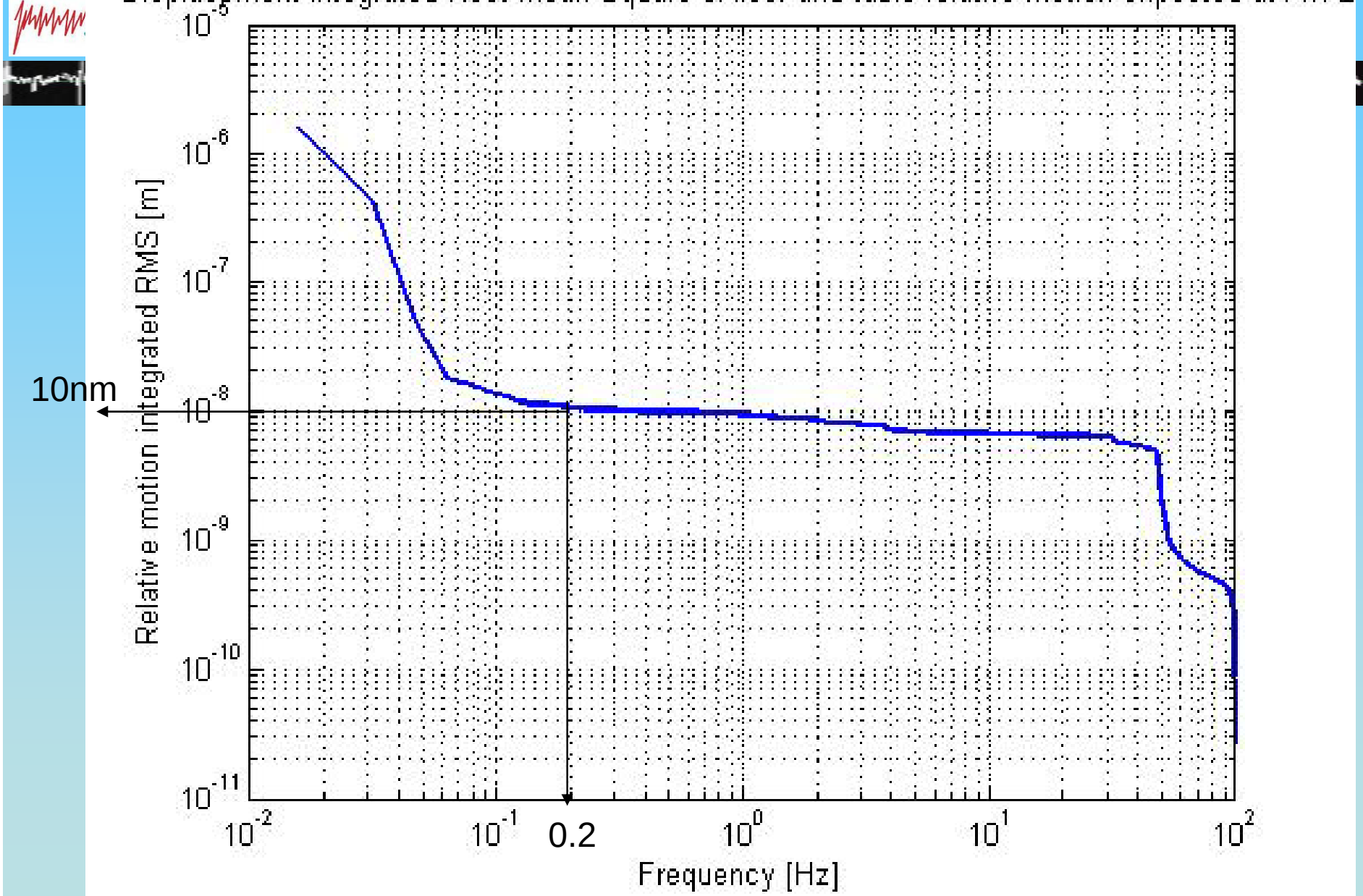


Main peak still around 50Hz, but lots of additional peaks

Andrea JEREMIE

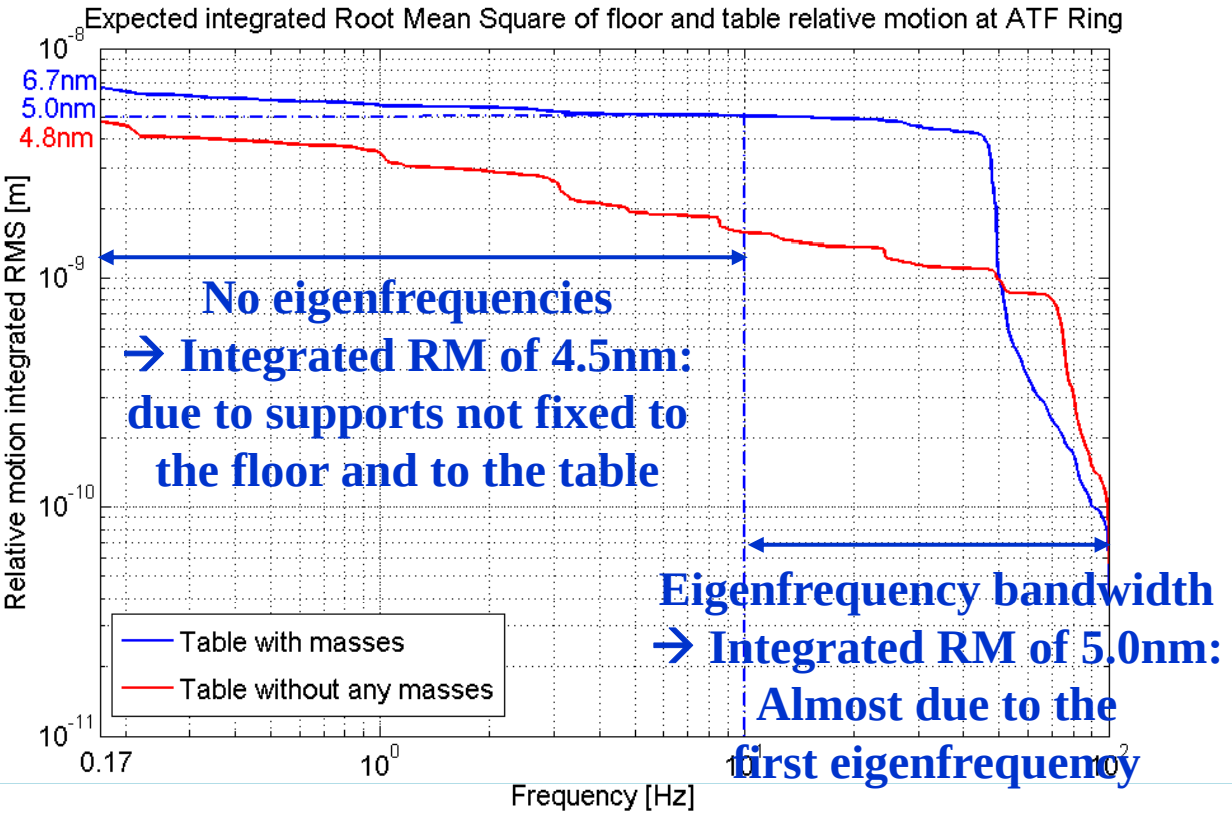
Amplitude spectral density on mover




Displacement integrated Root Mean Square of floor and table relative motion expected at ATF2
Relative motion integrated RMS [m]
Frequency [Hz]
10nm
0.2

Relative motion between table and floor at ATF Ring

✓ Integrated Root Mean Square of relative motion at ATF Ring:



B.Bolzon

➢ **Integrated RMS of relative motion with masses of 1400Kg:**

- From 0.17Hz to 100Hz: 6.7nm → Above ATF2 tolerances (6nm)!!

- From 10Hz to 100Hz (first eigenfrequency bandwidth): 5.0nm→ Tight

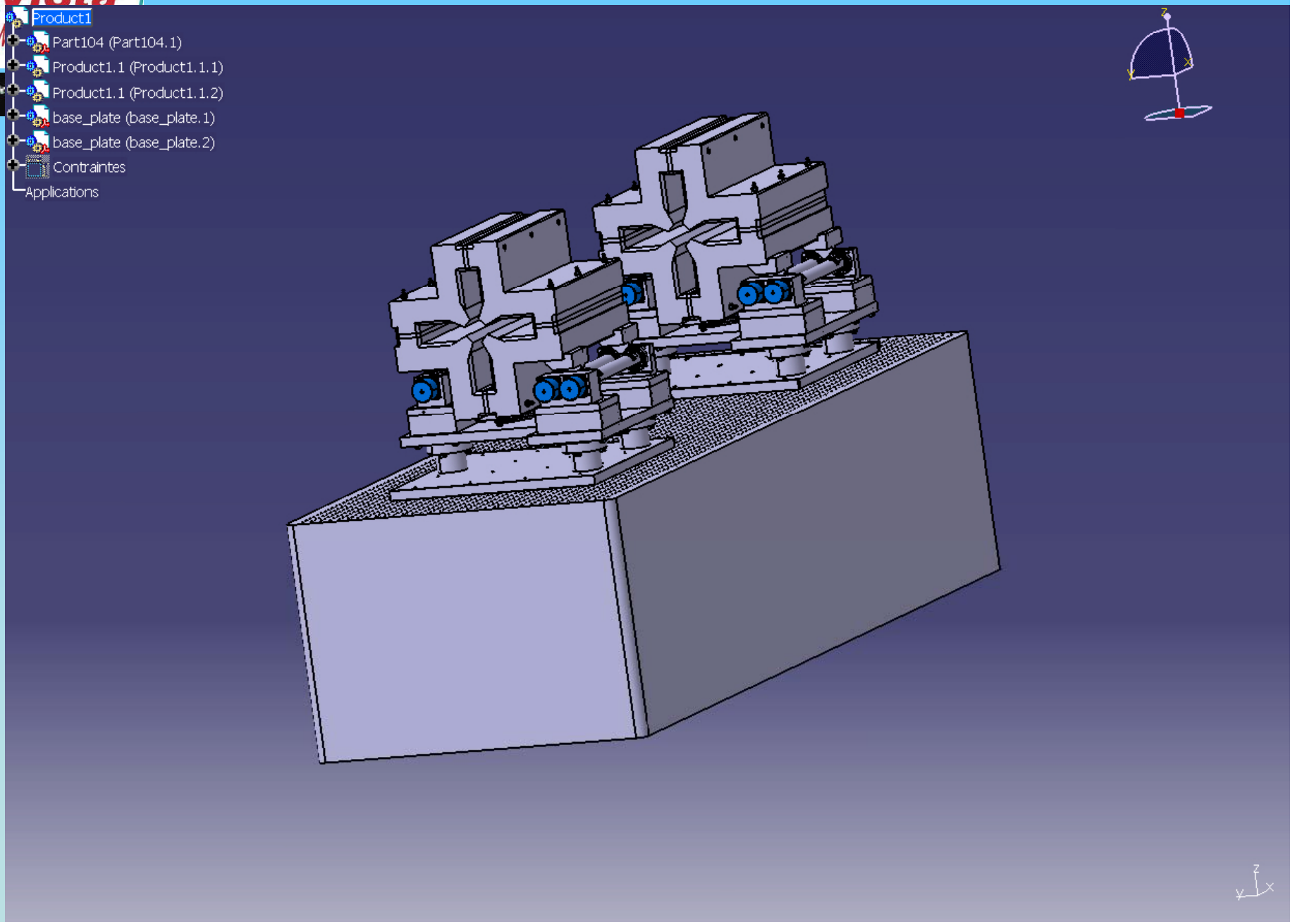
Near future work

- Measurements with weights
- Finalise how mover is fixed on table and measure

Work done by G. Durand with drawings

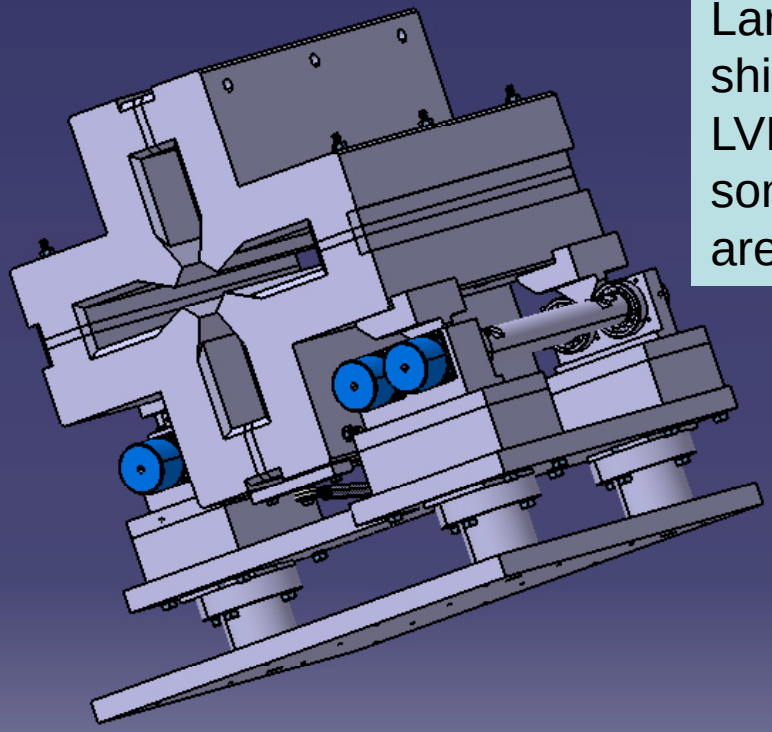
Andrea JEREMIE

Complete system for QC3 magnet (QD0 and QF1)



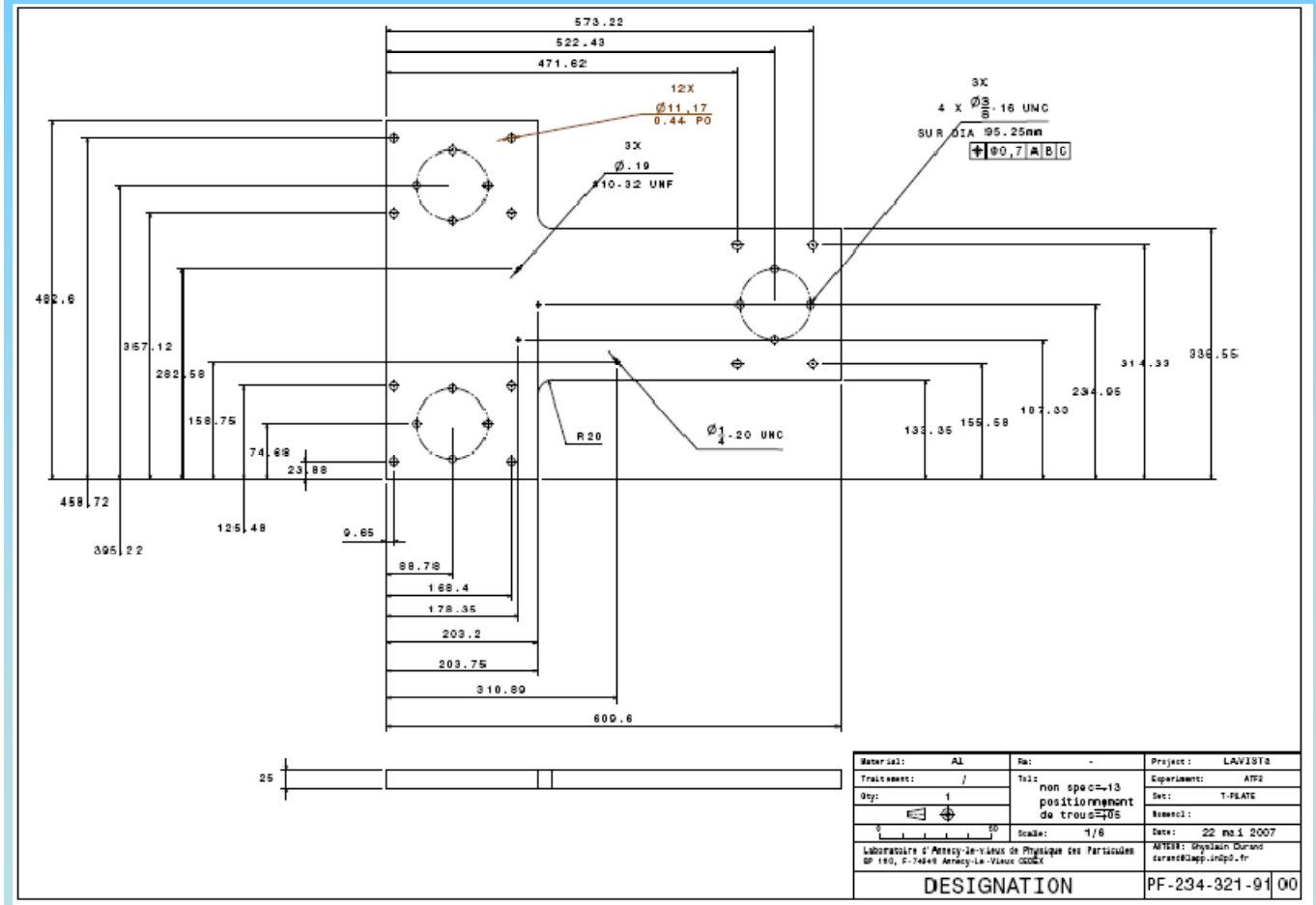
Complete system for QC3 magnet (QD0 and QF1)

- Product1.1
  - T-Plate_mm (T-Plate_mm.1)
  - Part1.1 (Part1.3)
  - Part1.1 (Part1.4)
  - Part1.1 (Part1.5)
  - Socle_LAPP (Socle_LAPP.1)
  - Socle_LAPP (Socle_LAPP.2)
  - Socle_LAPP (Socle_LAPP.3)
  - mtg_plate_type_1.1 (mtg_plate_type_1.1)
  - Product1.1.2.3.4 (Product1.1)
  - mtg_plate_type_1 (mtg_plate_type_1.2)
  - Product1.1.2 (Product1.2)
  - Product1.1.2.3 (Product1.3)
  - mtg_plate_type_1.1.2 (mtg_plate_type_1.3)
  - 15.5_shaft (15.5_shaft.1)
  - 15.5_shaft (15.5_shaft.2)
  - 1206 ETN9 (1206 ETN9.1)
  - 1206 ETN9 (1206 ETN9.2)
  - 1206 ETN9 (1206 ETN9.3)
  - 1206 ETN9 (1206 ETN9.4)
  - Product1.1.3 (Product1.1.3.1)
  - Product1.1.3.5 (Product1.5)
  - Part3 (Part3.1)
  - Part2.1 (Part2.1.2)
  - moteur (moteur.1)
  - moteur (moteur.2)
  - moteur (moteur.3)
  - Product11 (Product11.1)
  - Part45 (Part45.1)
  - Product1.1.3.5.7 (Product1.6)
  - Product13 (Product13.1)
  - ANSI_B18_22_1_PLAIN_WASHERS_NARROW_TYPE_A (ANSI_B18_22_1_PLAIN_WASHERS_NARROW_TYPE_A.1)
  - ANSI_B18_22_1_PLAIN_WASHERS_NARROW_TYPE_A.33 (ANSI_B18_22_1_PLAIN_WASHERS_NARROW_TYPE_A.2)
  - ANSI_B18_22_1_PLAIN_WASHERS_NARROW_TYPE_A.2 (ANSI_B18_22_1_PLAIN_WASHERS_NARROW_TYPE_A.3)
  - ASME_B18_21_1_REGULAR_HELICAL_SPRING_LOCK_WASHERS.11 (ASME_B18_21_1_REGULAR_HELICAL_SPRING_LOCK_WASHERS.1)
  - ASME_B18_21_1_REGULAR_HELICAL_SPRING_LOCK_WASHERS.5 (ASME_B18_21_1_REGULAR_HELICAL_SPRING_LOCK_WASHERS.2)
  - ASME_B18_21_1_REGULAR_HELICAL_SPRING_LOCK_WASHERS.32 (ASME_B18_21_1_REGULAR_HELICAL_SPRING_LOCK_WASHERS.3)



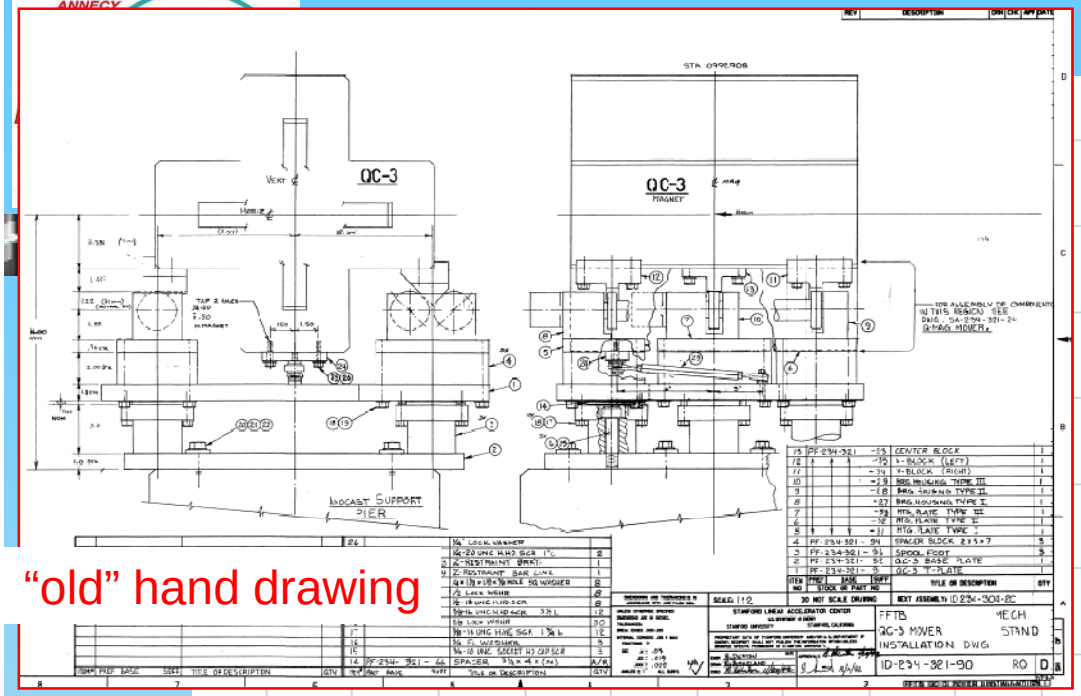
Larger magnet with shimming and LVDTs can still fit if some extra holes are done

T-plate

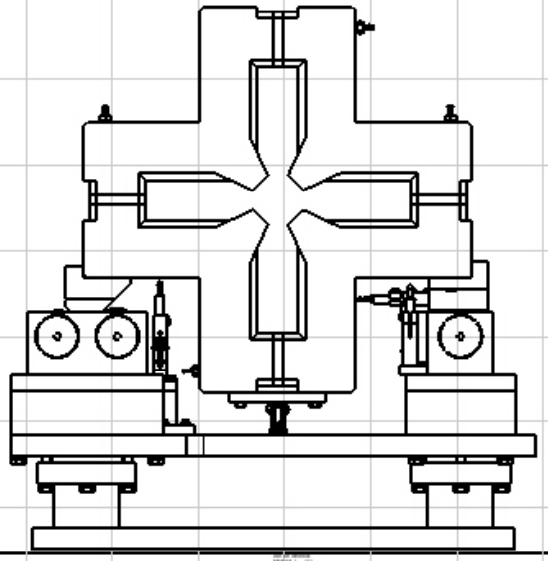


New T-plate (need two large movers, but only one available, so transformed one small mover in large mover by doing a new T-plate) unchanged
New T-plate can accommodate larger magnet (shimming)

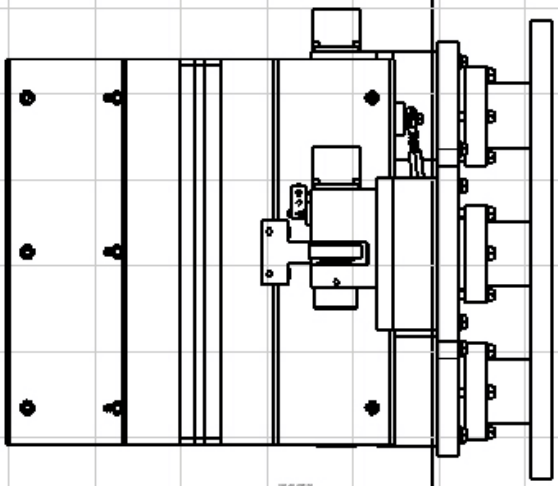
Andrea JEREMIE

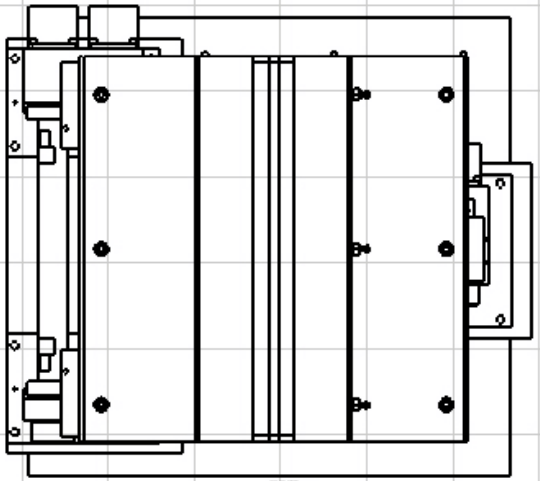


"old" hand drawing



New computer drawing





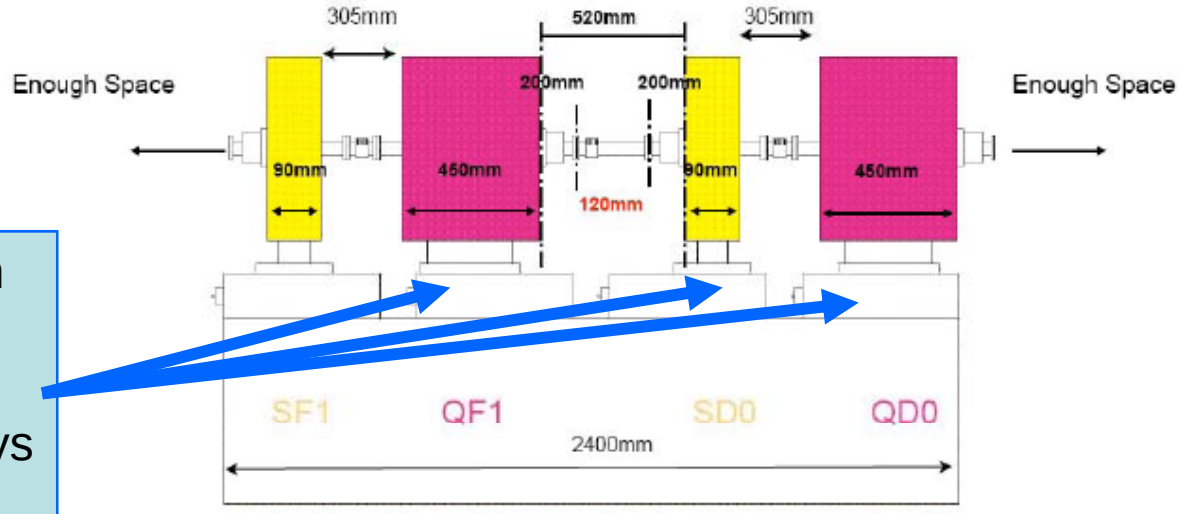
Andr

Discussion on table length

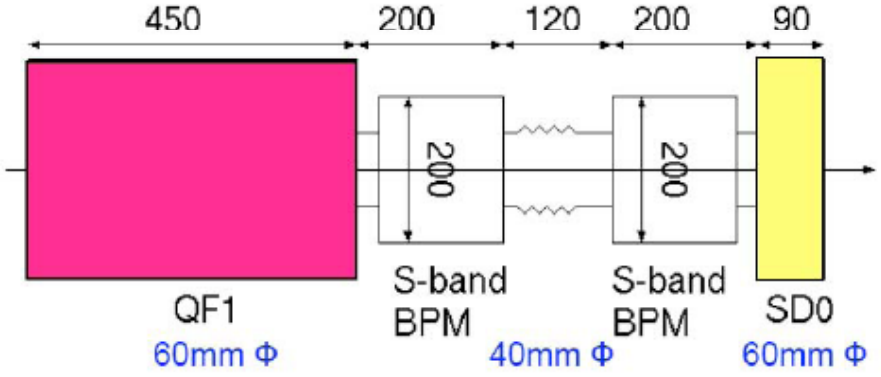
Andrea JEREMIE

Around Final Doublet – Monitor Configuration

T.Okugi



Notice that in this drawing the magnets are not always at same position on the mover

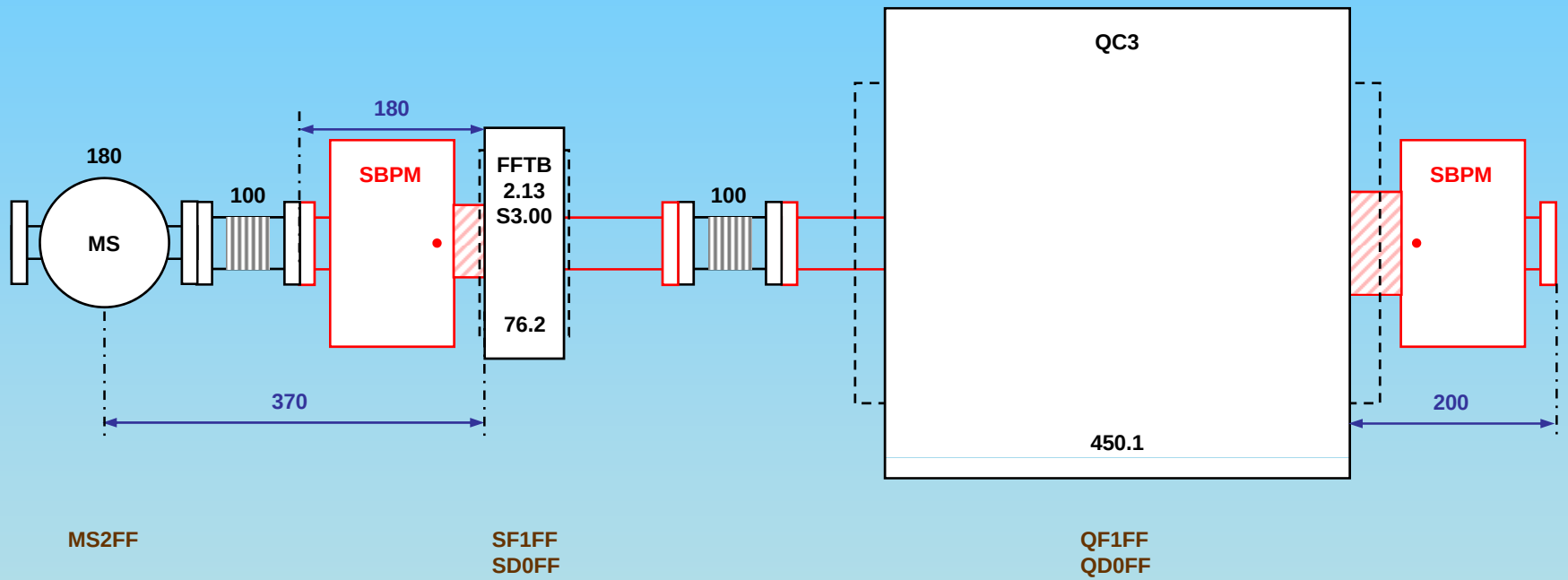


Y.Honda

S-band BPM is longer than SD0.

FF: MS2FF and Final Doublet

From Marc Woodley's presentation on July 18

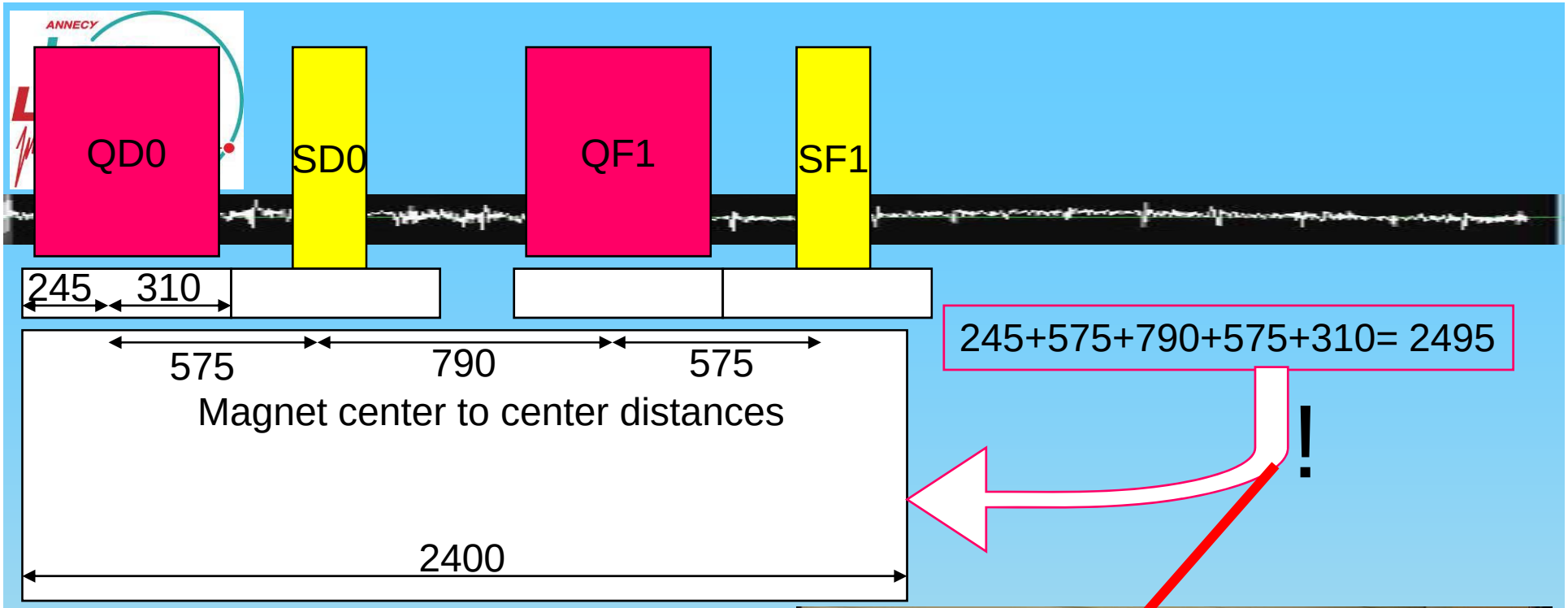


scale: 6 inches (drawing) = 1 meter (beamline)

Andrea JEREMIE

Marc Woodley's answer to the design distances

- Hi Andrea, In ATF2v3.7Layout.ppt, the dashed lines around magnets represent the approximate extent of the coils; the lengths quoted for the magnets are the core lengths (not the effective lengths).
- The center-to-center separations of the magnets are what defines the layout:
- QD2AFF -> SF1FF : 4875 mm center-to-center
- SF1FF -> QF1FF : 575 mm center-to-center
- QF1FF -> SD0FF : 790 mm center-to-center
- SD0FF -> QD0FF : 575 mm center-to-center
- QD0FF -> IP : 1225 mm center-to-IP -Mark


ANNECY
QD0
SD0
QF1
SF1
245
310
575
790
575
Magnet center to center distances
2400
245+575+790+575+310= 2495
!

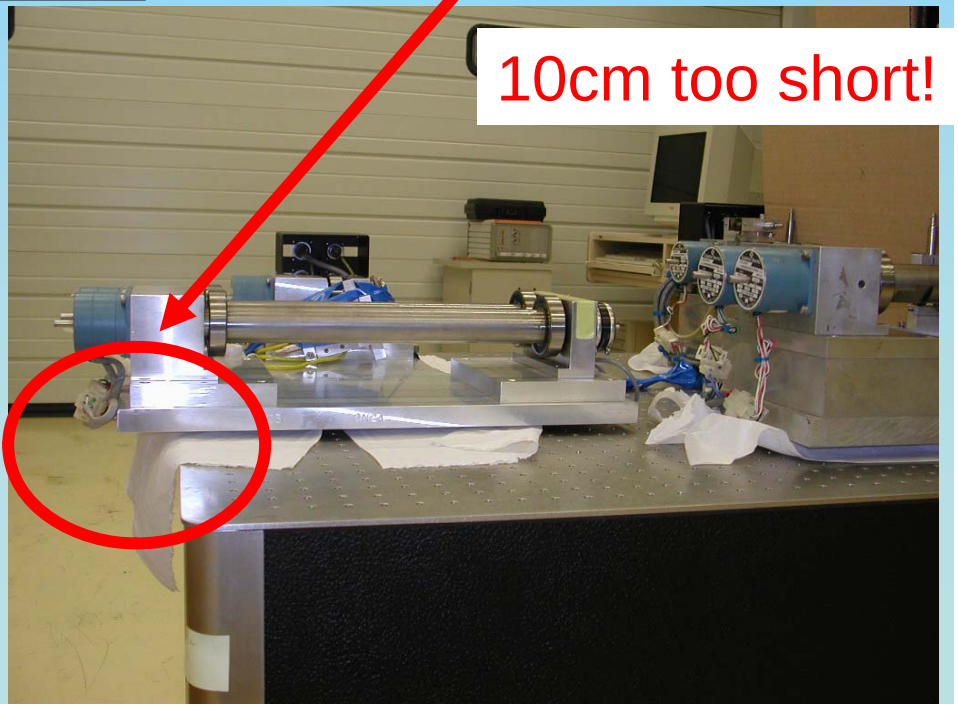

10cm too short!

Table length mm	2400	3000
Price €	15240	≈16500
delivery	12 weeks	12 weeks
“Free” first eigenfrequency (TMC value)	230Hz	185Hz
Simulated Four feet empty eigenfrequency	56Hz	
Simulated Four feet 1400kg eigenfrequency	26Hz	
Simulated totally fixed empty eigenfrequency	526Hz	629Hz
Simulated totally fixed 1400Kg eigenfrequency	132Hz	

Last words

- Current configuration leads to a table that is 10cm too short:
  - Do we change configuration to fit on the table?
  - Do we change the table (3000)? But does the layout allow this?
  - Do we ignore the 10cm?
- Concrete block can be made to any dimension whereas the table has fixed constraints (length, height, hole configuration…)=> need to adapt