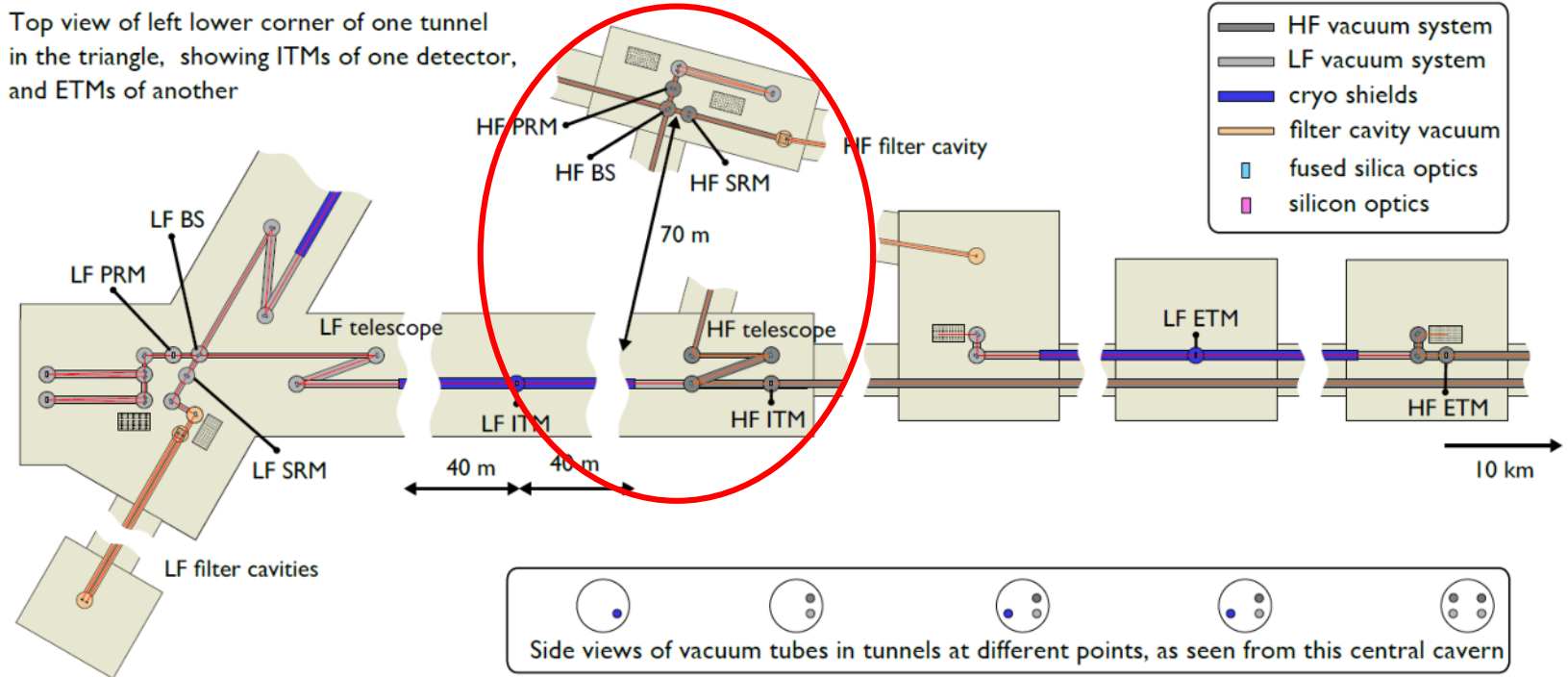


Design of the recycling cavities (focusing on ET-HF)



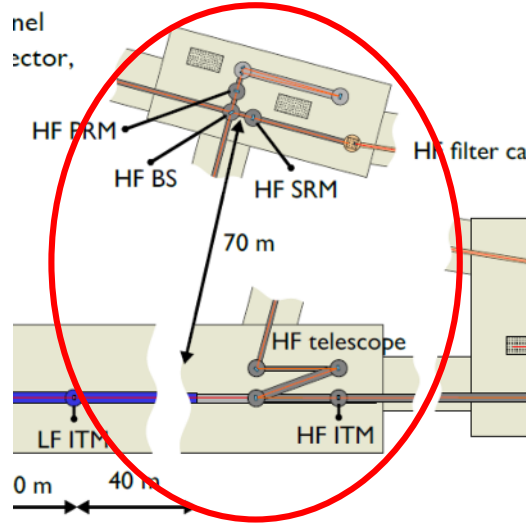
Top view of left lower corner of one tunnel in the triangle, showing ITMs of one detector, and ETMs of another



Already, acceptable design for low frequency

Parallel session summary
J. Casanueva & J. Degallaix

Design of the recycling cavities (focusing on ET-HF)



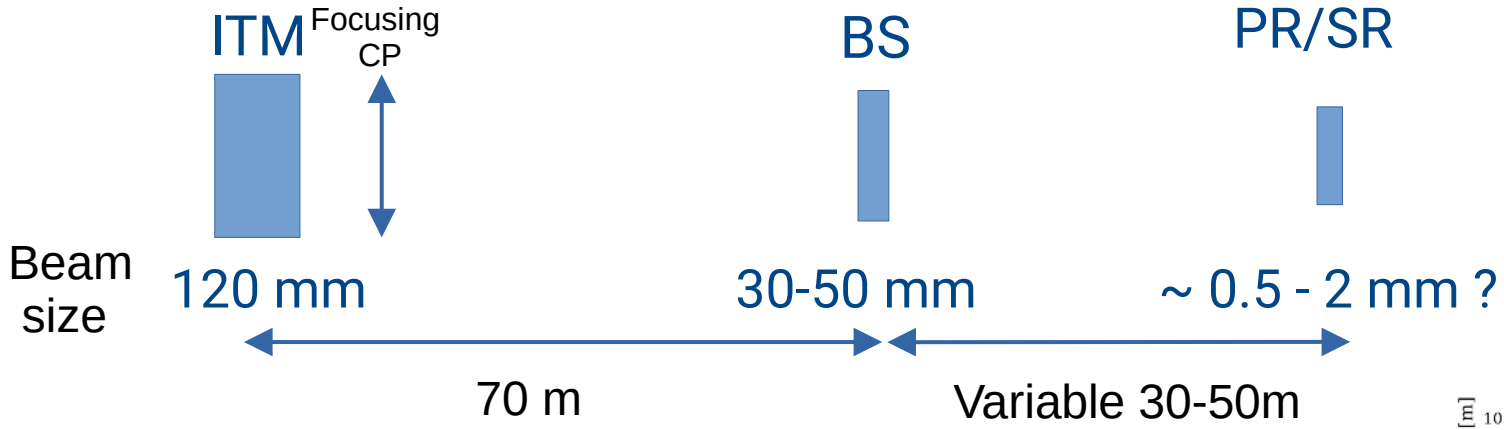
Several primordial requirements

- must be stable (Gouy phase shift $\sim 20^\circ$)
- must not be too long (~ 100 m)
- reasonable beam size (\sim few cm)
- simplest and robust configuration

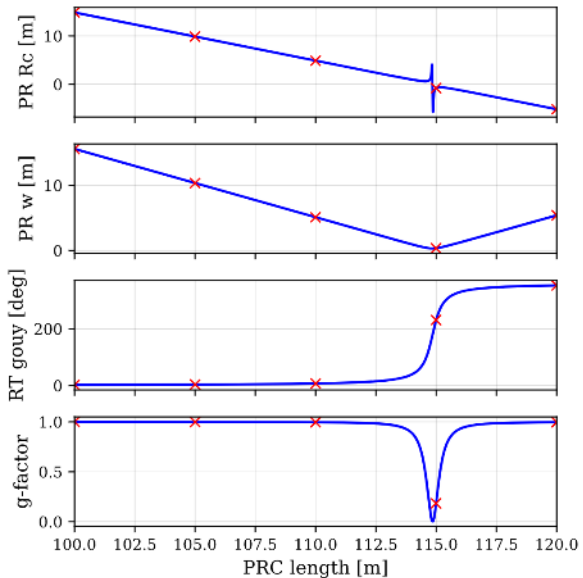
Requirements with references links in:

<https://www.overleaf.com/read/yvxxmxnsmnbfy>

Example of a starting design



Cavity length [m]	RoC at PR [m]	Beam size at PR [mm]	RT Gouy [deg]	g-factor
100.0	14.9	15.6	2.07	1
105.0	9.86	10.3	3.27	0.999
110.0	4.87	5.1	6.95	0.996
115.0	-0.792	0.358	231	0.183
120.0	-5.17	5.41	353	0.996



Suggested length ~ 115 m, PR beam radius 1 mm, g-factor 0.88

Short term actions



Reinforce the working group!!

- try different designs for acceptable Gouy phase (20-30°), comparison if simplest not working → change configuration
- possibility to have longer cavity (decrease also the arm finesse, more power in RC)
- try to have the same design for PRC and SRC but not mandatory (different beam size on PRM/SRM)
- we need input from aberration control WP: minimum beam size on PR (for a given power ~10 kW)
- once with one acceptable design then more thoroughly check