Einstein Telescope Instrument Science Board

Jan Harms (GSSI, LNGS)

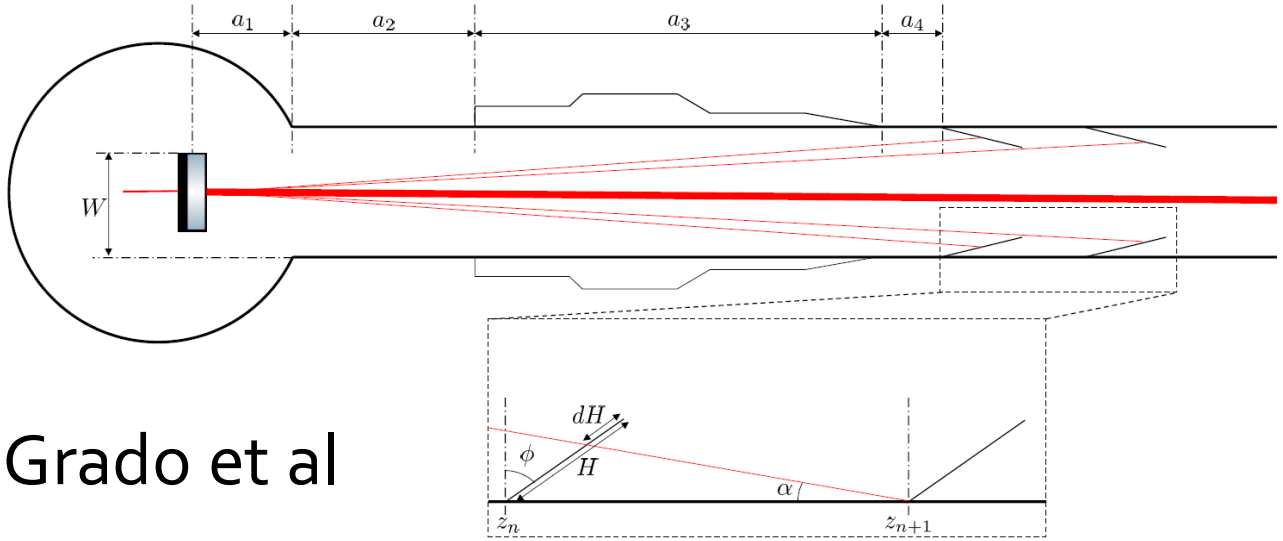
Status of ISB Activities

- A first version of the **Product Breakdown Struture** (PBS) was submitted to the Project Office in December 2023.
  - Now working on parameterization of each PBS item: functional parameters, integration parameters, and interfaces. This work is in progress.
- **Optical layout** needs to be provided by the ISB as central information for the development of a detector layout and definition of the underground infrastructure. A group of experts will meet on March 7-8 in Amsterdam with the goal to provide a layout that will remain frozen for the upcoming infrastructural studies.
- The ISB contribution to the **beam-pipe requirements document** was reviewed and the reviews are to be discussed in the coming weeks.

Excerpt from the PBS

Level	PBS code	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
6	1.1.1.10.3.2						Acoustic and vibrational	
6	1.1.1.10.3.3						Electromagnetic	
5	1.1.1.10.4					Control		
6	1.1.1.10.4.1						Feedback loops	
6	1.1.1.10.4.2						Adaptive control	
6	1.1.1.10.4.3						Lock procedures	
3	1.1.2			Optics				
4	1.1.2.1				Core Optics			
5	1.1.2.1.1					Input Test Mass (ITM)		
6	1.1.2.1.1.1						ITM Substrate	
6	1.1.2.1.1.2						ITM Polishing	
6	1.1.2.1.1.3						ITM Coating	
5	1.1.2.1.2					End Test Mass (ETM)		
6	1.1.2.1.2.1						ETM Substrate	
6	1.1.2.1.2.2						ETM Polishing	
6	1.1.2.1.2.3						ETM Coating	
5	1.1.2.1.3					BeamSplitter (BS)		
6	1.1.2.1.3.1						BS Substrate	
6	1.1.2.1.3.2						BS Polishing	
6	1.1.2.1.3.3						BS Coating	
5	1.1.2.1.4					Power Recycling Mirror (PRM)		
6	1.1.2.1.4.1						PRM Substrate	
6	1.1.2.1.4.2						PRM Polishing	
6	1.1.2.1.4.3						PRM Coating	
5	1.1.2.1.5					Signal Recycling Mirror (SRM)		
6	1.1.2.1.5.1						SRM Substrate	

Beam-pipe Requirements Document

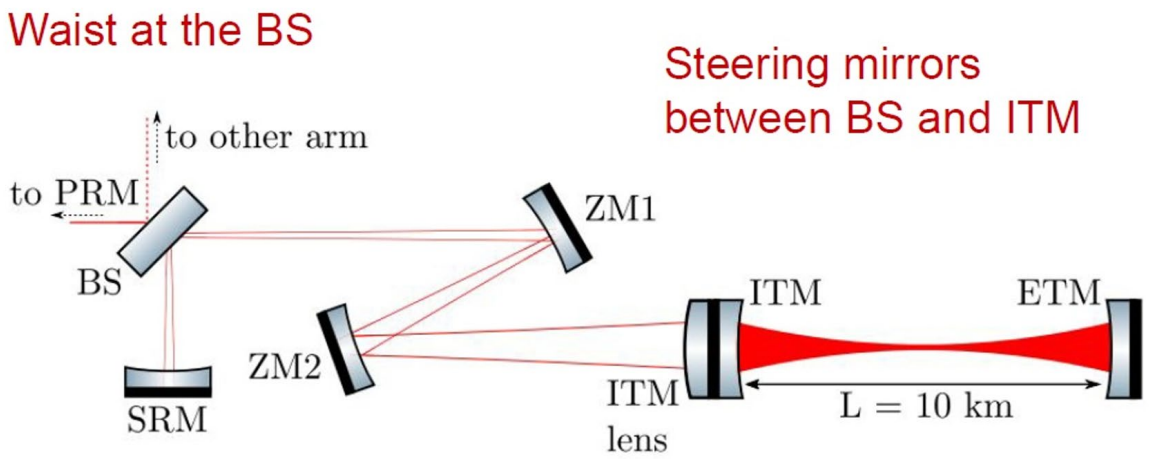


Grado et al

ISB defines important requirements on

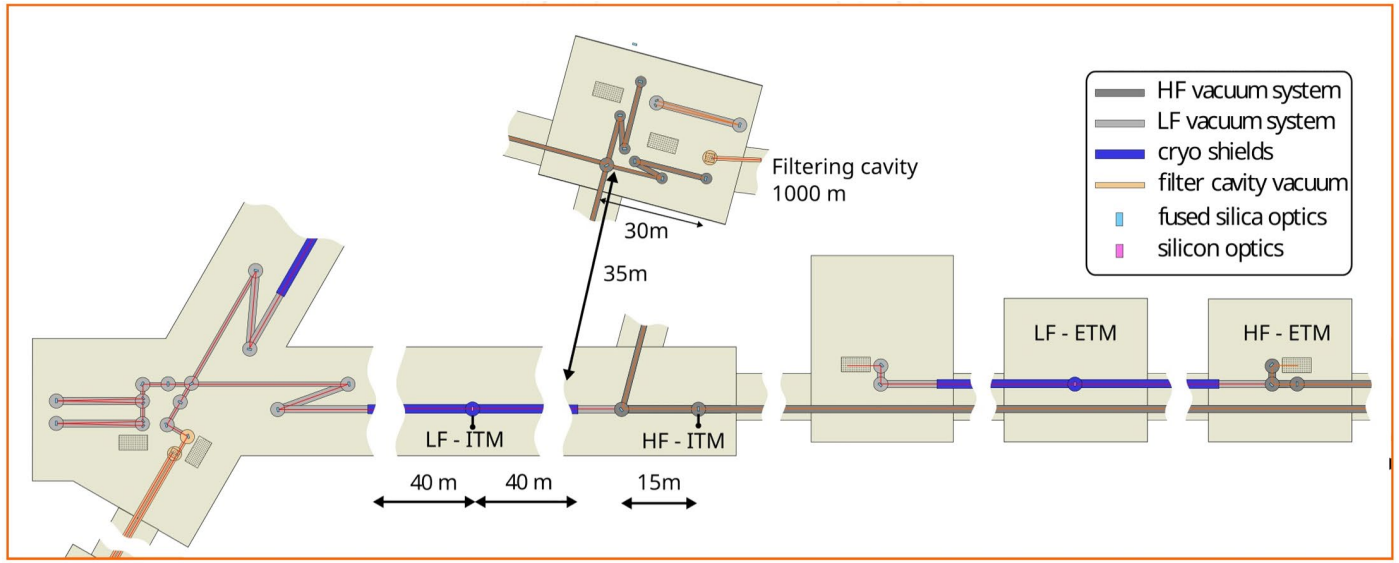
- Pipe diameter
- Baffle system
- Dust contamination
- Residual-gas pressure
- Magnetic properties of the pipe
- Alignment tolerances
- Maximum vibration of baffles

Optical Layout



Optimization problem

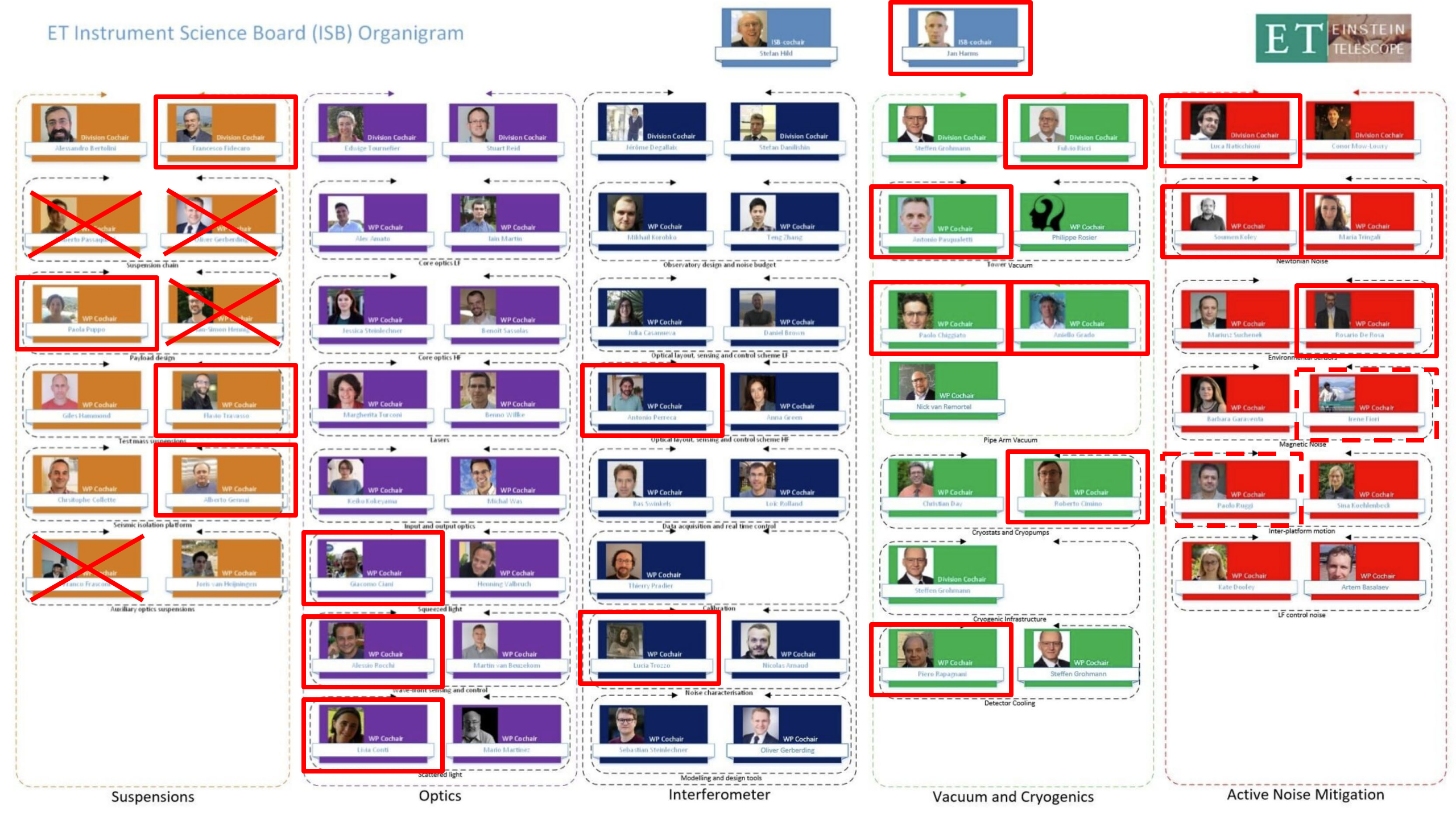
- Large beam size inside arm cavities
- Stability of recycling cavities
- Required to have collimated beam at BS?



ISB: Next Steps

- Review of the PBS parameter files and request of amendments. A lot of work is needed still to obtain a 100% complete set of parameter files.
- The ISB needs to start working systematically on the calculation of requirements propagating to all the PBS items. Enormous task that requires close collaboration between divisions and many many early-career scientists.
  - We need to establish a review system (there will be a committee under the service board responsible for providing the policy, but the mechanics need to be decided by the ISB)

ET Instrument Science Board (ISB) Organigram



ET Member Database

ISB

206 (no division decleared), 17 (ANM), 14 (IFO), 54 (OPT), 18 (SUS), 10 (VAC-CRYO)

Researchers in Italy (excluding EGO)

47 (no division declared), 4 (ANM), 2 (IFO), 21 (OPT), 15 (SUS), 4 (VAC-CRYO)

EGO - Italians

11 (no division declared), 3 (ANM), 0 (IFO), 0 (OPT), 0 (SUS), 0 (VAC-CRYO)