

Input Mode Cleaner

Update

LIGO-G070343-00-Z

IMC

Reminder:

New end mirror ordered (14 cm vs.. 8 cm);
needs new Payload -- Roma 1;
and new installation tooling -- Nikhef ;

In addition:

losses in IMC close to 50 %, needs action at level of
input bench: DiHedron.

Since beg. 2007, Nikhef responsible for IMC.

IMC End Mirror

End mirror Payload: already started by Roma -1

Installation tooling: at present designed by Frans Mul (Nikhef).

next few slides are by Frans.

First step, mirror on support

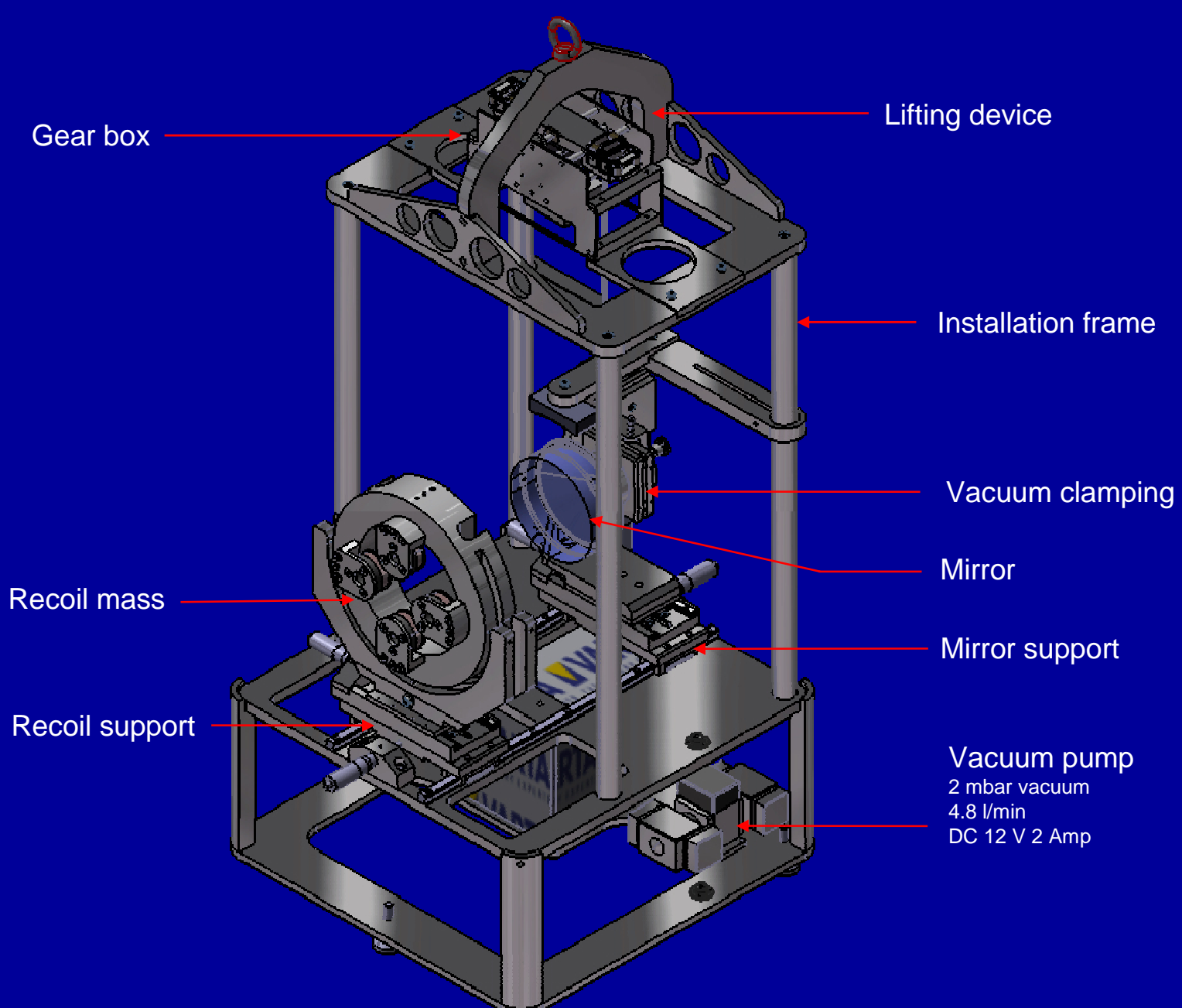
CONFIDENT



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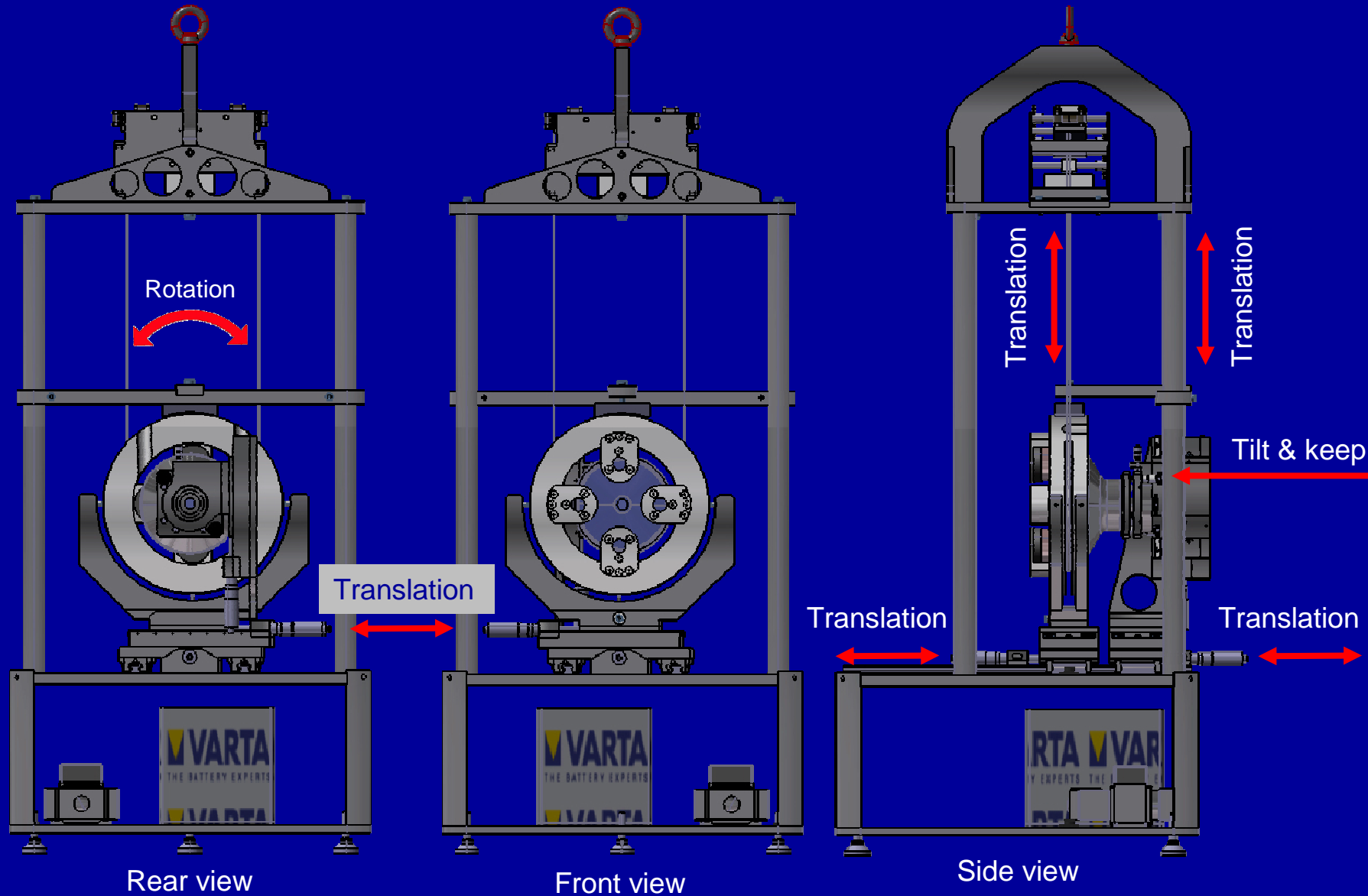


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Movements

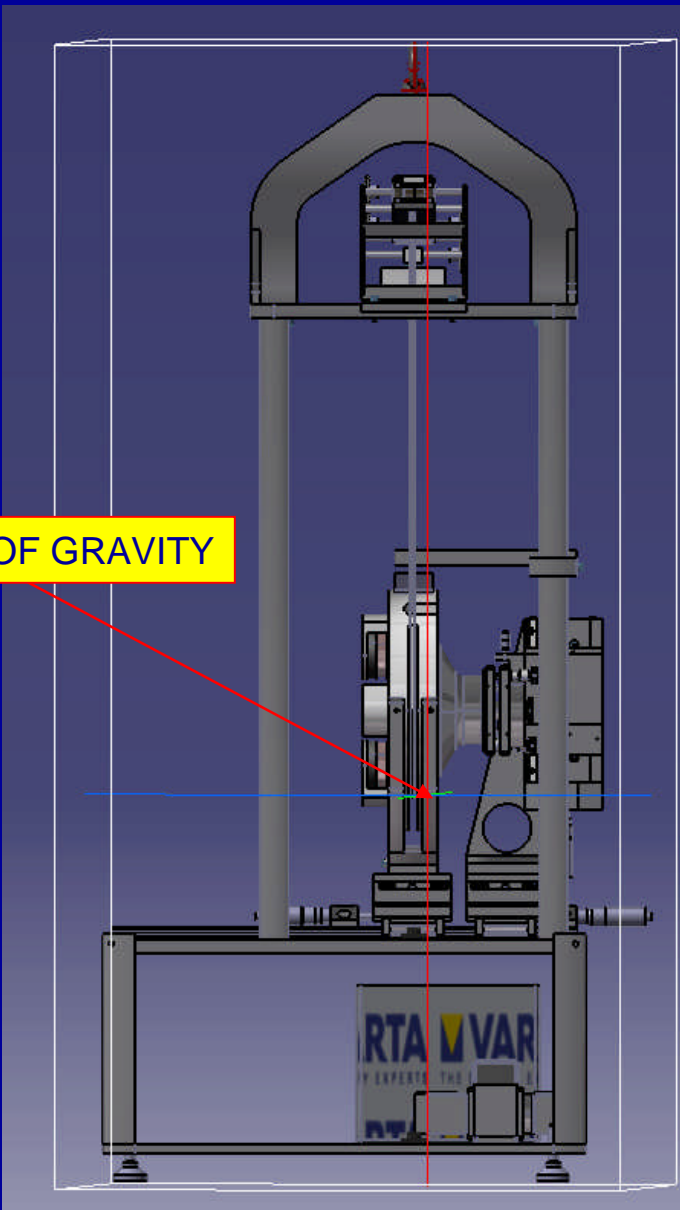


Rear view

Front view

Side view

CENTRE OF GRAVITY



Measure Inertia

Definition
Selection : 06_07_0000_frame

Result

Characteristics	Center Of Gravity (G)
Mass	70.275kg
Gx	-90.728mm
Gy	-9.641mm
Gz	67.334mm

Inertia / G | Inertia / O | Inertia / P | Inertia / Axis | Inertia / Axis System

Principal Axes

A1x	-0.00031	A2x	-0.105859	A3x	0.994381
A1y	0.011698	A2y	-0.994314	A3y	-0.105848
A1z	0.999932	A2z	0.0116	A3z	0.001546

Keep measure | Create geometry | Export | Customize... | OK | Cancel

Total weight 71 kg



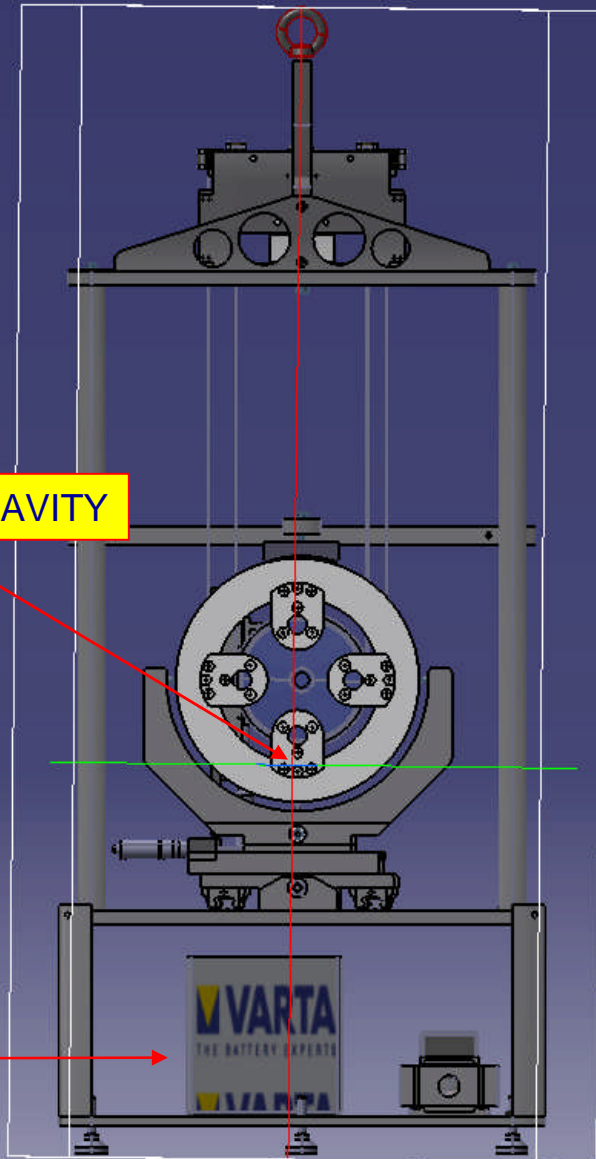
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CENTRE OF GRAVITY

VARTA
Deep Cycle battery
12V/ 44Ah
hxbxd: 225 x 176 x 409
38 kg
€ 192



Measure Inertia

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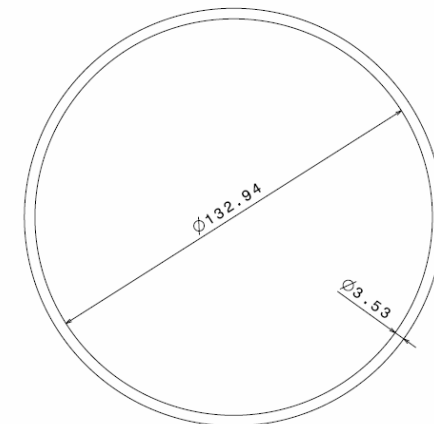
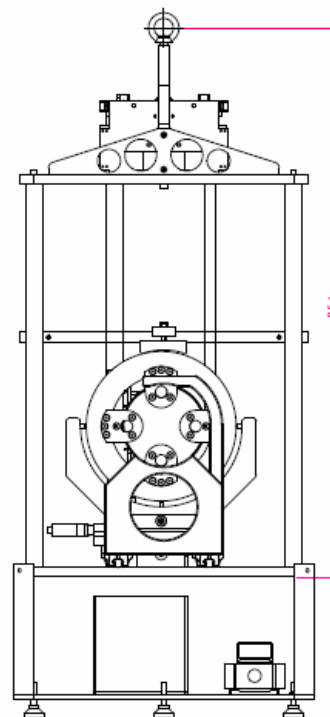
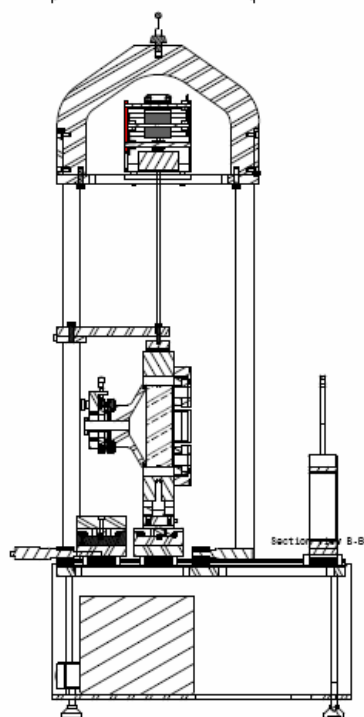
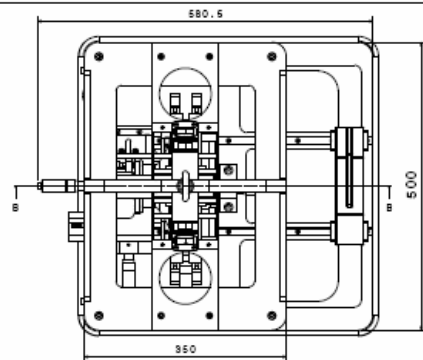
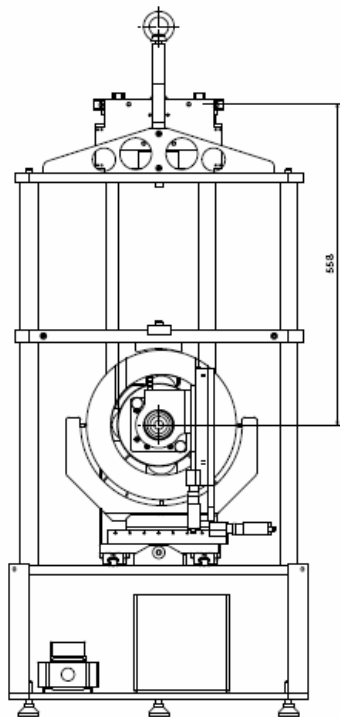
Total weight 71 kg



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ERIKS TYPE SCVBR
70 - 75 Hardheid Shore A
SEMICON INDUSTRIE

06	01	O- RING	SCVBR		ERIKS
Pos Nr.	Aant.	Benaming	Materiaal	Afmeting	Toelevering
Benaming: INSTALLATION TOOL END MIRROR					Formaat: A4
		Get: F.A.M.U.L.	Datum: 02052007	Opdr. Nr.:	
		Schaal: 1:1	Geo:	Algemene Toleranties Volgens ISO 2768 -	
Auteursrecht voorbehouden volgens de wet.			Tek. Nr. 07-65100-08-2006		

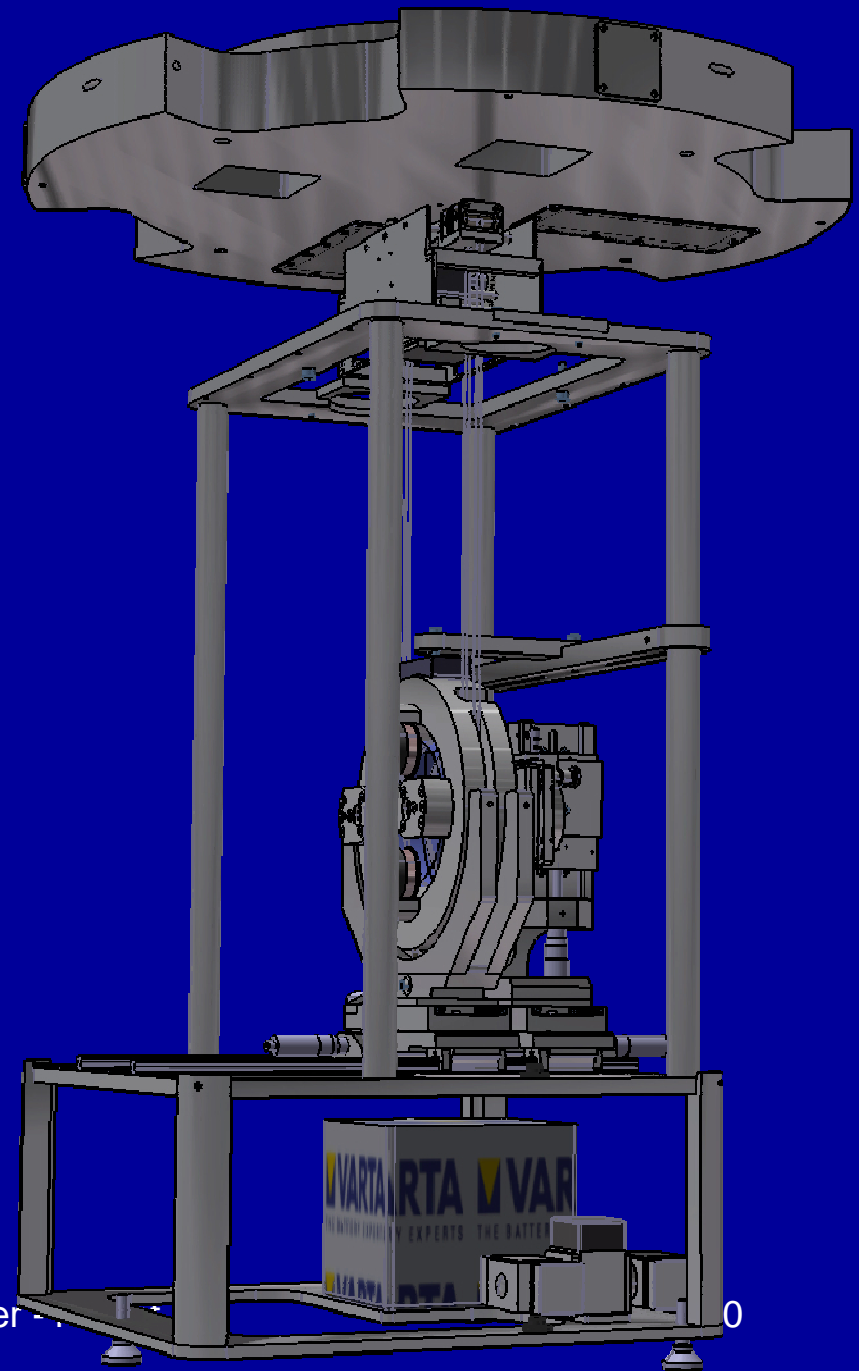
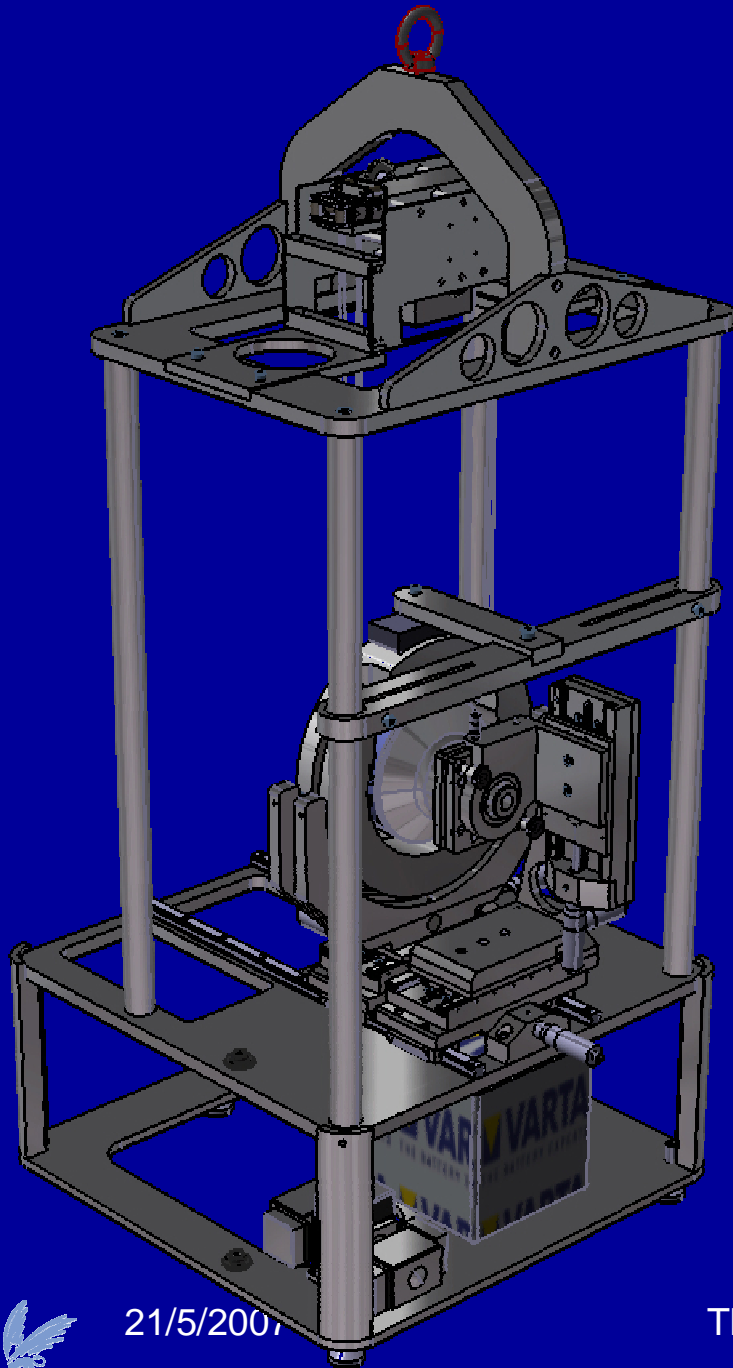
END MIRROR INTALLATION TOOL				Formaat: A4
		Get: F.A.M.U.L.	Datum: 02052007	Opdr. Nr.:
		Schaal: 1:1	Geo:	Algemene Toleranties Volgens ISO 2768 -
Auteursrecht voorbehouden volgens de wet.			Tek. Nr. 07-65100-07-0005	



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VIRGO MODE CLEANER END-MIRROR INSTALLATION fmul@nikhef.nl

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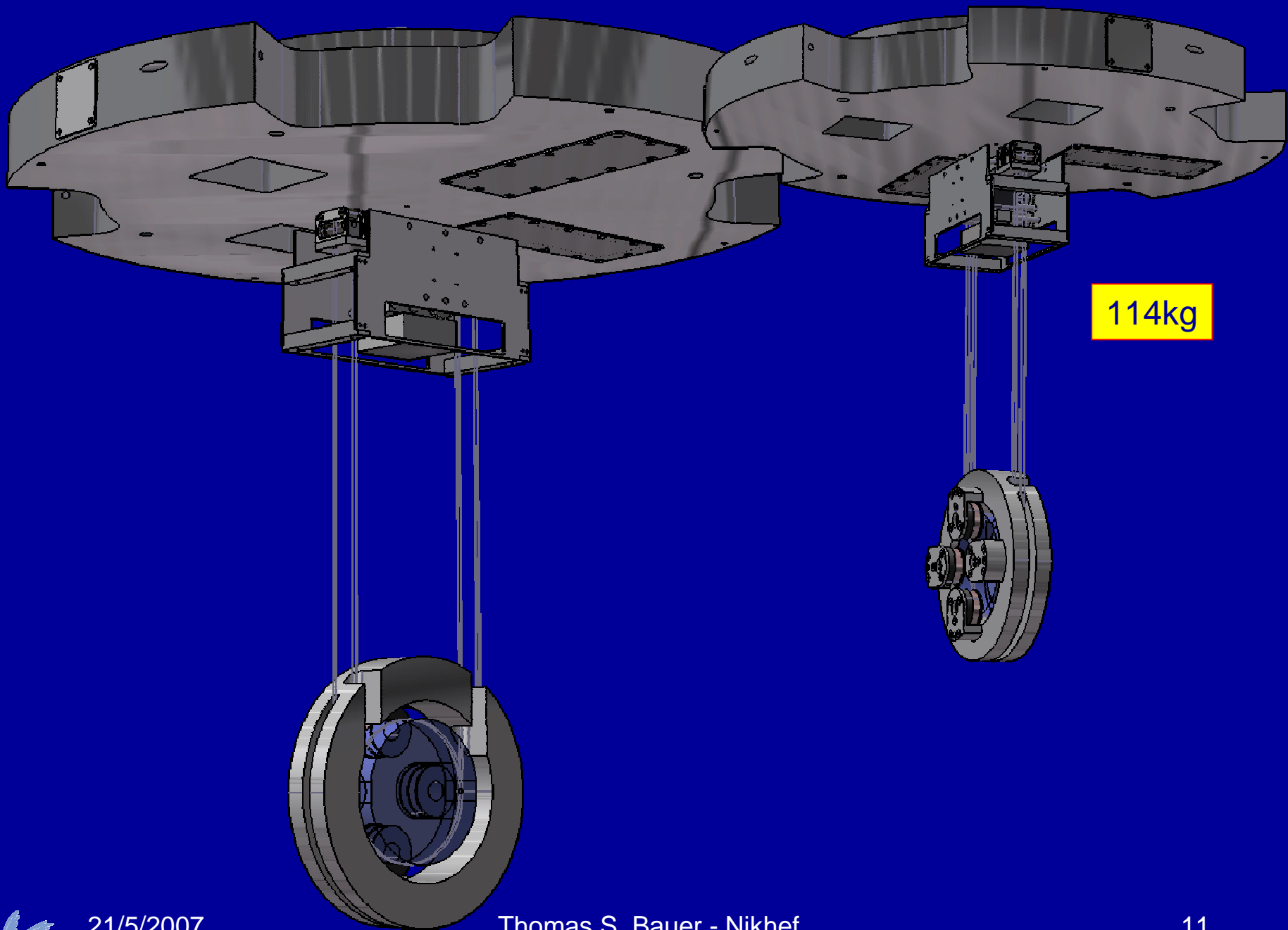


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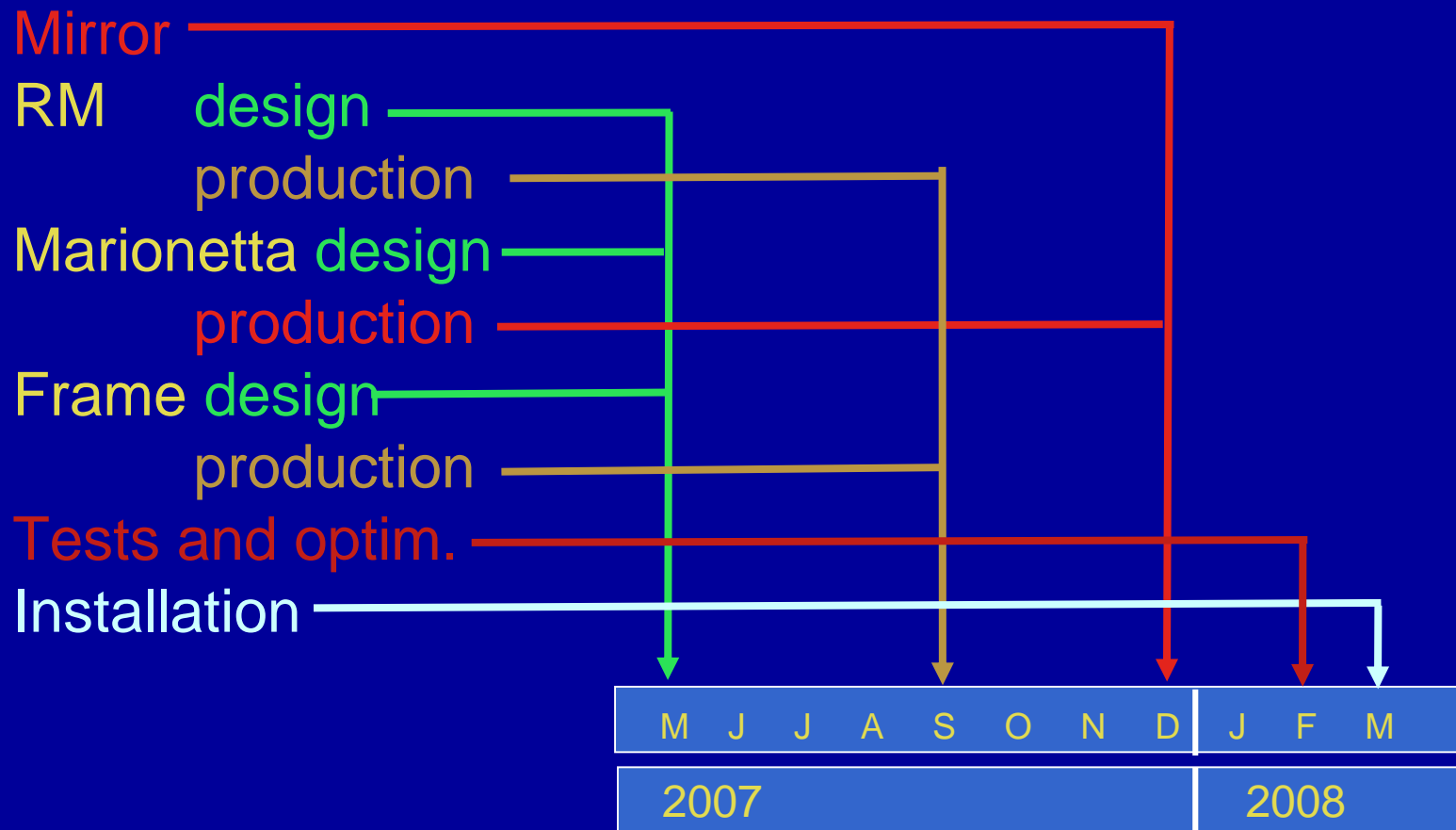
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VIRGO MODE CLEANER END-MIRROR INSTALLATION fmul@nikhef.nl

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Timescale



Timescale ITF Shutdown

Old Mirror dismount	Few days
Marionetta dismount	1 -2 days
machining	1 week ? more ?
re-mounting	1-2 days
SA pre-tuning	1 week
New MC installation	Few days
SA post-tuning	2 weeks
Total	min 5 ... 6 weeks
Tower closed:	end April 08

End mirror Action :

Finalize tooling design:

few measures need to be fixed, no work;

Approve and produce it.

Decide about Marionetta:

Options:

- modifying the existing one, will take precious time when tower is open;
- produce a new one (can be done at Nikhef) will save time (and surprises)

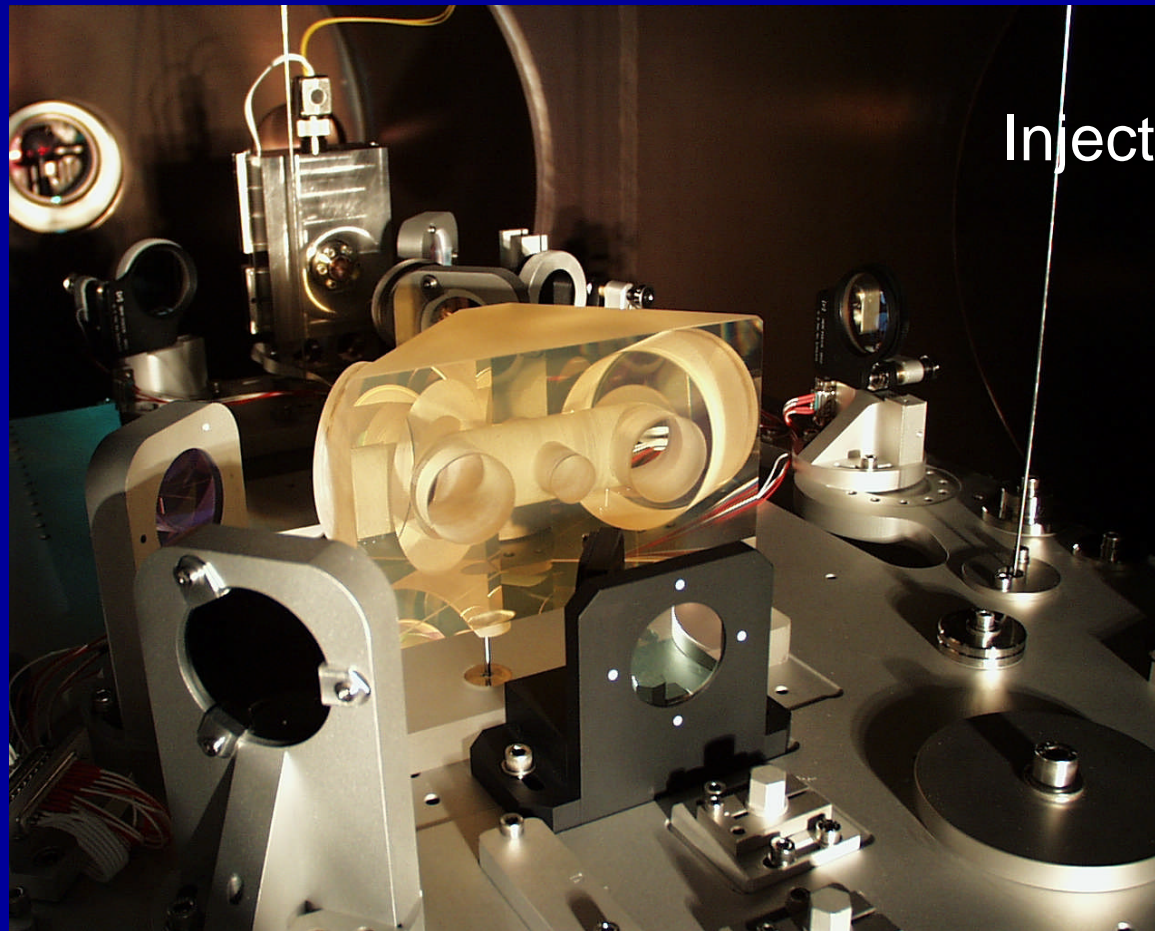
DiHedron...

Problems:

- a) Present DiHedron "jumps";
- b) IMC transmission about ~ 55..60 %
 - due to too small aperture?
 - or rather to poor quality^{*)} mirrors?

^{*)} - could be "dirty"

Present DiHedron

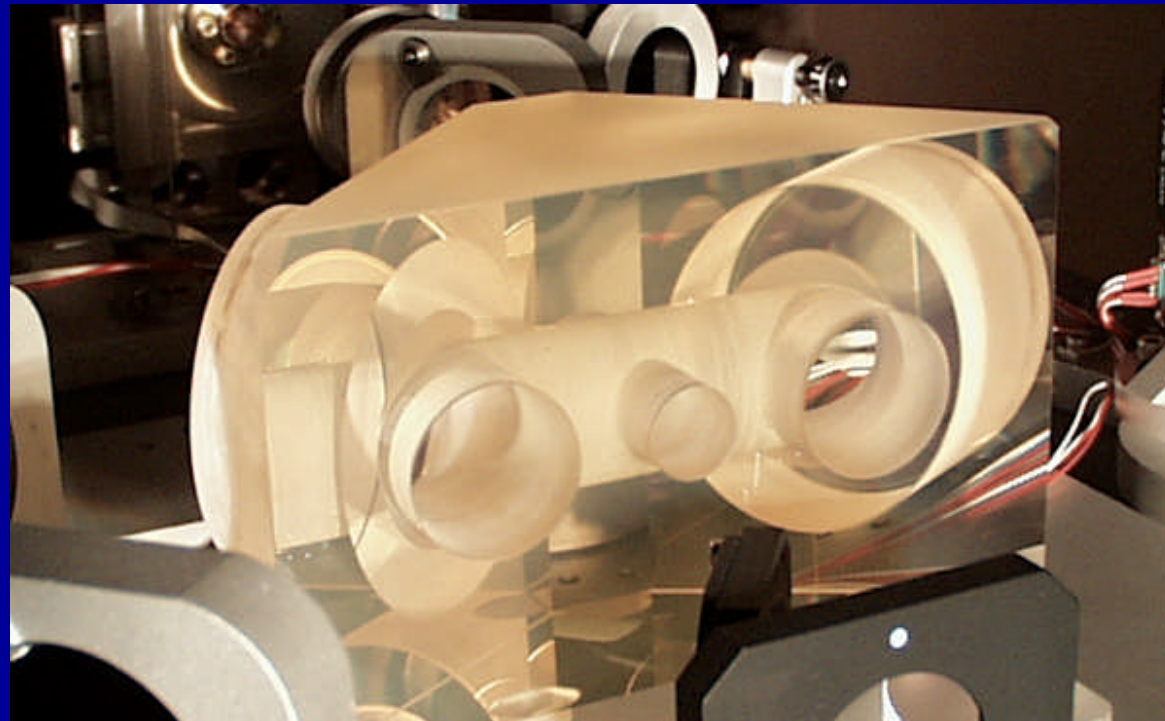


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Present DiHedron



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Options DiHedron

Clamp existing DiH on Bench, or suspend it:
solves only jumping, not losses

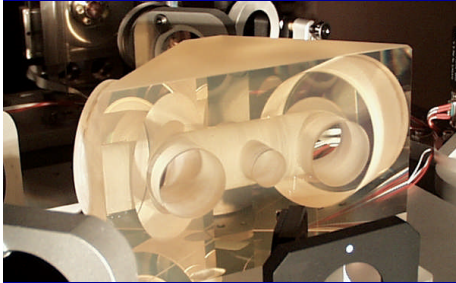
Clean mirrors:
not easy - chance for success... ?

Replace DiH by 2 suspended mirrors (GEO600)
quite involved, crowded IB, commissioning?

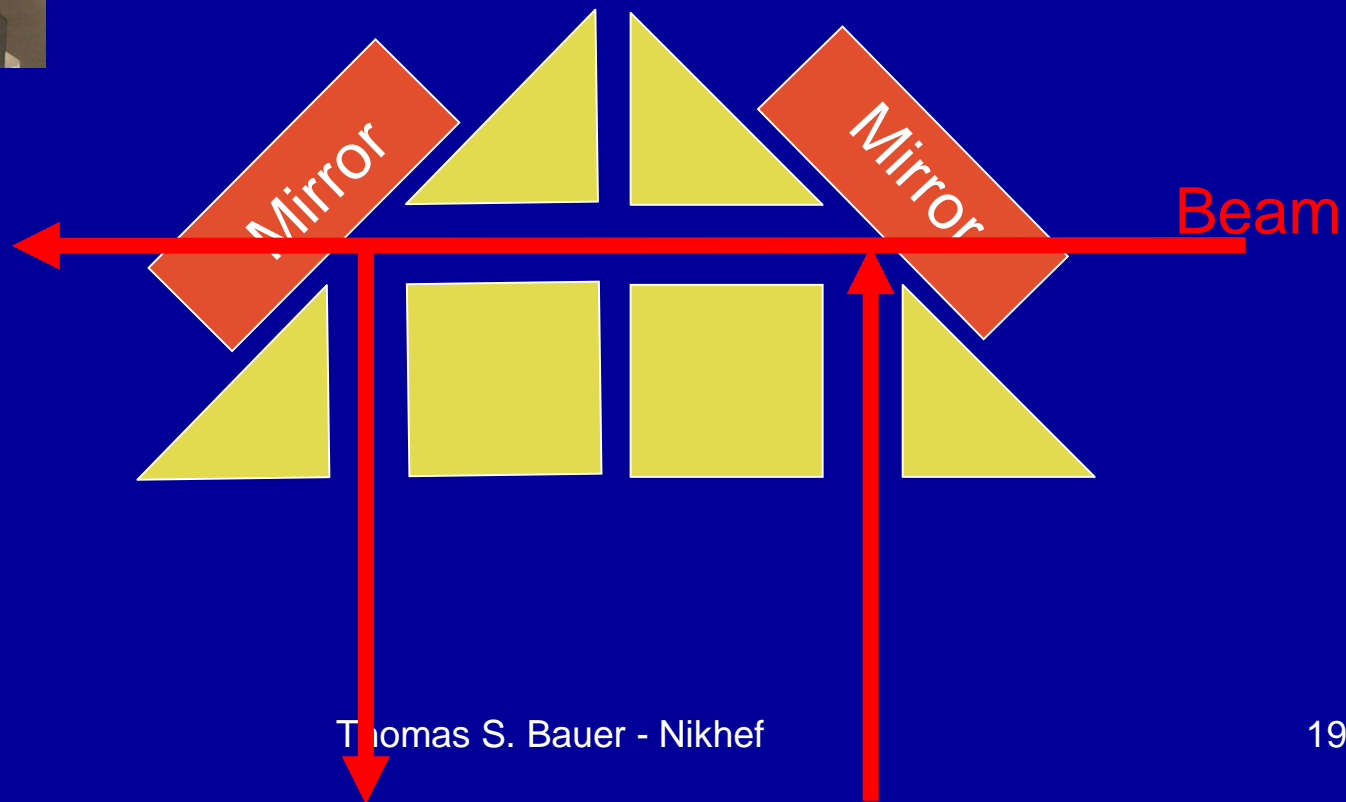
new DiH with larger apertures:
solves only part of problems

Other ???

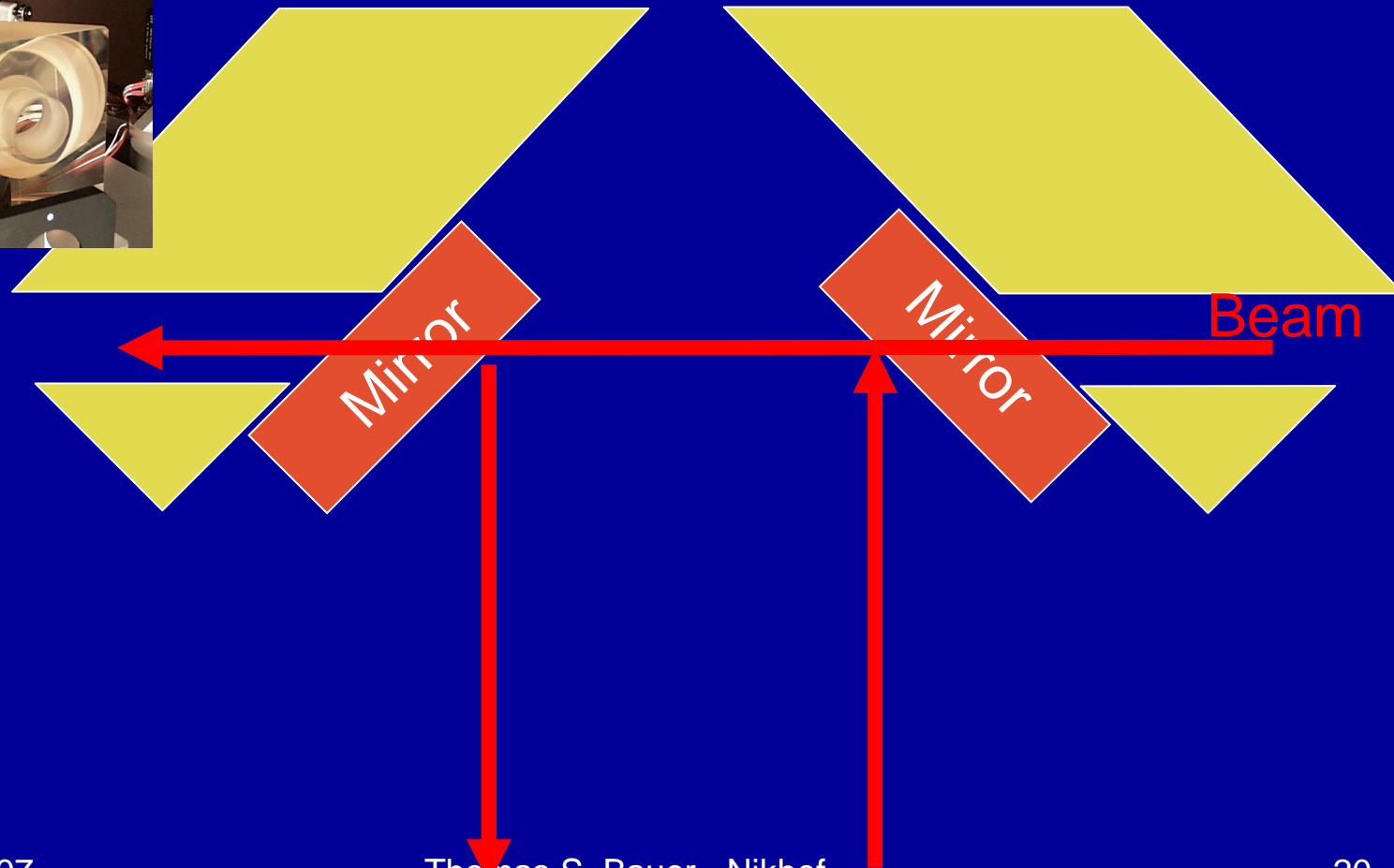
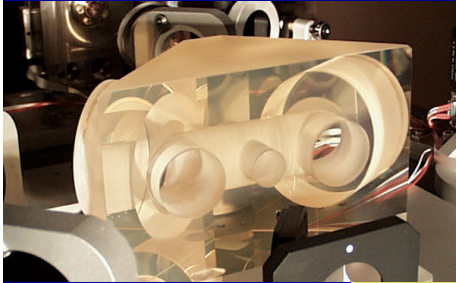
Present DiHedron



Channel for alignment



inverted DiHedron (?)



FEA inverted DiHedron

$$L = 55$$

$$D = 54$$

$$S = 20$$

$$R1 = 10$$

$$R2 = 17.5$$

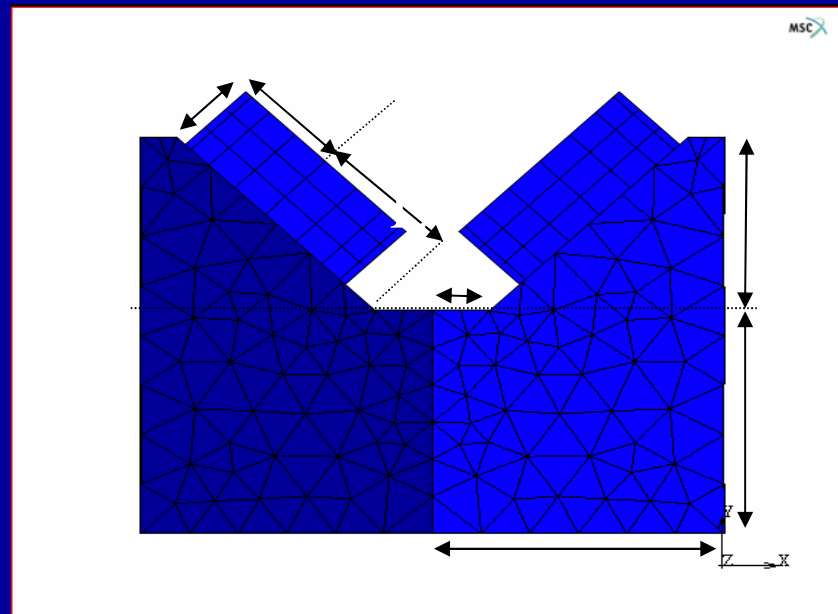
$$R3 = 40$$

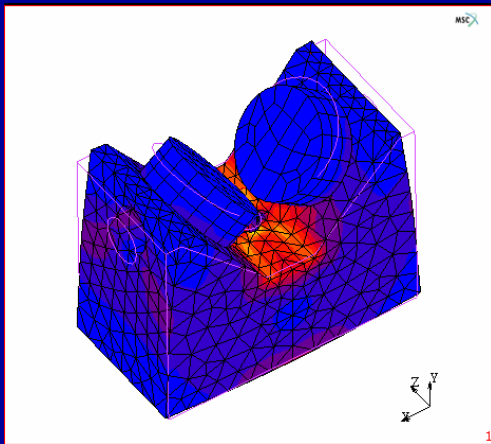
$$T = 30$$

$$H1 = 90$$

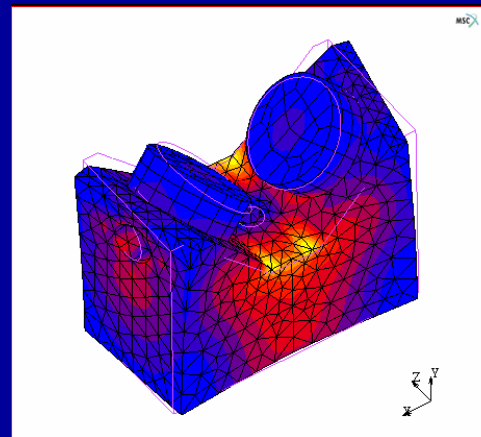
$$H2 = 70$$

$$H3 = 5$$

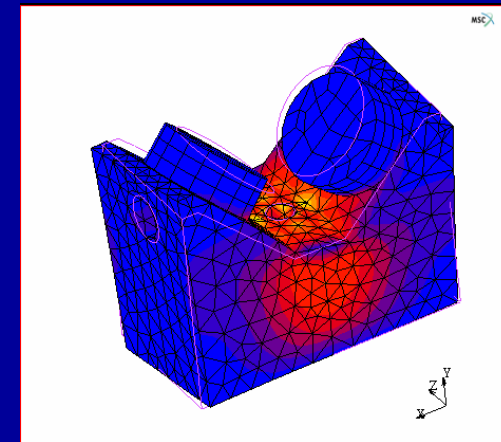




Oscillation in X-Y plane
4250 Hz



Oscillation in X-Z plane
7500 Hz



3D-Torsional mode
4600 Hz

QuickTime™ and a
Microsoft Video 1 decompressor
are needed to see this picture.

Advantages vs. Problems

2 "minitowers" for independent mirrors complicated:

- very crowded area,
- commissioning needs quite considerable time

Inverted DiHedron:

need to get good idea on whether it is possible;
prelim. FEA indicates: lower frequency

Seems to be a nice idea, but is it a viable option??

Summary

End mirror:

Design tooling, Gearbox, started
need to finalize and approve it
start production

Marionetta: produce a new one? or modify existing one?

DiHedron:

available information collected, no decision yet.

Independent mirror suspension looks quite complicated.

New Dihedron with larger aperture ? inverted?