

LHC Luminosity Upgrade
Interface Issues with ATLAS Detector and Experimental Area
11/1/2007

Q0 with $L^* = 13\text{m}$

Emanuele Laface

Accelerator Technology Department, CERN

Reducing β^*

Moving the existing triplet to 13 meters from the IP could be a way to decrease the value of β^*



Reducing β^*

Moving the existing triplet to 13 meters from the IP could be a way to decrease the value of β^*

but

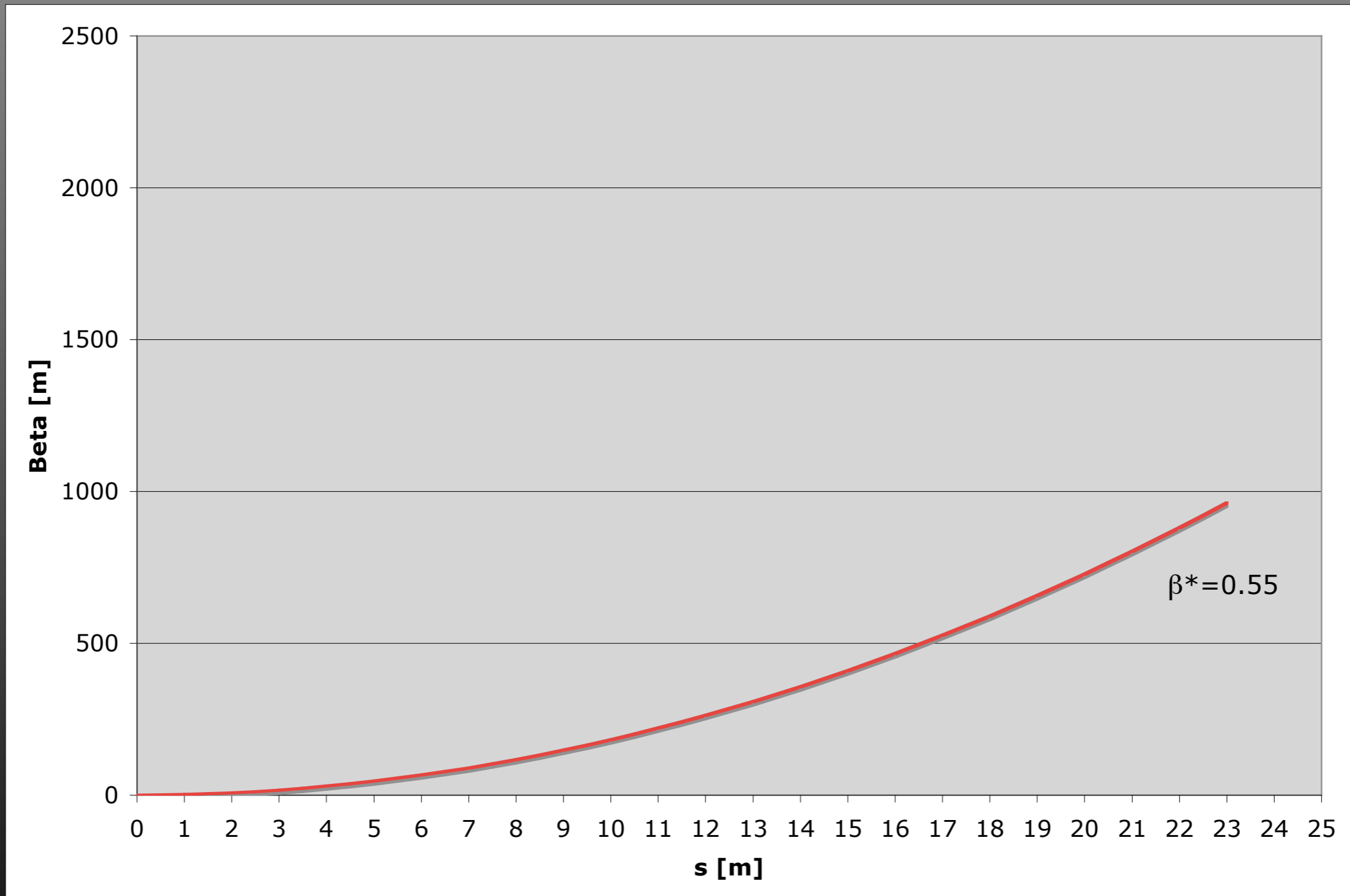
a first analysis shows that, if we want to preserve the size of the triplet in order to have a limited impact into experiments integration, an **increase in gradient or in aperture** is mandatory.



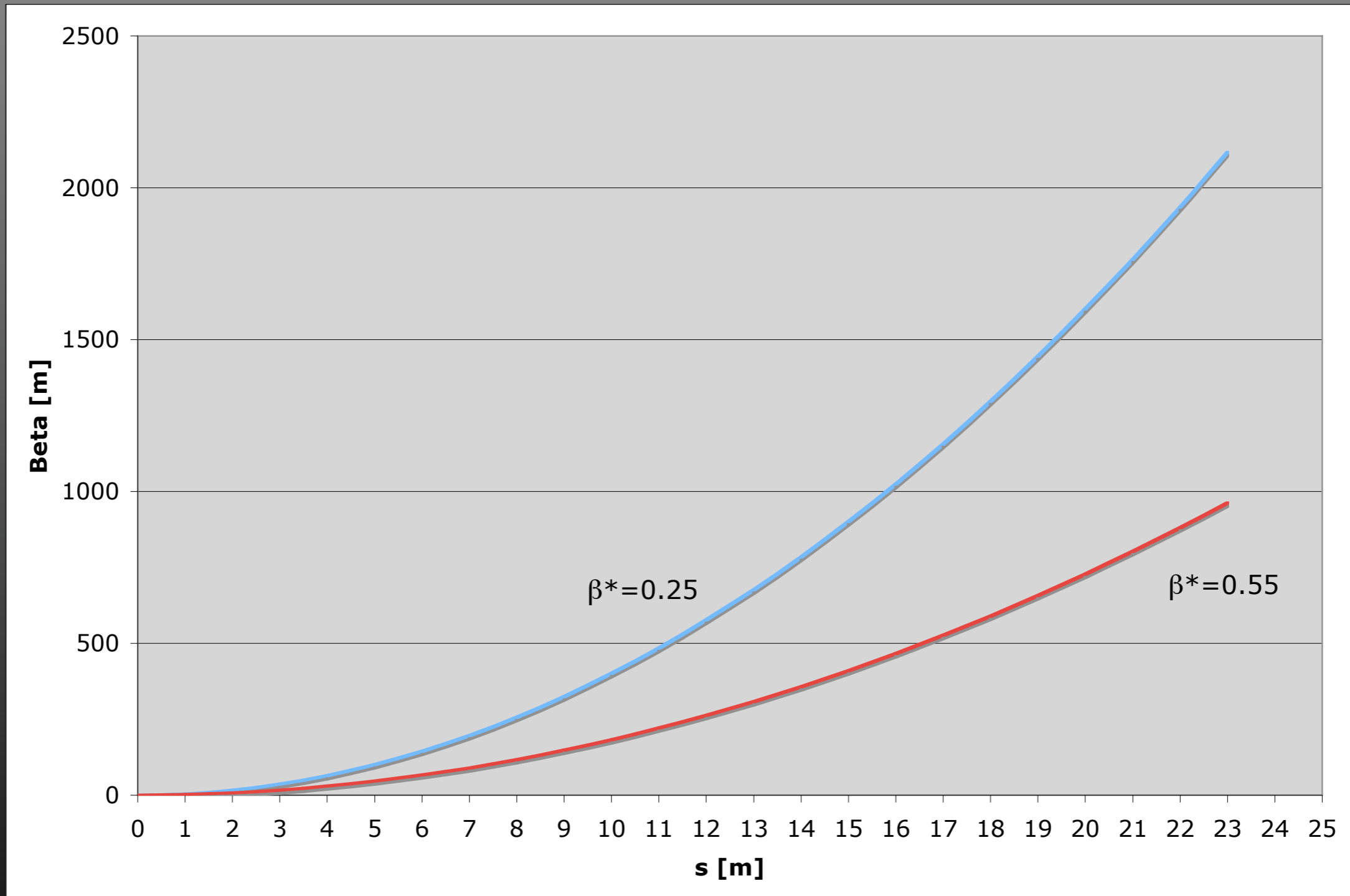
Is there any way to reduce β^* without introducing new technology (Nb_3Sn) or a completely new design of the Triplet?



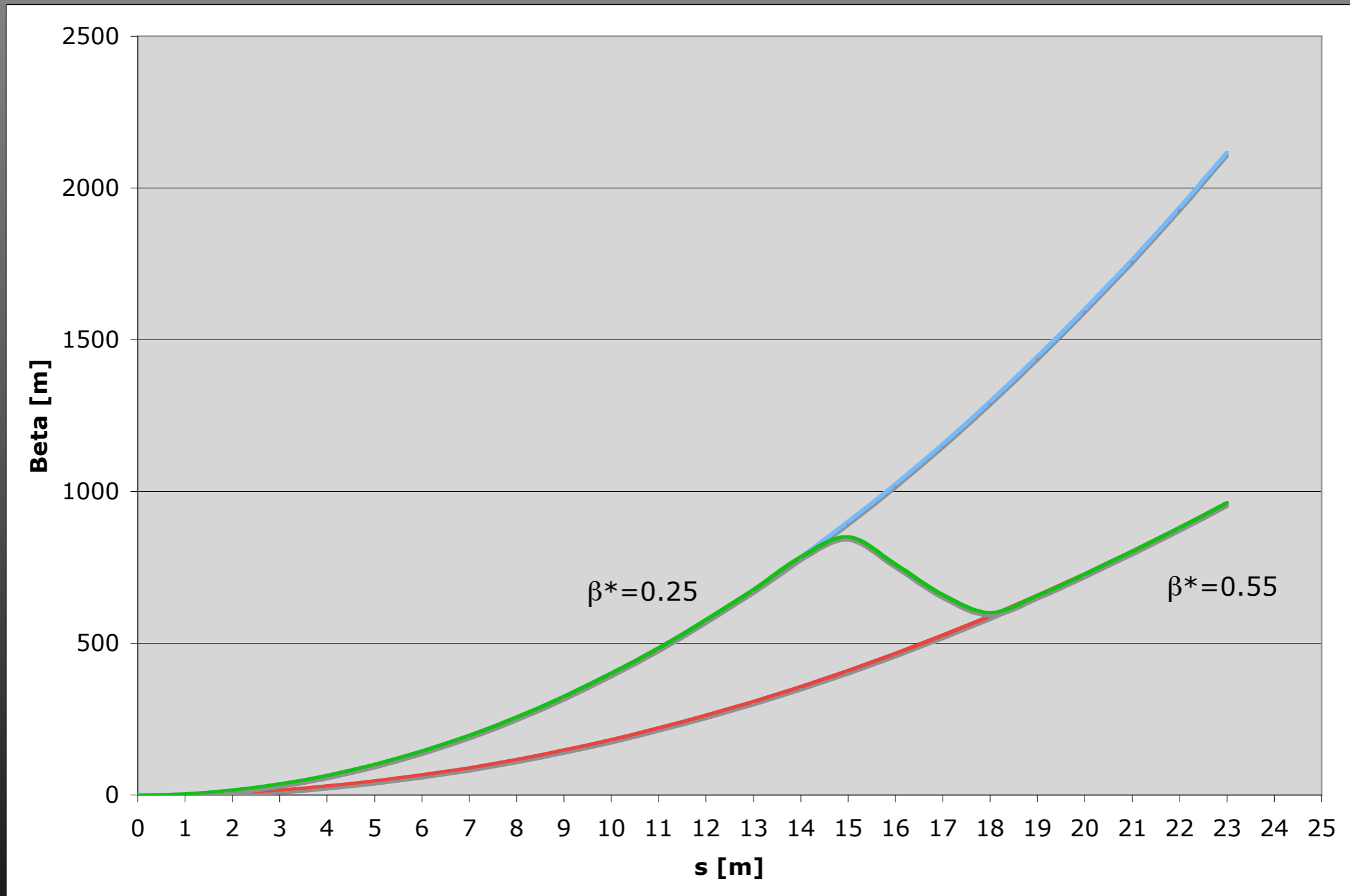
Beta function



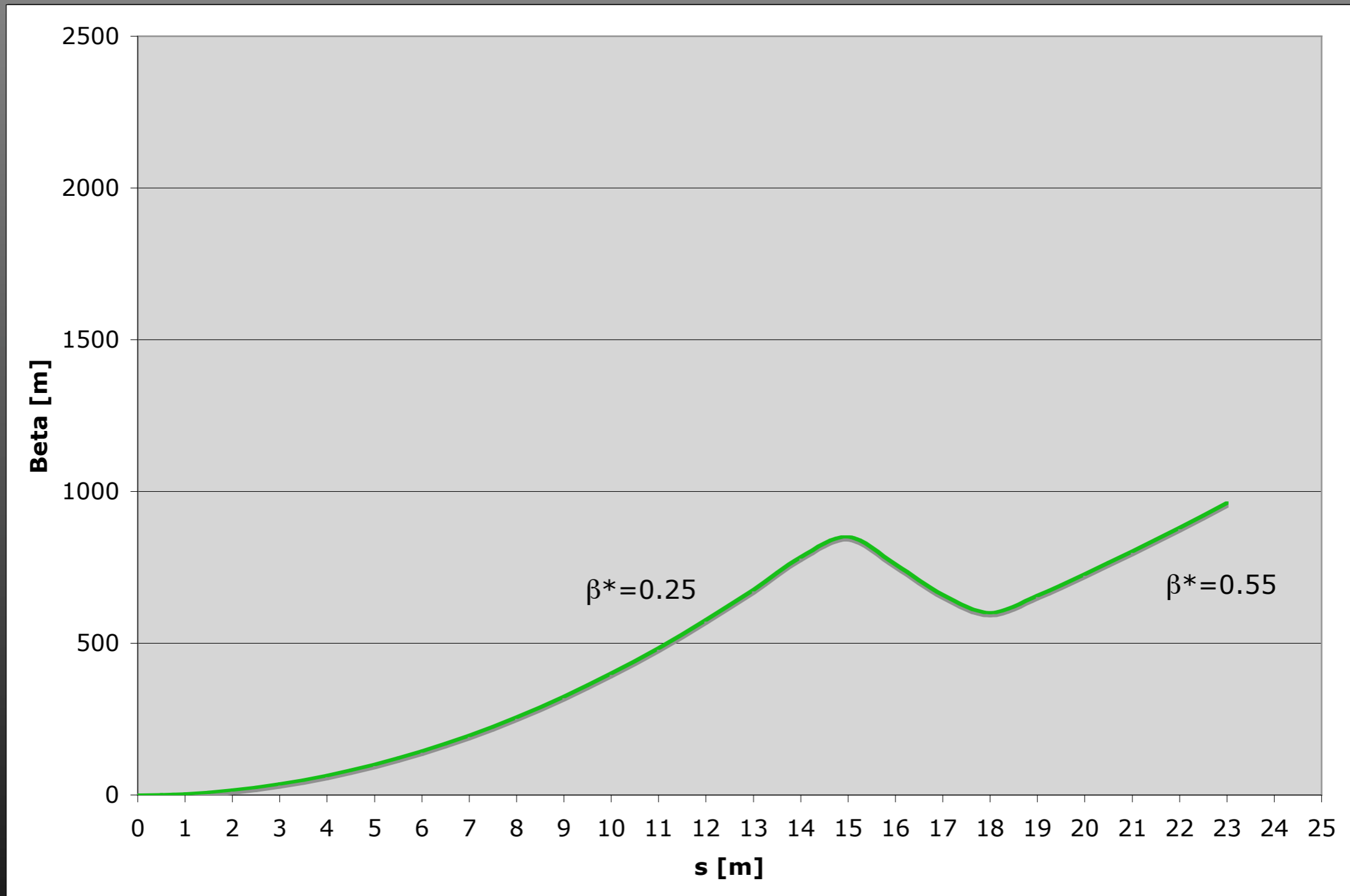
Beta function



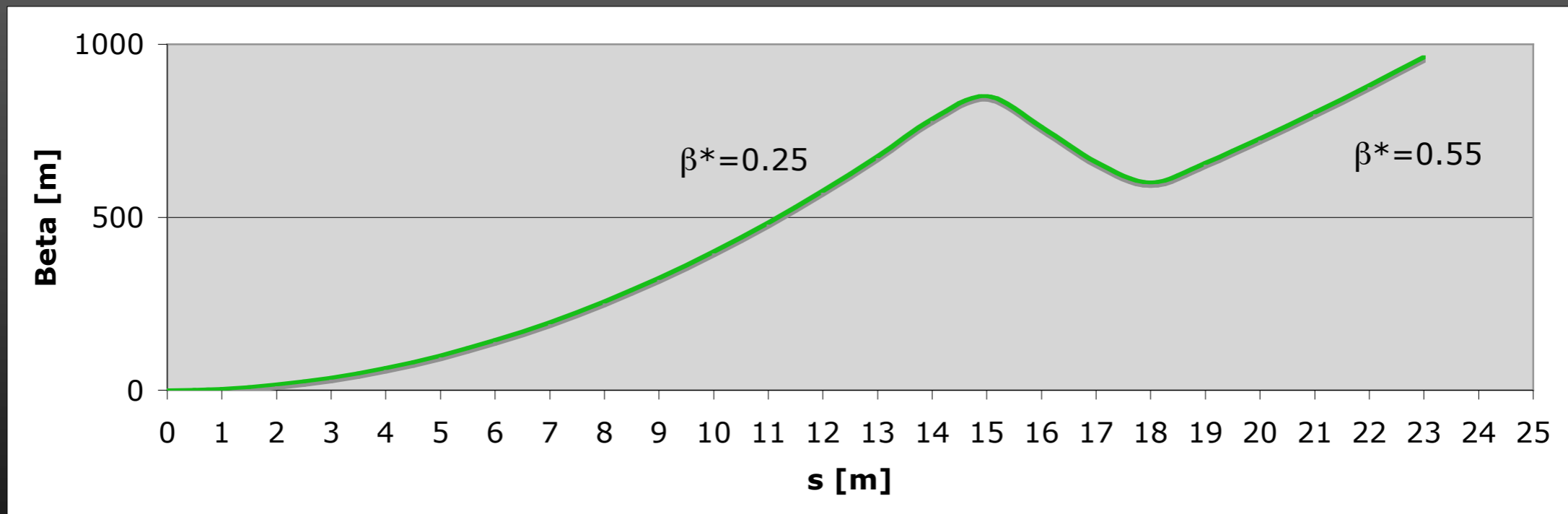
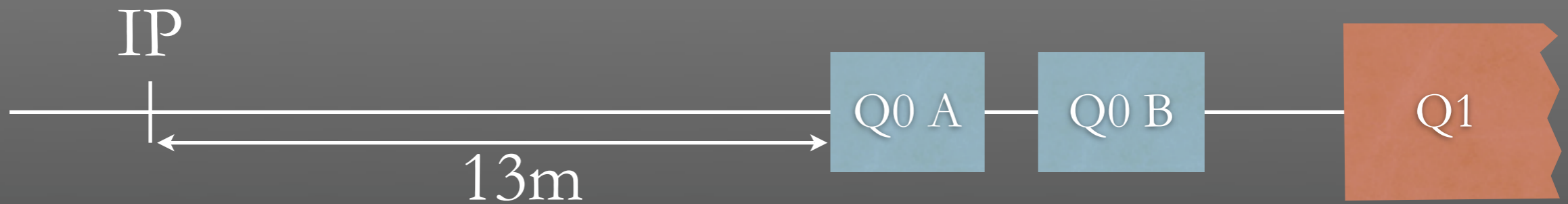
Beta function



Beta function



New layout



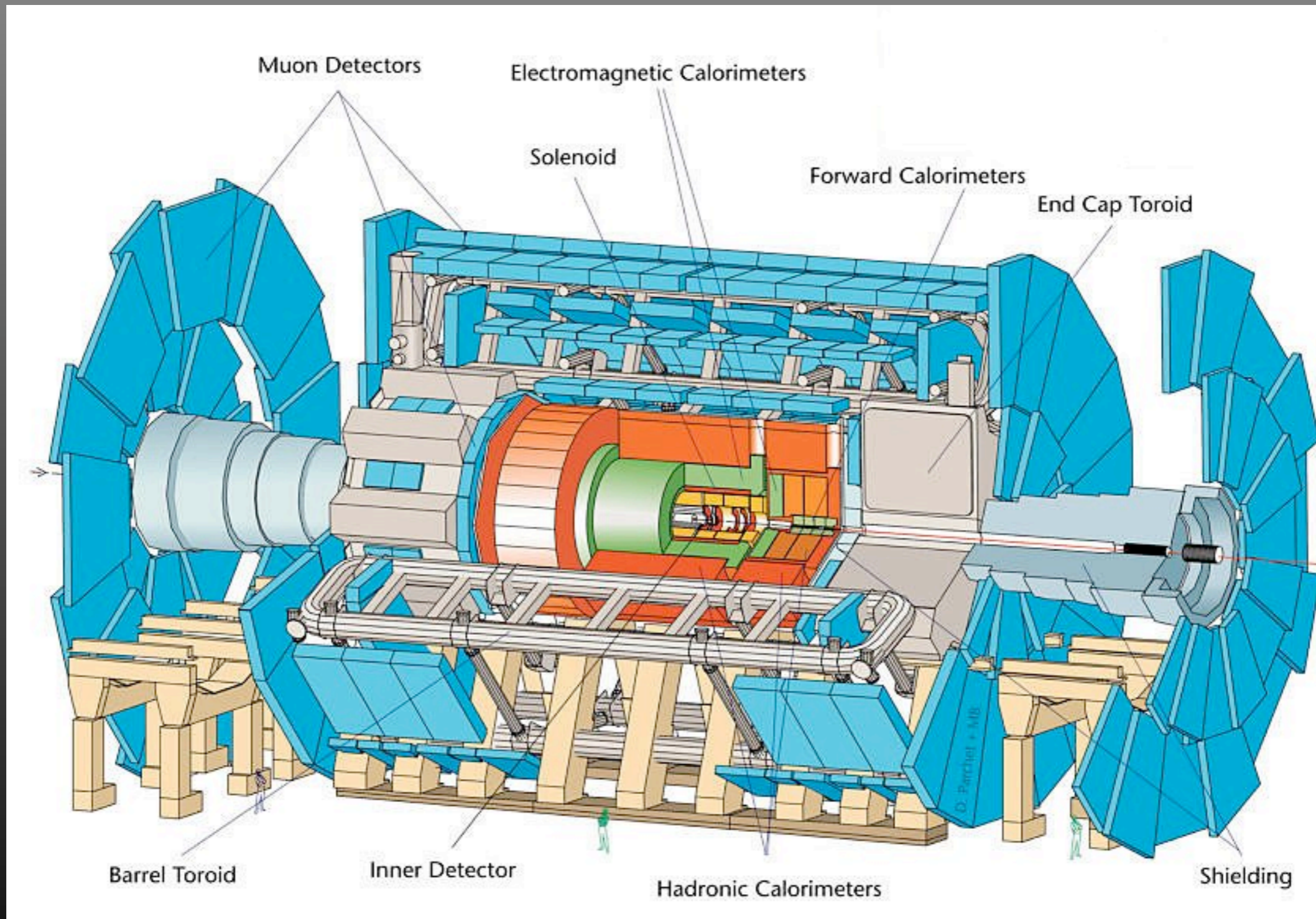
Q0 parameters*

Magnet	Length	Min. Diameter	Gradient
Q0 A	3 m	> 40 mm	165 T/m
Q0 B	3.5 m	> 40 mm	165 T/m

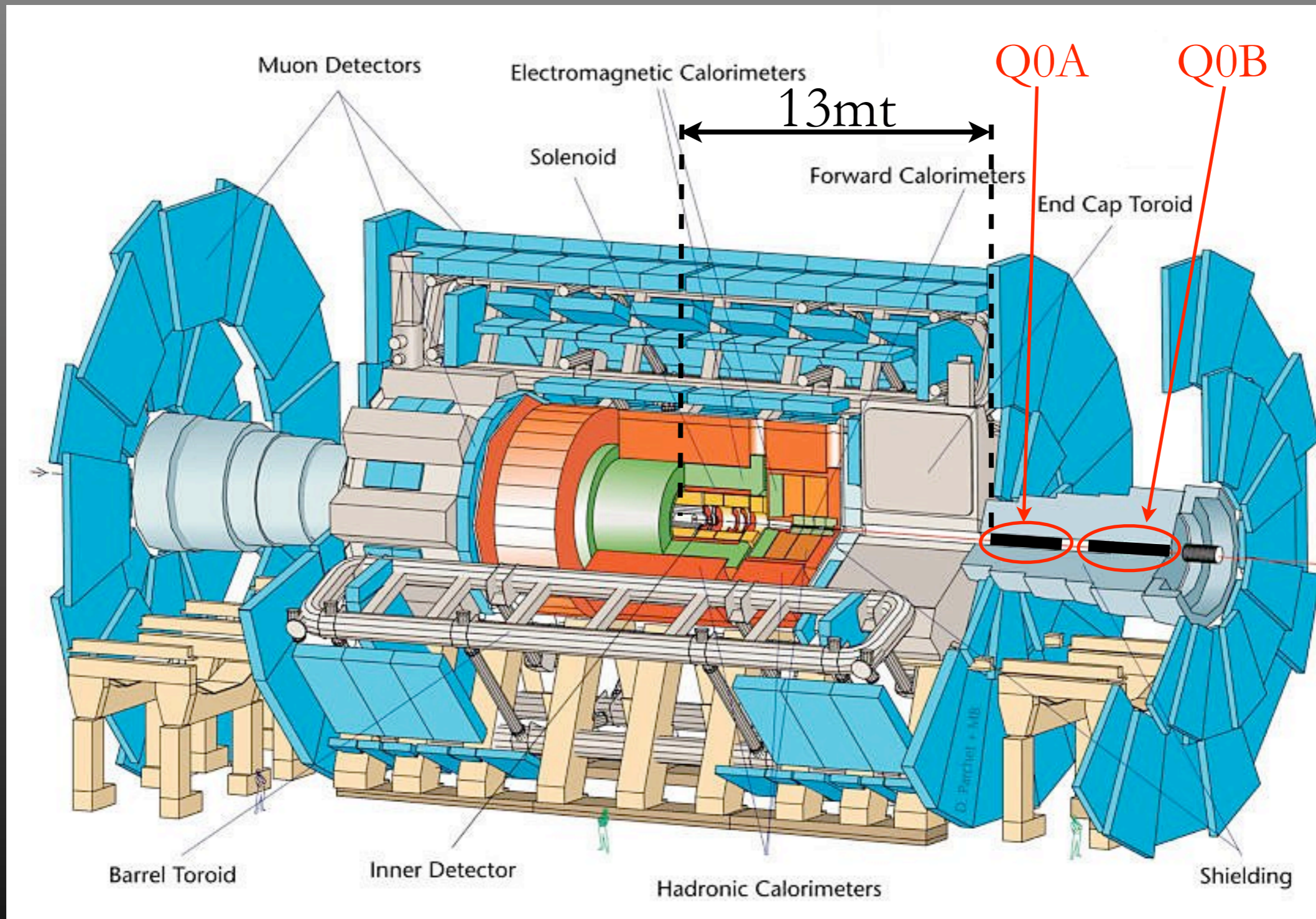
* E. Laface, R. Ostojic, W. Scandale, D. Tommasini,
“Interaction region with Slim Quadrupoles”. Proceedings of EPAC 2006.



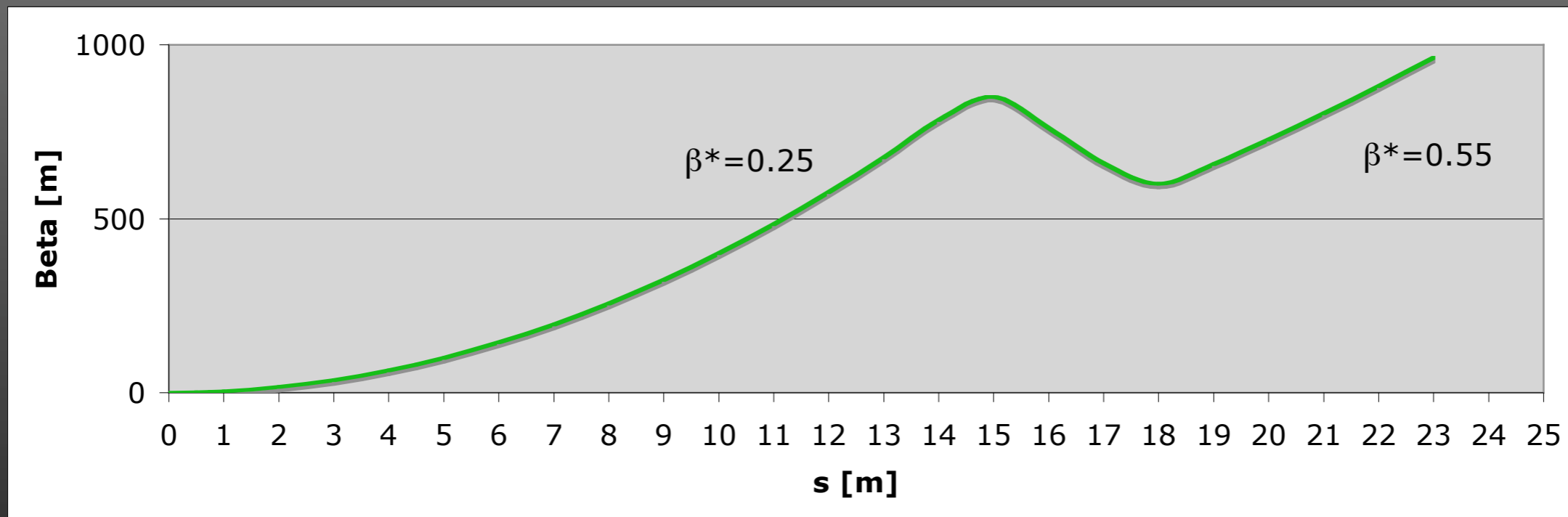
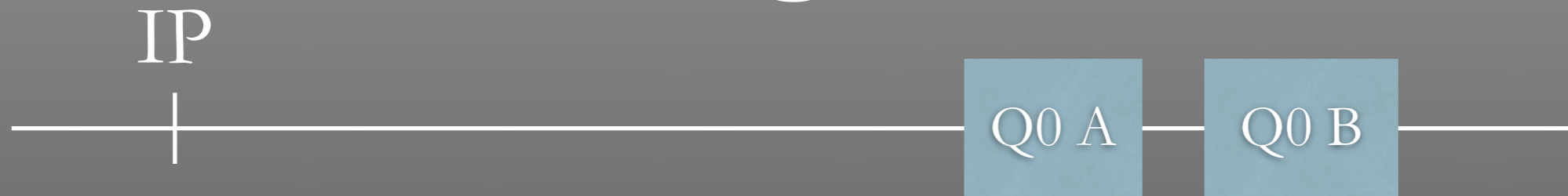
Where in Atlas?



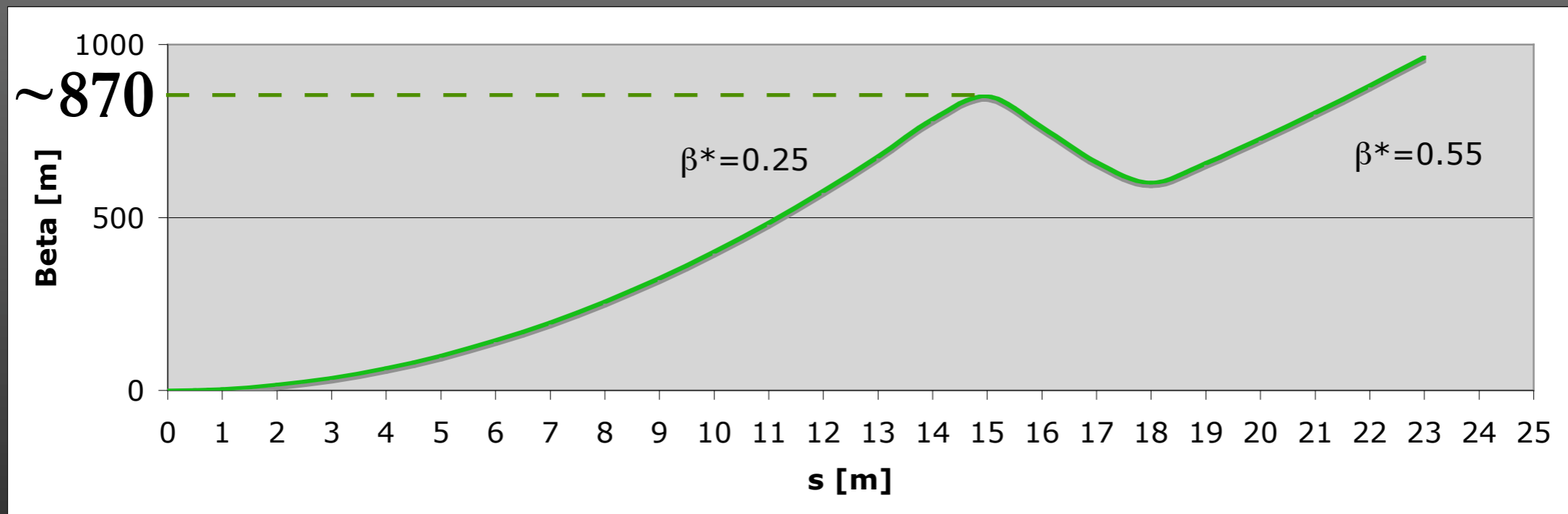
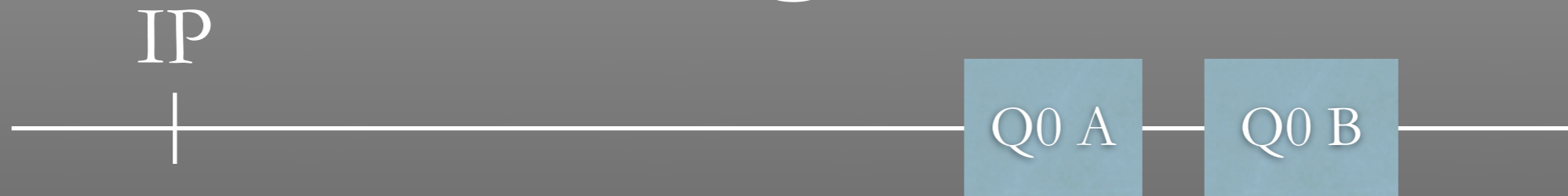
Where in Atlas?



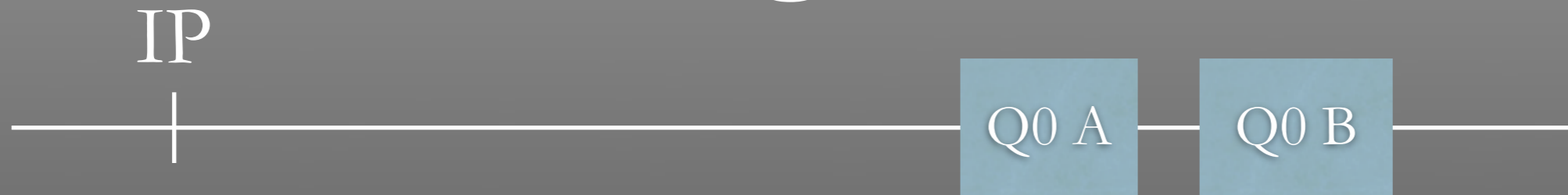
Alignment



Alignment



Alignment



Alignment



Alignment

Relative misalignment tolerance



Alignment

Relative misalignment tolerance



Alignment

Relative misalignment tolerance



We need a rigid structure

Alignment



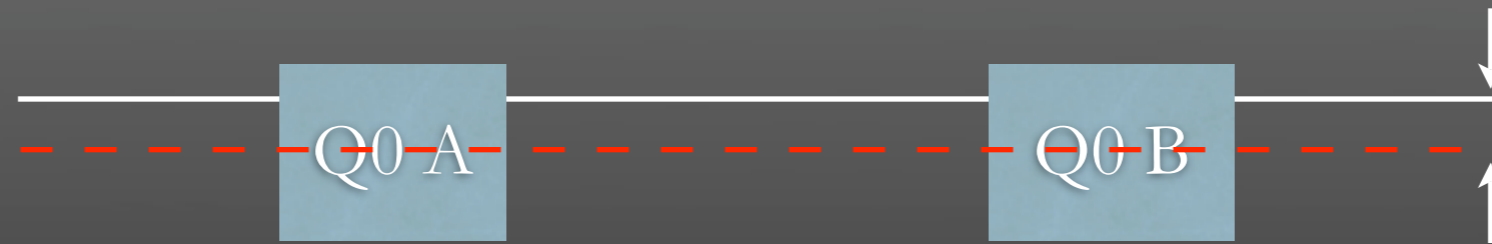
Alignment

Misalignment tolerance
respect to the ideal trajectory



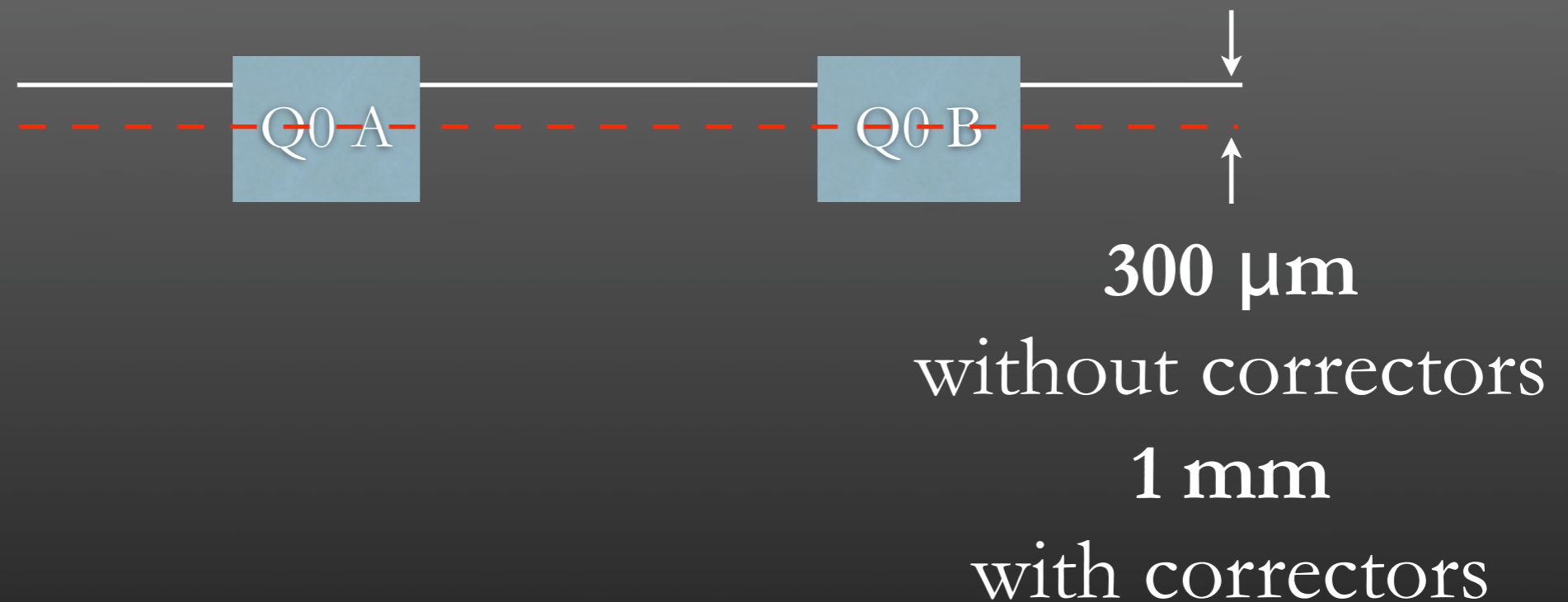
Alignment

Misalignment tolerance
respect to the ideal trajectory



Alignment

Misalignment tolerance
respect to the ideal trajectory



Conclusions



Emanuele.Laface@cern.ch



Conclusions

- Low β^* solution with NbTi



Conclusions

- Low β^* solution with NbTi
- Slim quadrupoles with small apertures and gradients



Conclusions

- Low β^* solution with NbTi
- Slim quadrupoles with small apertures and gradients
- A rigid structure is necessary in order to have good tolerances for misalignment



What's been keeping us busy



Emanuele.Laface@cern.ch



What's been keeping us busy

- Study of dynamic misalignment (vibrations)



What's been keeping us busy

- Study of dynamic misalignment (vibrations)
- What about the TAS?



What's been keeping us busy

- Study of dynamic misalignment (vibrations)
- What about the TAS?
- Study of energy deposition

