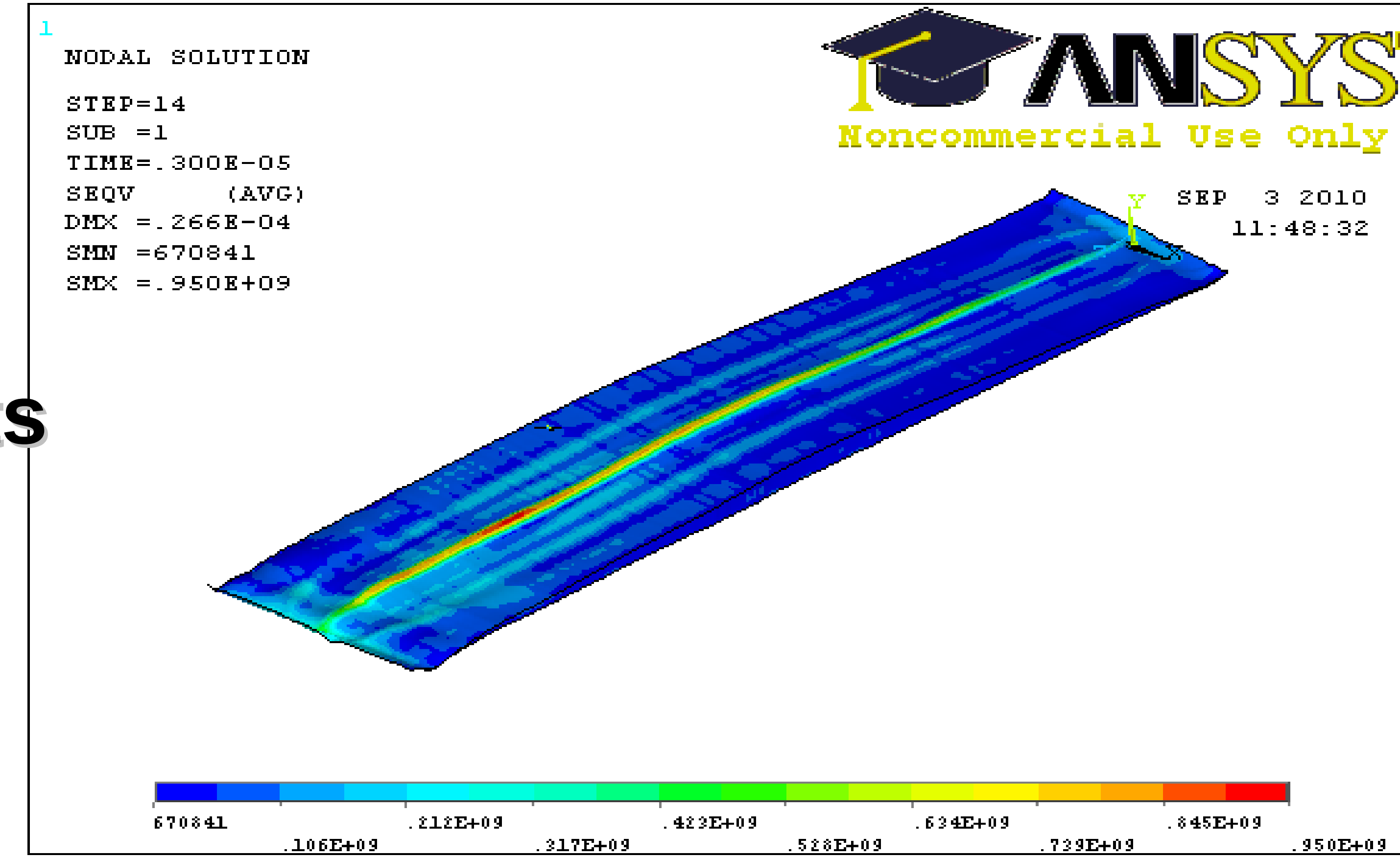
AWG5 summary

Conveners: L. Gatignon, R. Tomas & A. Seryi

CLIC collimation exhaustive review

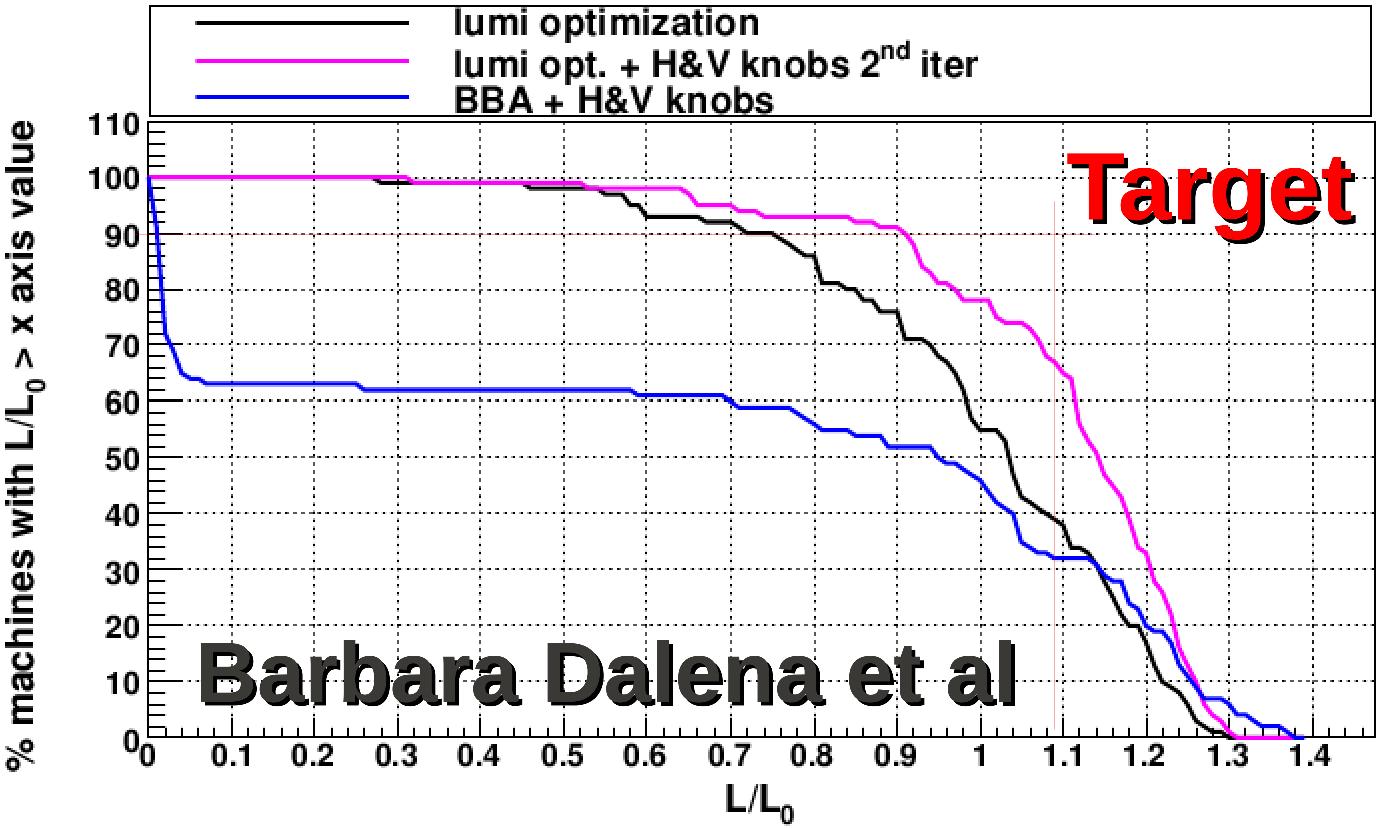
Deep impacts can fracture the collimator.



Solutions: New materials (~hollow collimators), non-linear collimation, etc

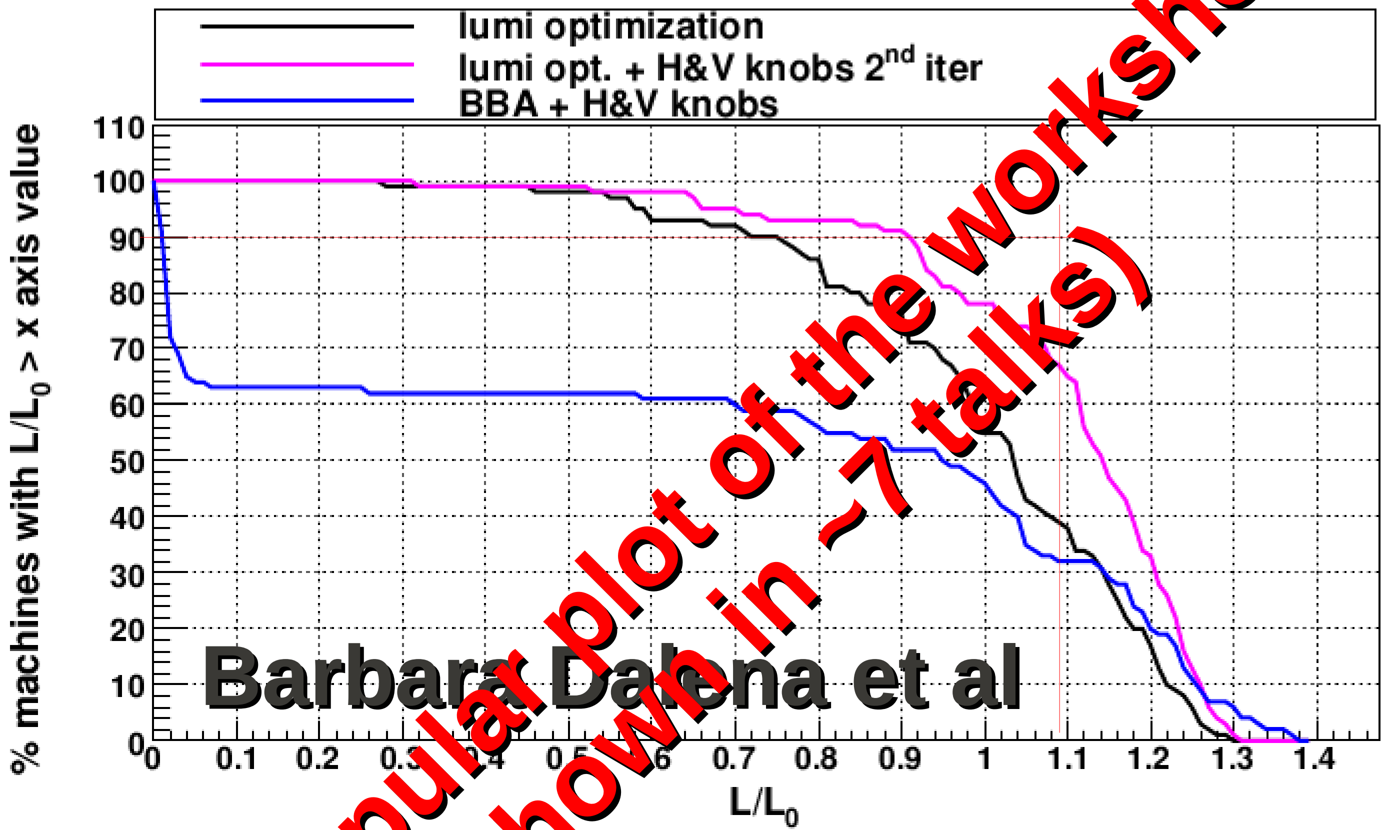
J. Resta et al

Progress in tuning the CLIC FFS



Combining Simplex with knobs almost meets the target. Needs work and other options.

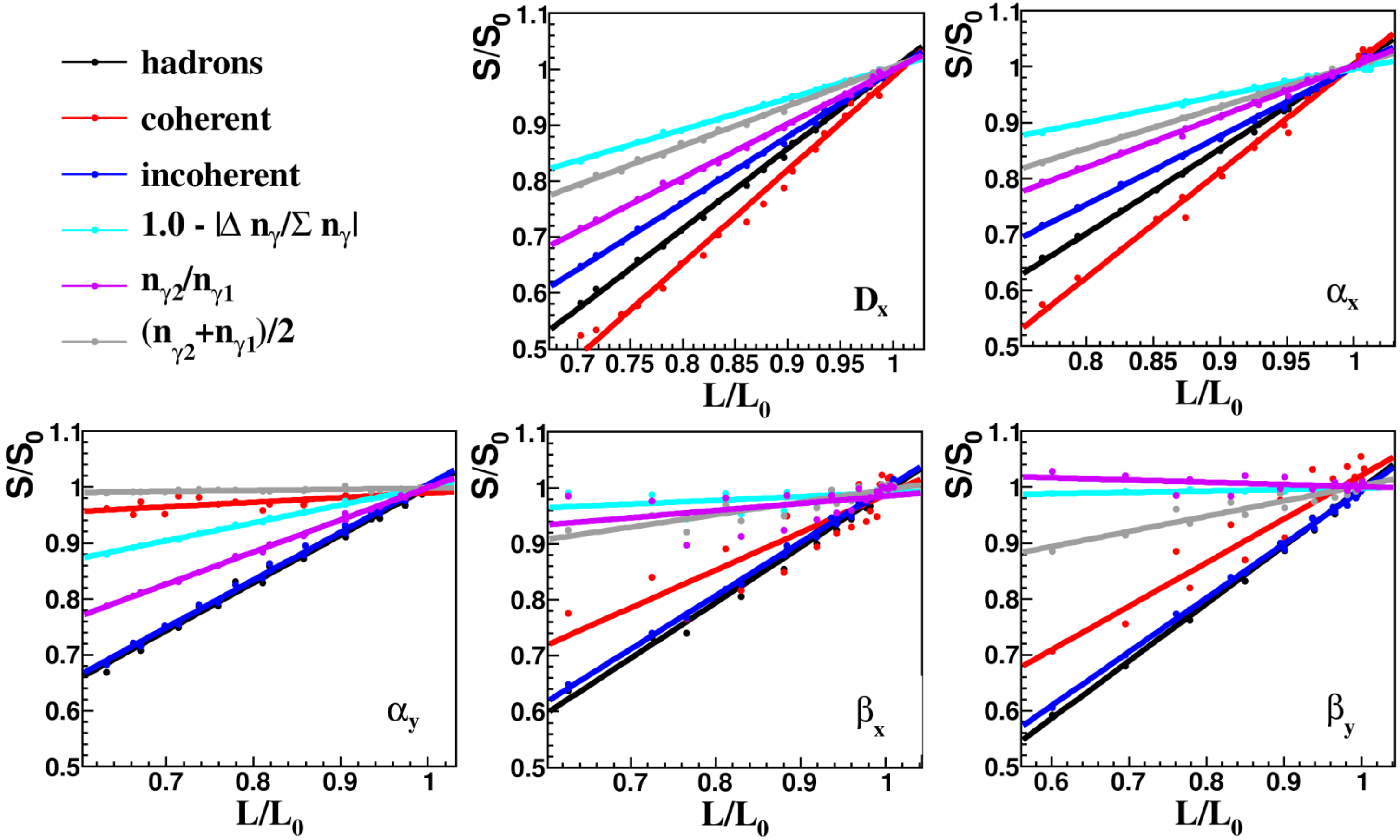
Progress in tuning the CLIC FFS



Most popular plot of the workshop!
(shown in ~7 talks)

Hadron events are a great luminosity signal!!

B. Dalena



Hadron signal is well correlated with luminosity for all linear beam aberrations at the IP

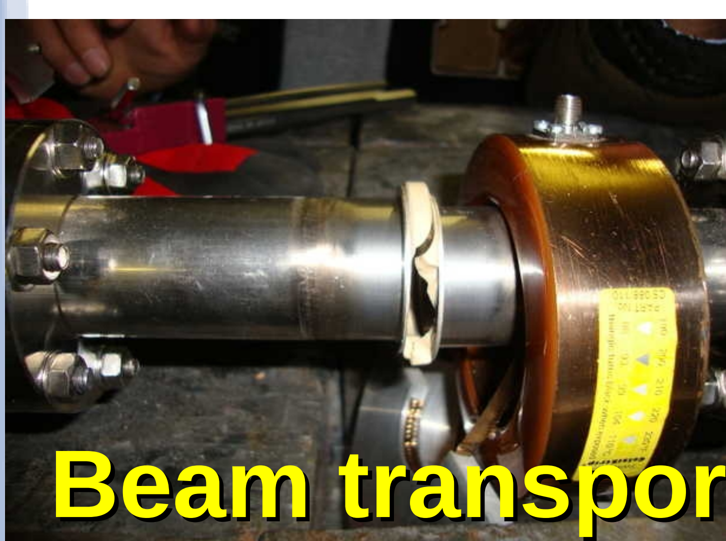
Traditional FFS for CLIC?

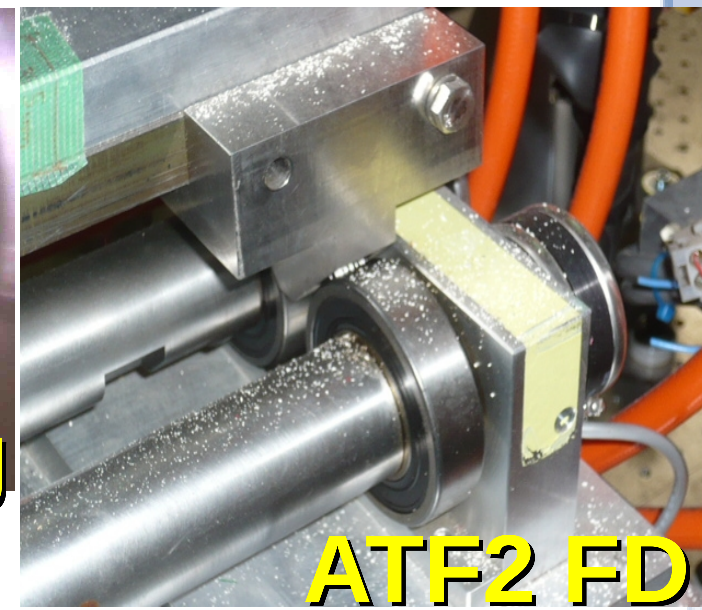
H. Garcia

	Traditional 1	Traditional 2	Nominal
Length [km]	3	1.5	0.5
Luminosity [L_0]	0.80	0.73	1
Bandwidth [%]	0.40	0.37	0.59

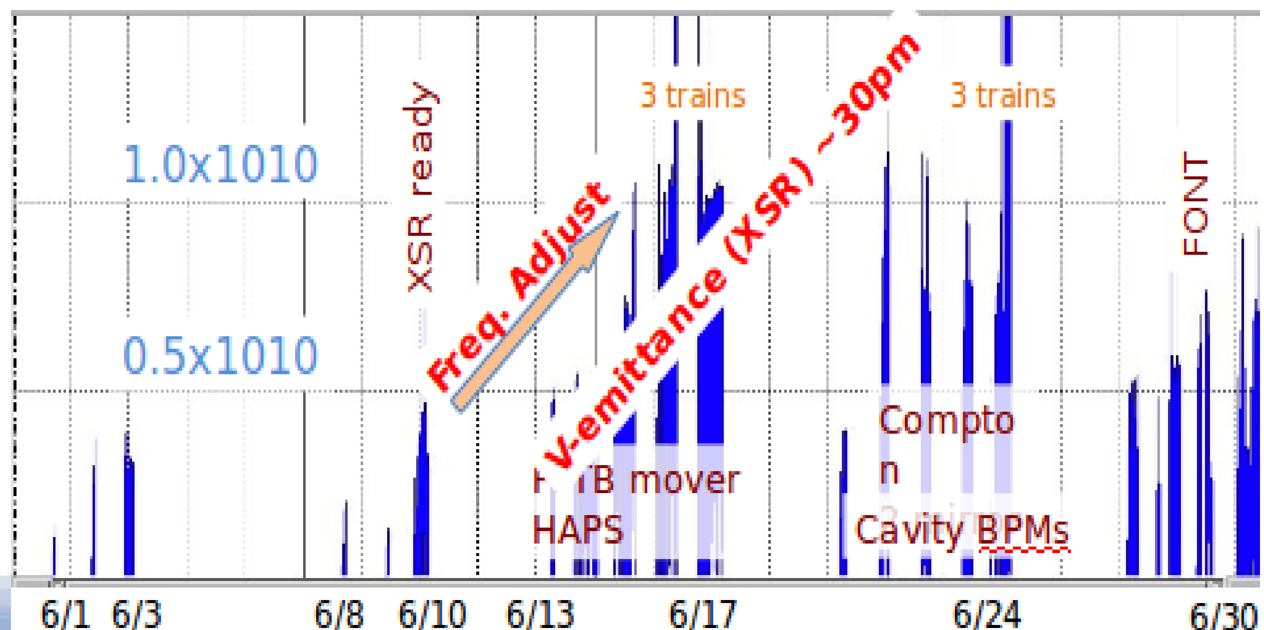
Current local chromaticity FFS scheme is clearly superior to the traditional design, to be improved

ATF2 – Impressive recovery from earthquake

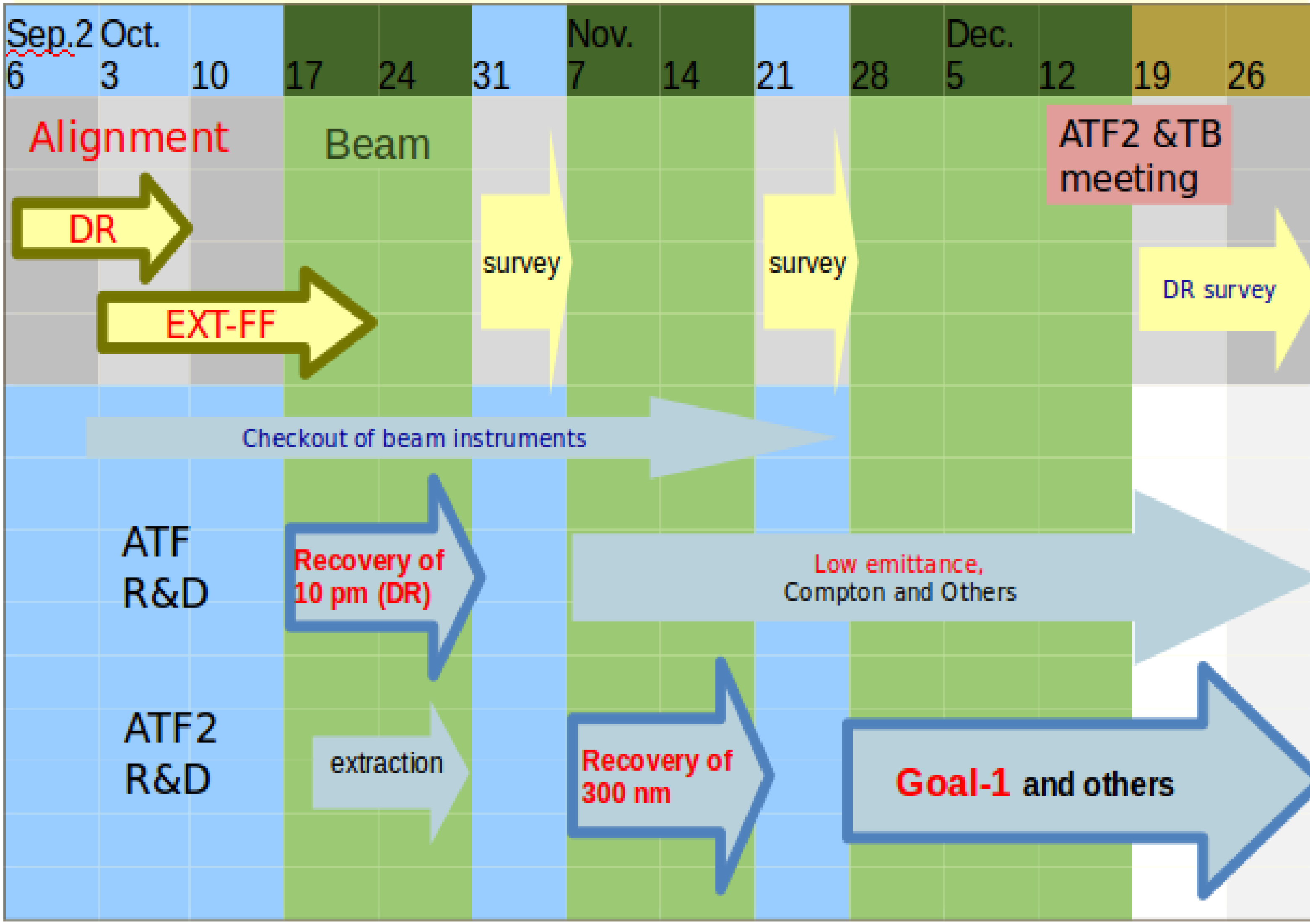




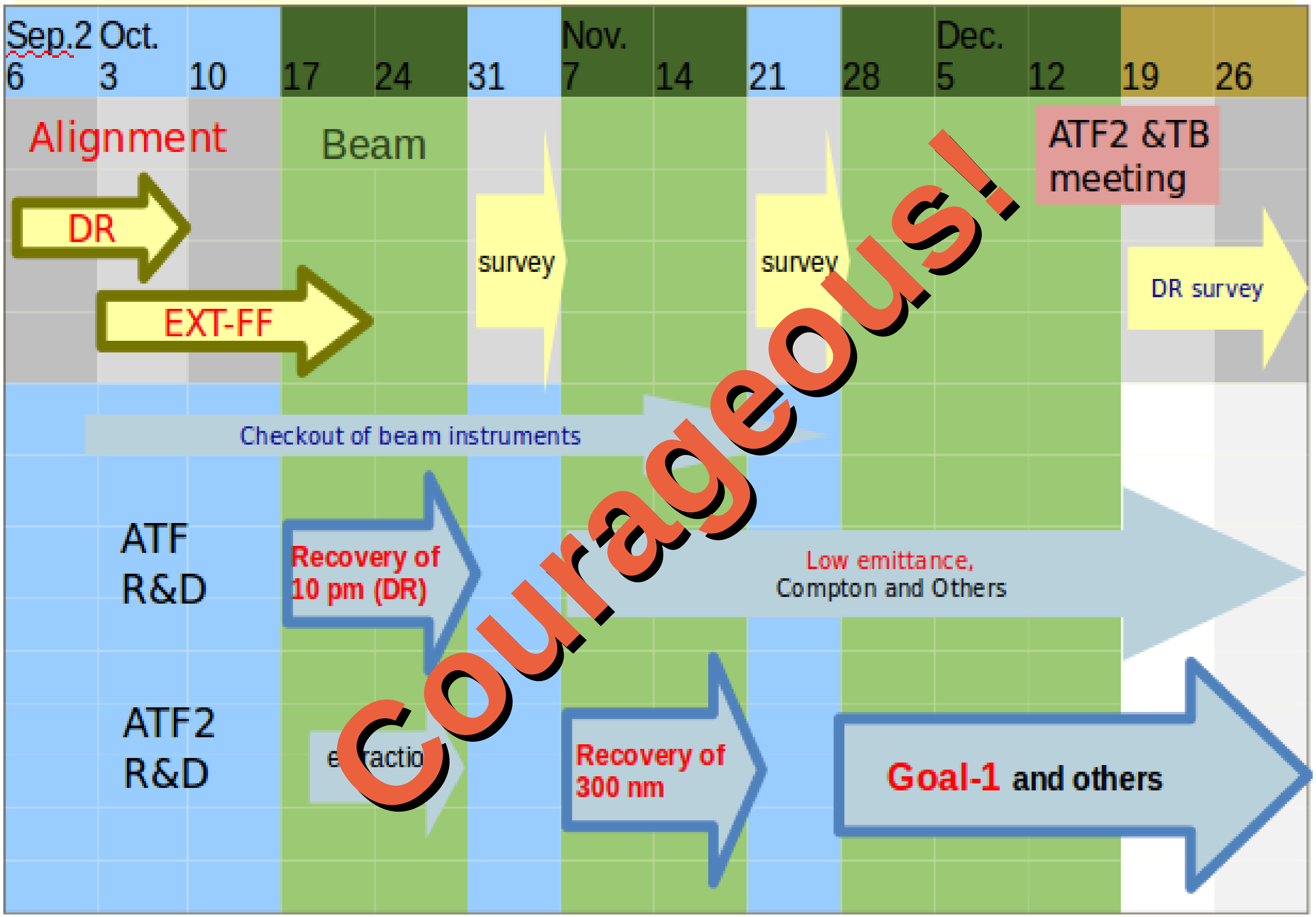
Beam back already in June!



ATF2 schedule



ATF2 schedule



Planning for Goal1 (Autumn)

P. Bambade

October (2 weeks)	- alignment day-time → beam evenings & nights
	- DR tuning (emittance ~ 10 pm, reproducible extraction orbit), extraction
November week-1	- if needed, further DR tuning (emittance reduction, reproducible & stable extraction)
	- initial R-matrix, BBA, steering, linear optics, BSM laser wire test
November week-2	- Trial run with "goal 1" 6-shift block; ➔ recover 300 nm spot in BSM interference mode
December week-1	- further R-matrix, BBA, steering, linear optics
	- IP beam stability test with IP-BPM, slow feedback
	- decision on whether to increase β* by factor 5
December week-2 **December week-3**	- focus on "goal-1" 6-shift blocks in weeks 2 and 3; ➔ validate 30° BSM fringe mode with σ_y < 300 nm; - initial test of 174° BSM mode if possible

Planning for Goal1 (Autumn)

P. Bambade

Discussion: not Aggressive enough !!

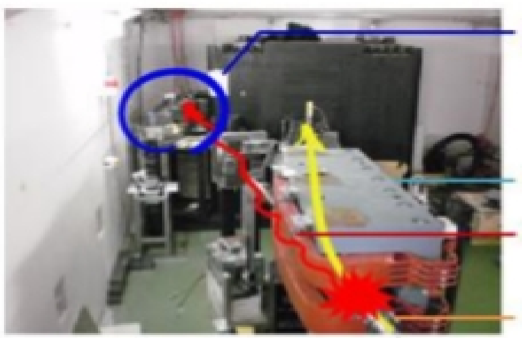
October (2 weeks)	- alignment day-time → beam evenings & nights
	- DR tuning (emittance ~ 10 pm, reproducible extraction orbit), extraction
November week-1	- if needed, further DR tuning (emittance reduction, reproducible & stable extraction)
	- initial R-matrix, BBA, steering, linear optics, BSM laser wire test
November week-2	- Trial run with "goal 1" 6-shift block; → recover 300 nm spot in BSM interference mode
December week-1	- further R-matrix, BBA, steering, linear optics
	- IP beam stability test with IP-BPM, slow feedback
	- decision on whether to increase β* by factor 5
December week-2 / **December week-3**	- focus on "goal-1" 6-shift blocks in weeks 2 and 3; → validate 30° BSM fringe mode with σ_y < 300 nm; - initial test of 174° BSM mode if possible

Shintake monitor

J. Yan

High BG → **Investigate new BG source ➔ intermediate collimator**

Extra post–IP BG source

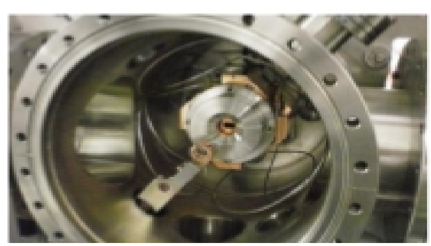


Beam size jitter → **New status display**

Monitor beam profile, magnet current

Beam position jitter → **IPBPM + upstream BPMs**

Requirement for 30 mode, σy ~ 100 nm:
IPBPM res. < 30 nm
Beam position jitter < 50 nm



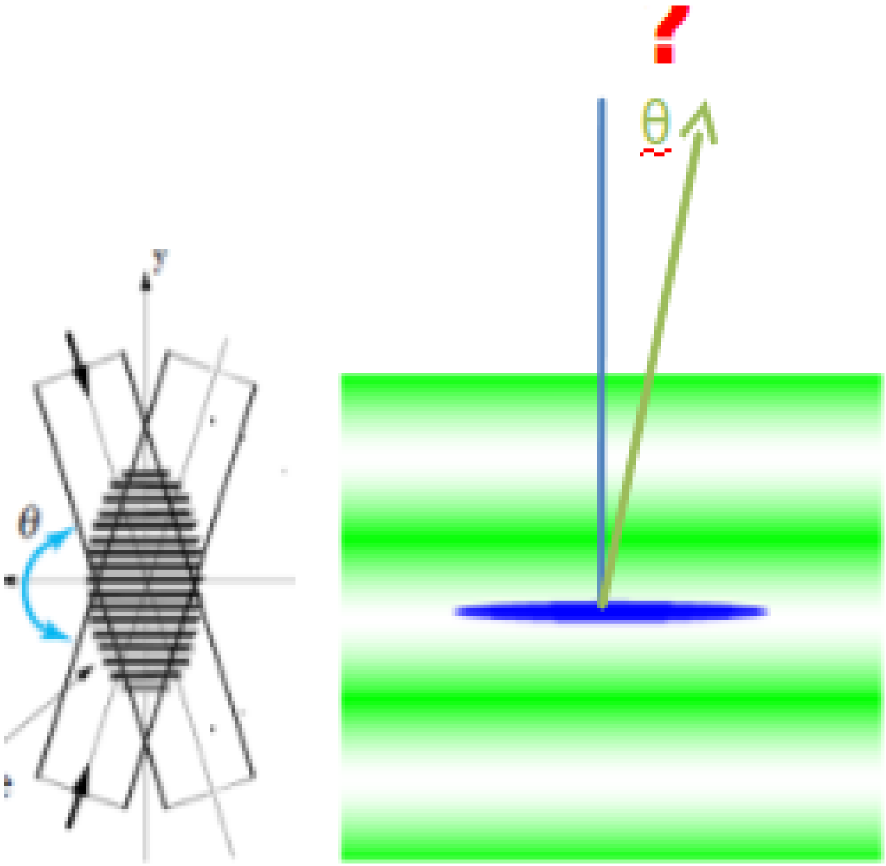
New analysis method:
"atfepics_full"
Include data of all ATF2 BPMs

Needs work!!

S. Boogert

Critical: Rotation of IP BSM

G. White



Can we know/control this at the 100urad level?

New lattice

G. White

	BX1BY1	BX2.5BY1	BX10BY1
MFB2FF waist σx/σy (um)	275/0.67	249/0.57	150/1.16
IP σx/σy (um/nm)	4.2/**35.8**	4.5/36.3	8.9/36.0
IP 3rd order subtracted σy (nm)	**34.3**	34.0	34.2
IP effective βy / mm	0.098	0.096	0.097
Dominant residual aberrations and contributions / nm	T344(0.8), U3246 (0.2)	T344 (2.1), U3244 (0.1)	T344(1.2), U3246(0.1)

Discussion: Consensus to use BX2.5BY1

New FD quads from CERN?

Tolerances for QD0FF and QF1FF at a $r_a = 0.02$m

H. Garcia
E. Marin

Multipole	Sextupolar $[10^{-4}]$		Octupolar $[10^{-4}]$	
Component	Normal	Skew	Normal	Skew
QF1/QD0	0.83	0.109	2.61	0.304

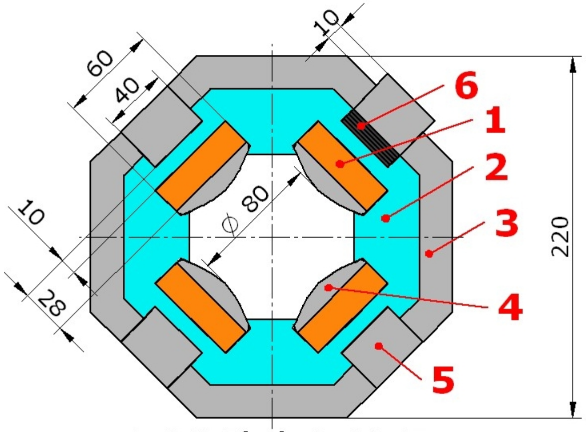
Multipole	Decapolar $[10^{-4}]$		Dodecapolar $[10^{-4}]$	
Component	Normal	Skew	Normal	Skew
QF1/QD0	3.04	0.542	8.11	1.28

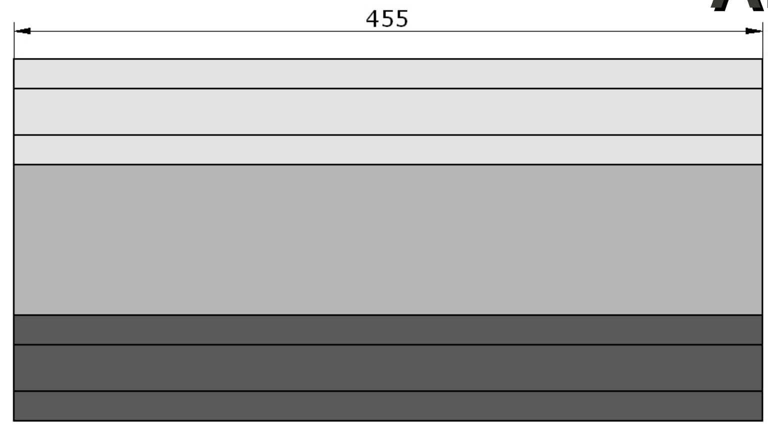
Reaching 25-30nm in ATF2 requires:
-new FD quads,
-swapping quads
-increase β^*_x

S. Bai & E. Marin

New QF1 & QD0 design

A. Vorozhtsov





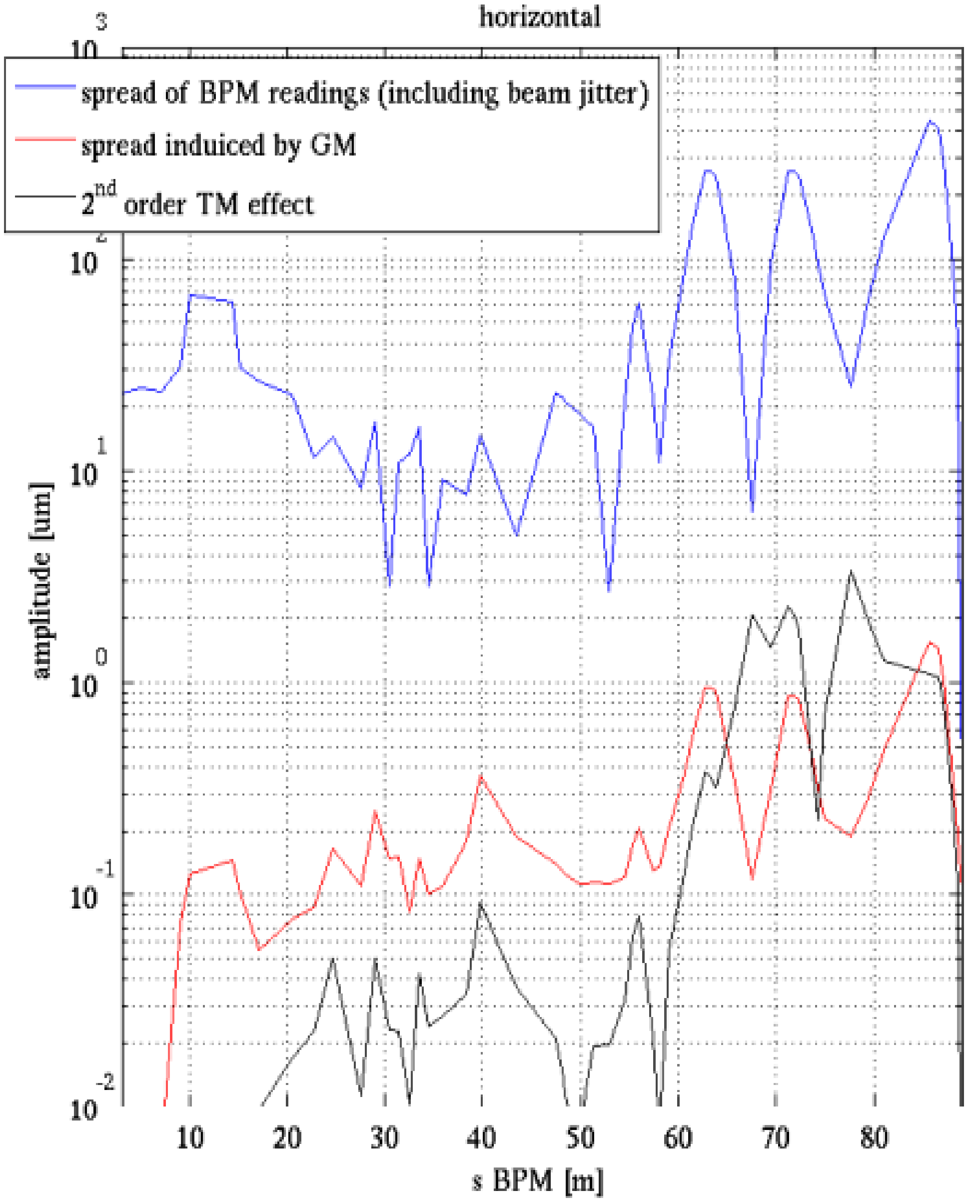
Hybrid
Large aperture

1- P.M. Block, Sm2Co17
2- Aluminium core
3- Return Yoke, AISI 1010
4- Pole Tip, AISI 1010
5- Tuning block, AISI 1010
6- Spacers, Stainless steel

Magnet Name	QF1FF		Linac 4(Proto)			
Gradient	6.791 T/m		~16 T/m			
Aperture radius	40 mm		22.5mm			
GFR radius	20mm (50%)		15 mm (67%)			
Harmonic N	Required		MSRD@15 mm		Scaled@11.25 mm(50%)	
	an	bn	an	bn	an	bn
3	0.124	0.748	8.5	-5.2	6.38	-3.90
4	0.344	4.12	0.5	6.1	0.28	3.43
5	0.665	2.76	-1.3	-0.3	-0.55	-0.13
6	1.57	9.82	0.8	-2.2	0.25	-0.70

Good Field quality!

Possibility to detect ground motion at ATF2

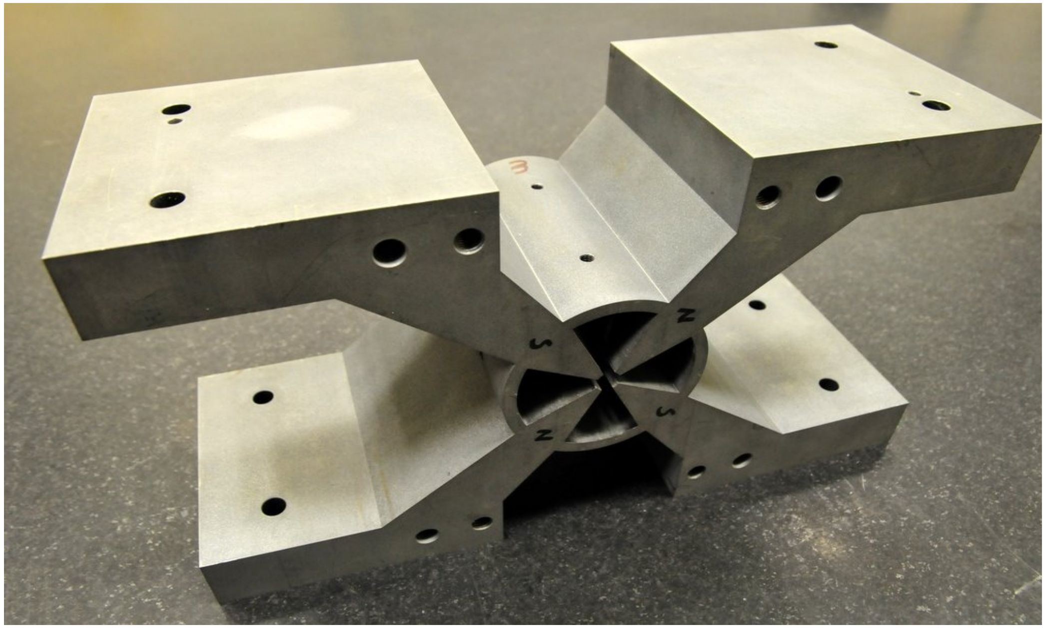


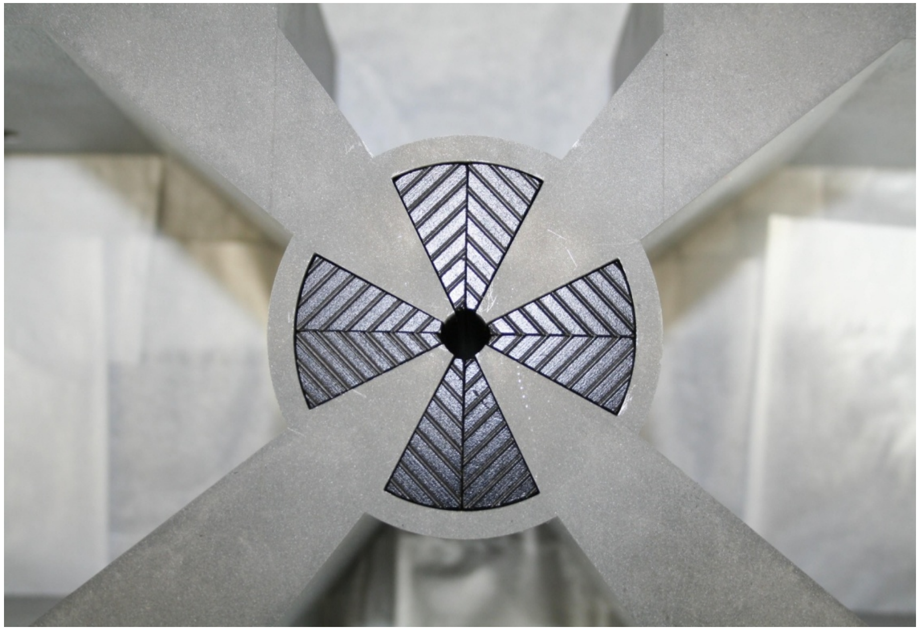
Yves Renier

New algorithm incorporating Sextupole effects

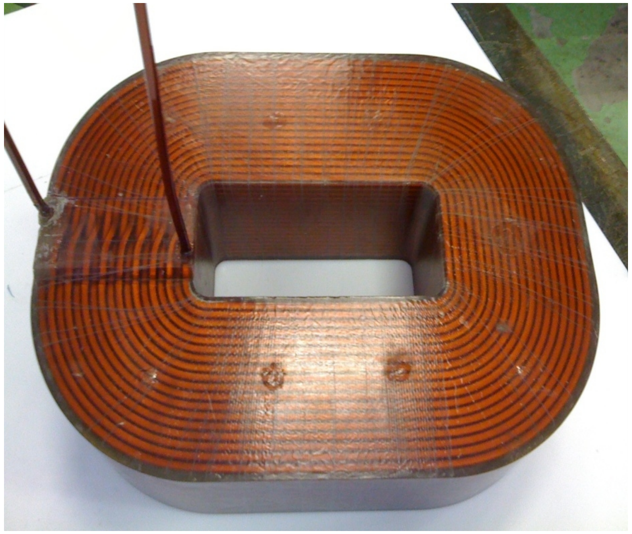
FFS QD0 prototype design and procurement

M. Modena

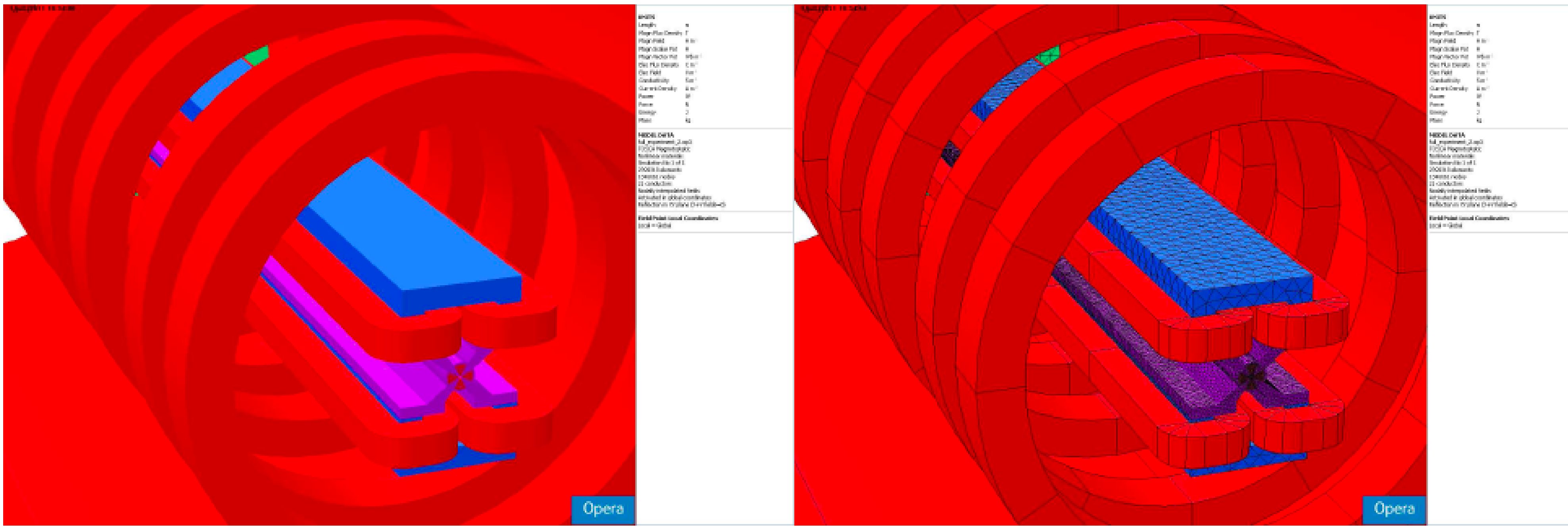




Coils are being manufactured. First tests with coils planned for November.

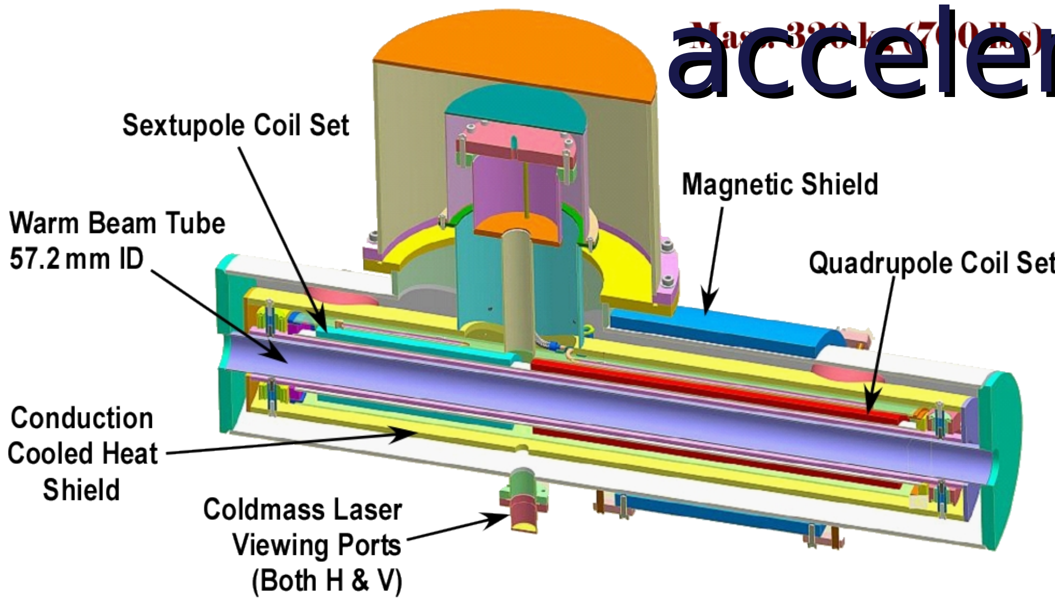


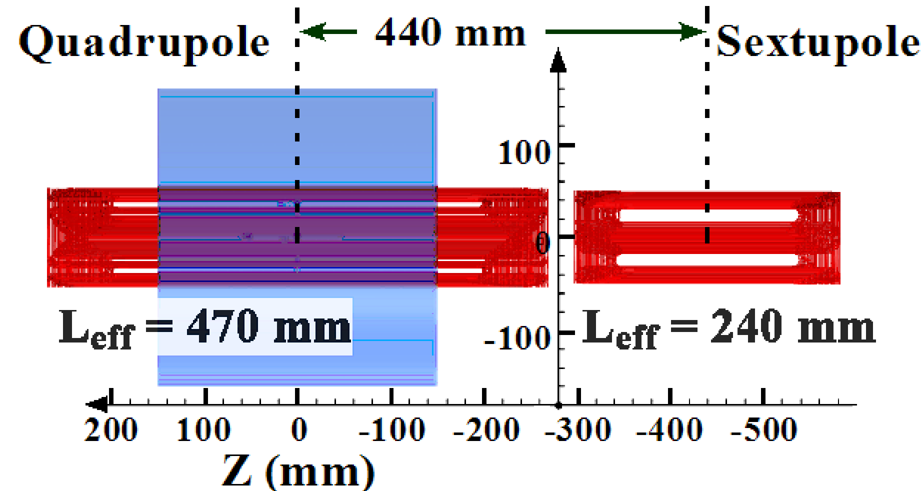
New 3-D simulations for the CLIC anti-solenoid



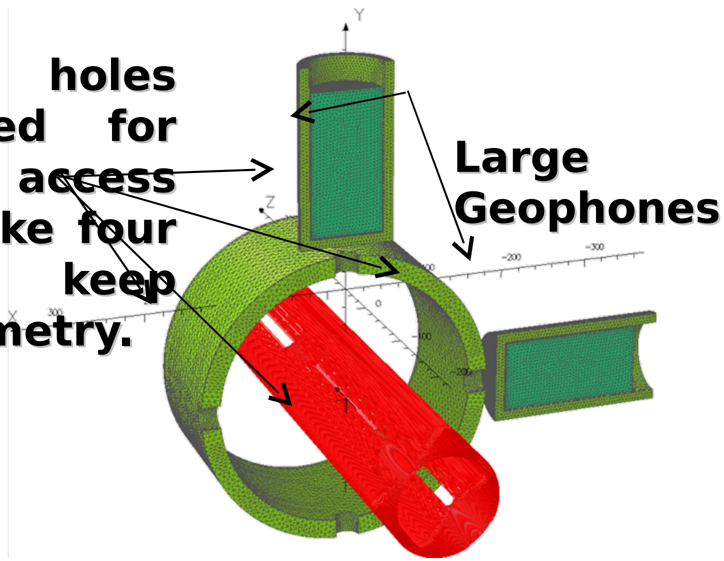
The mayor challenge is the scale difference:
Experiment outer radius = 7 m,
QD0 aperture radius = 4.125 mm.

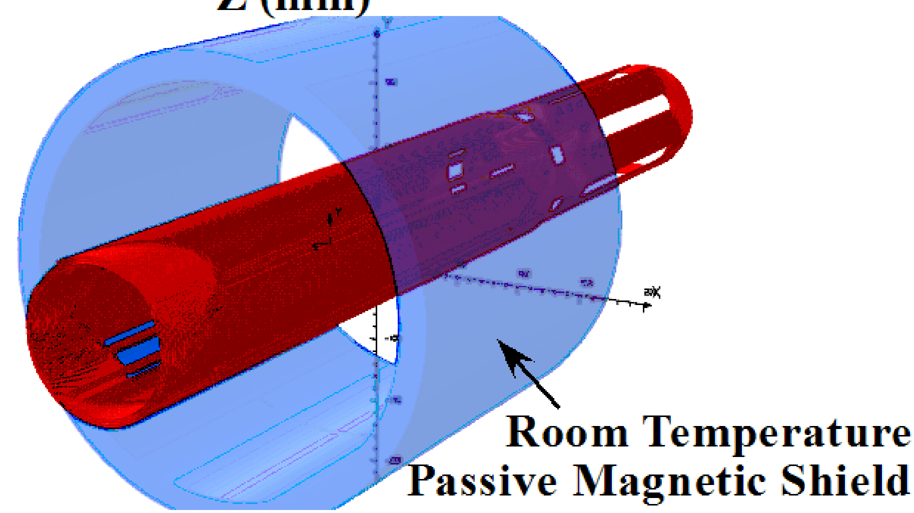
ILC QD0, can we revive accelerator tests?





Only two holes are needed for the laser access but we make four holes to keep quad' symmetry.



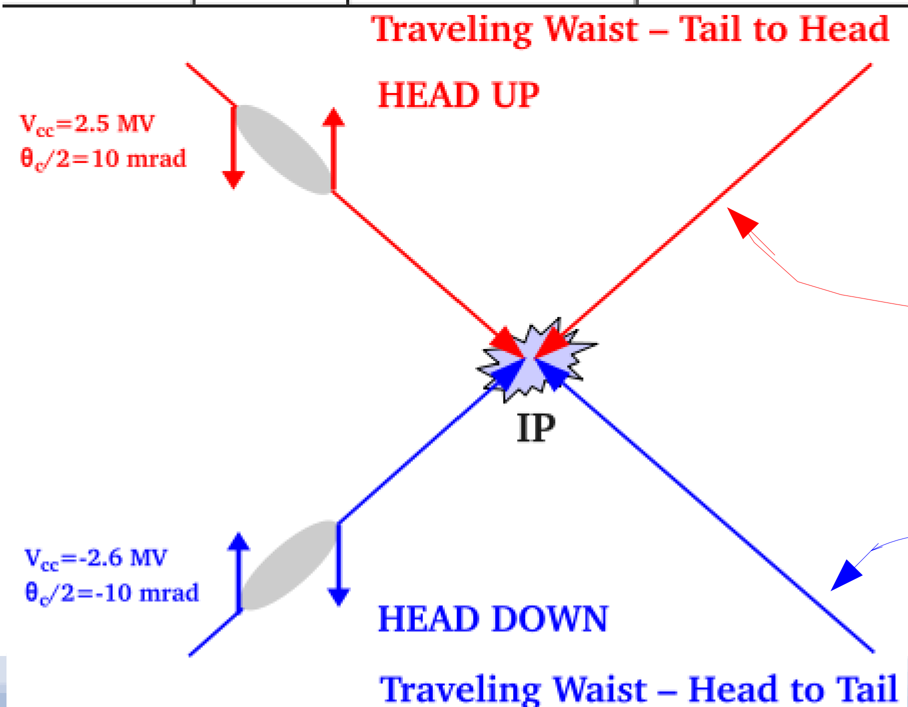


Final Decision: Point laser at quadrupole magnetic center through magnetic shield.

Compensating the CLIC luminosity loss due to the Crab Cavity

Case	CC	E-z corr	$\theta_c/2$	$\mathcal{L}/\mathcal{L}_{\text{Case 1}}[\%]$
1	No	No	0 mrad	100.0
2	Yes	No	10 mrad	95.0
3	Yes	No	-10 mrad	99.2
4	No	Yes	0 mrad	99.0
5	Yes	Yes	10 mrad	94.3
6	Yes	Yes	-10 mrad	99.8

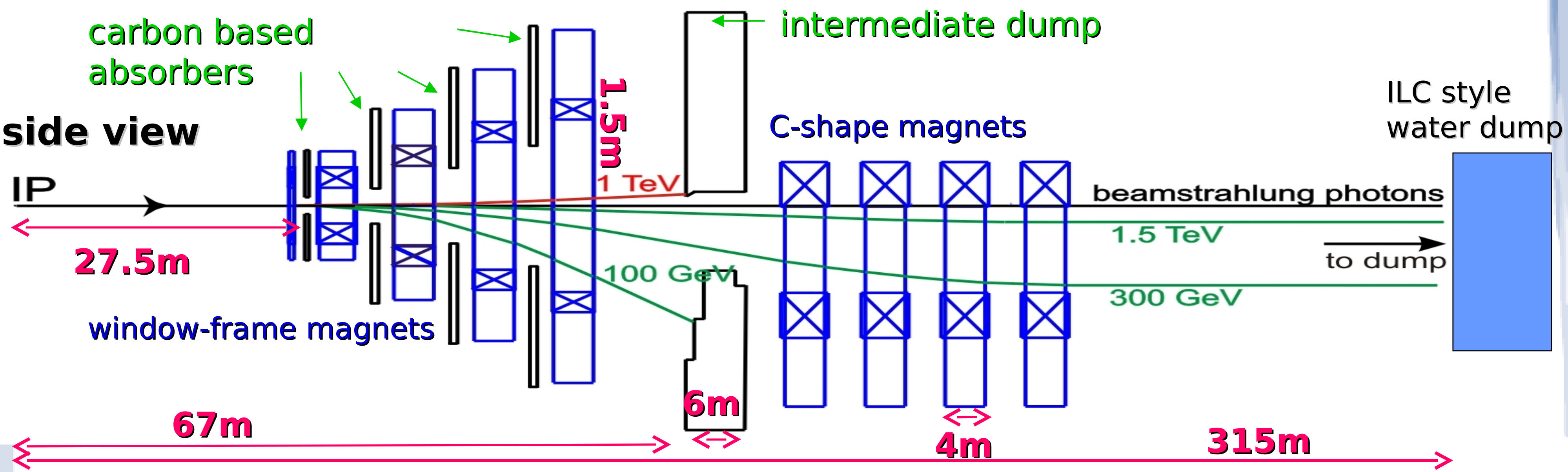
J. Barranco



Crossing scheme matters!!

Post-collision line

E. Gschwendtner



- 5 window-frame dipoles and 4 C-shaped dipoles
- Absorbers and an intermediate dump
  To reduce beam losses in the magnets
- Possible background sources:
  Backscattered photons and neutrons from dump and along post-collision line

Luminosity Monitors

1. Beamline beamstrahlung monitors are based on:

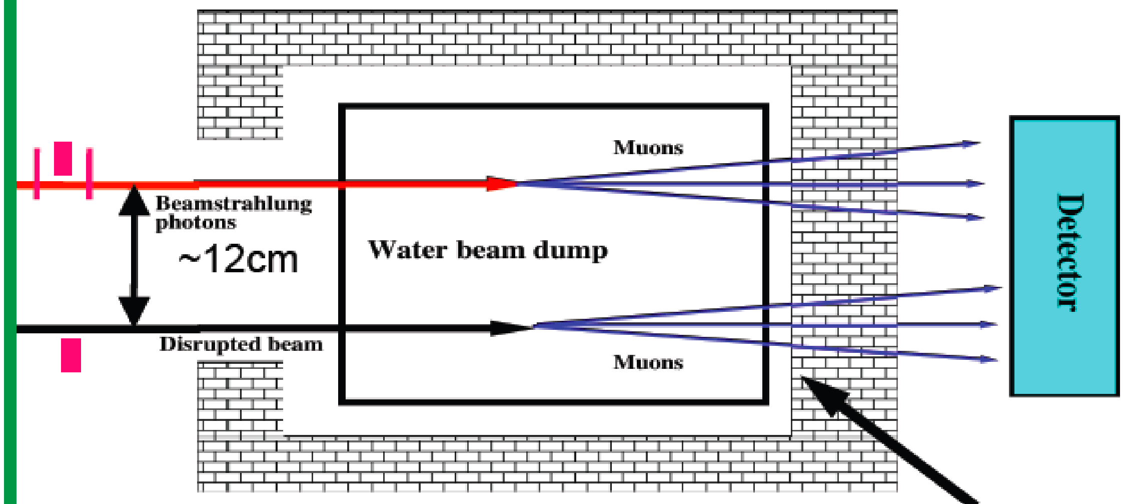
◆ *direct counting of beamstrahlung photons* **or**

◆ *indirect measurement, where the photons could be converted into e+e- pairs in a thin foil.*

2. Beam dump luminosity monitor is based on detection of high energy muons

◆ *High energy muons escape the main dump nearly unaffected, except for small energy losses due to ionization.*

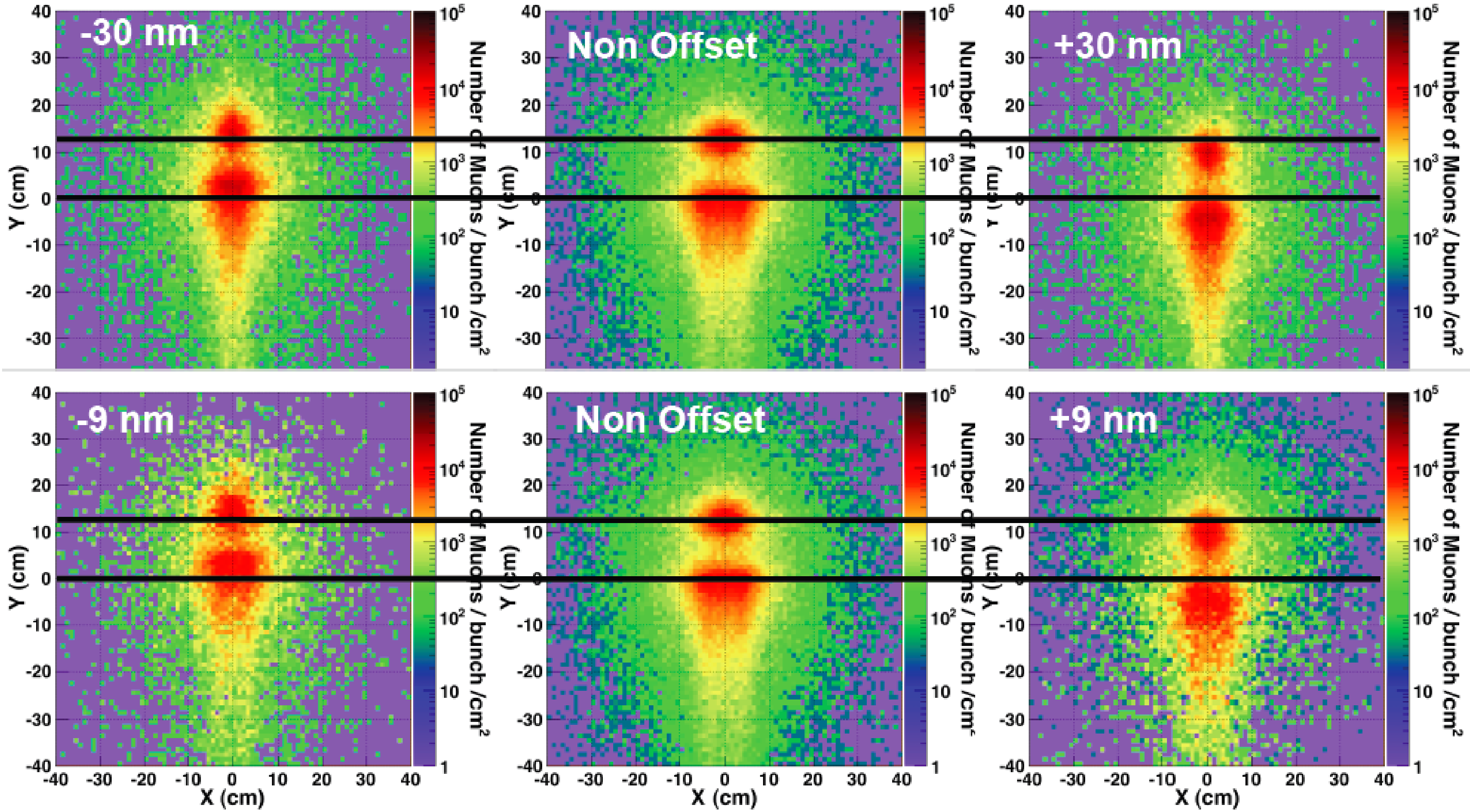
◆ *Transverse distribution of muons depends on the offset of primary beams.*



3×80 cm thick Concrete blocks

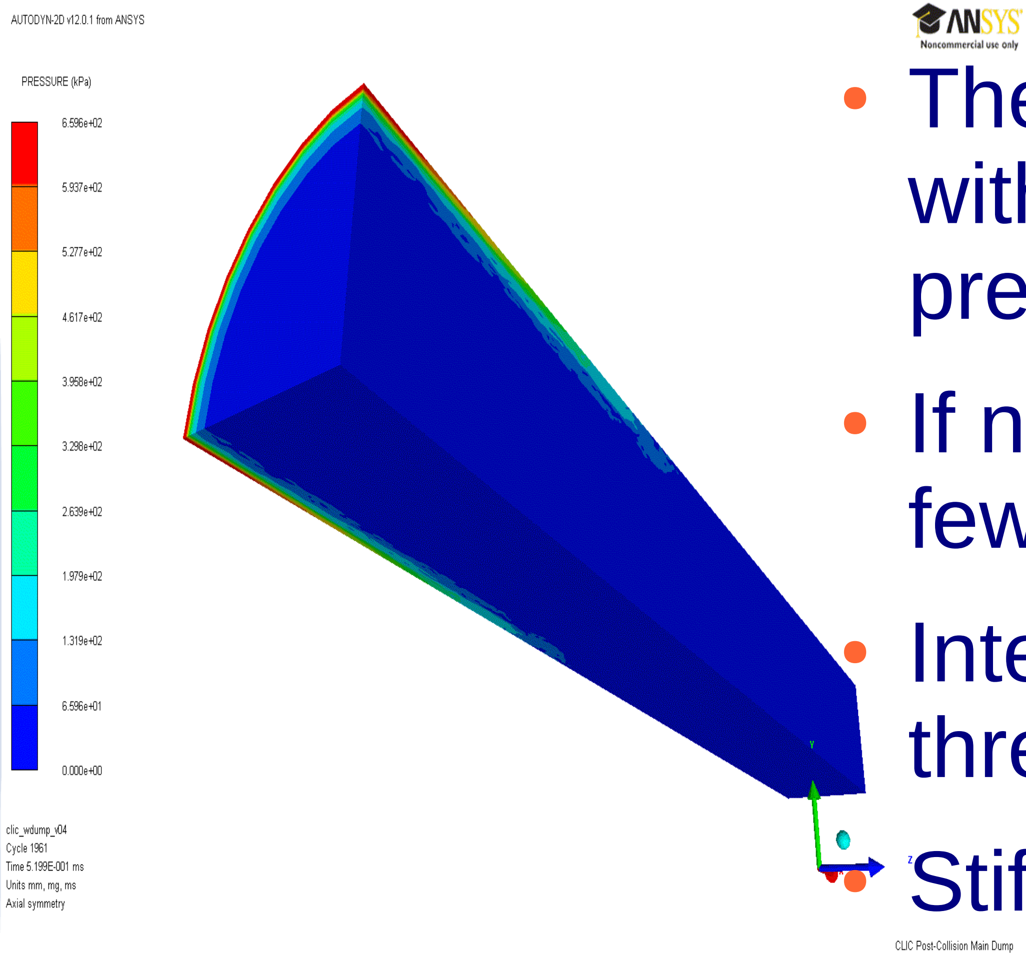
Spatial Distribution of Muons after Beam Dump

(Vertical Offset)



Dump simulations and considerations

C. Maglioni



- The window cannot withstand the hydrostatic pressure
- If no circulation water boils in few pulses
- Interlock must be as fast as three pulses
- Stiffeners on tank & window? sweeping system? Shock absorber?