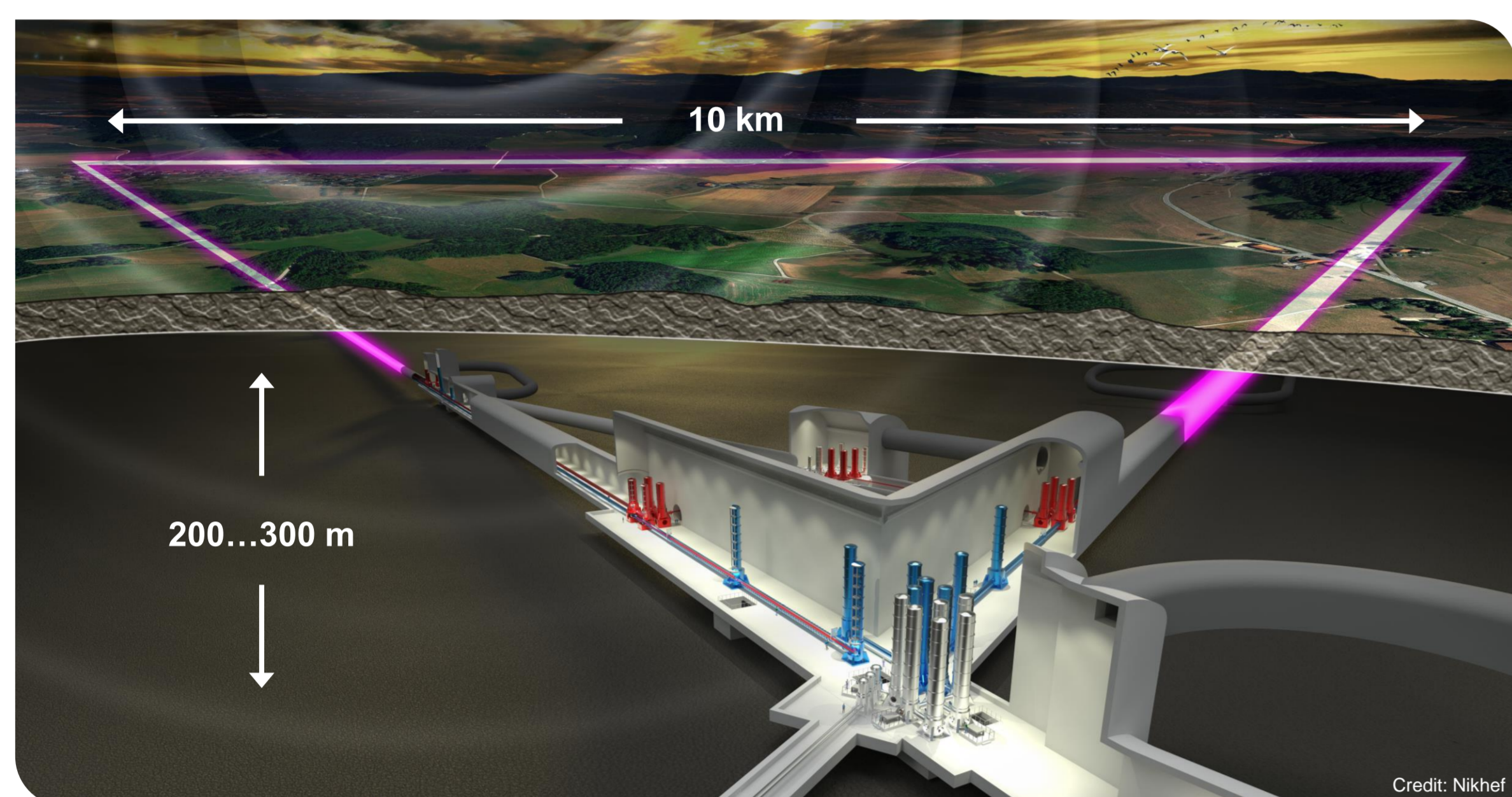
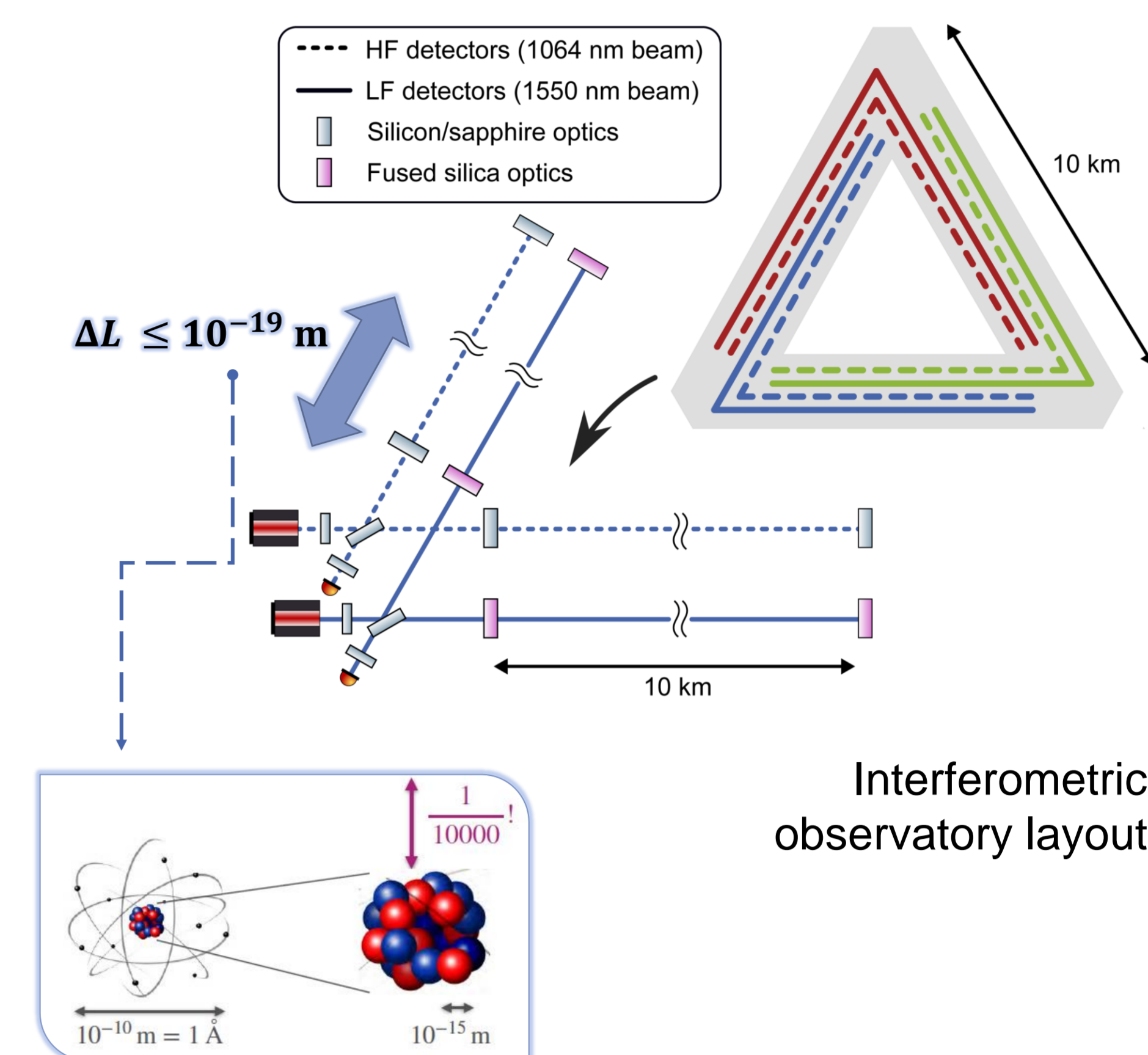
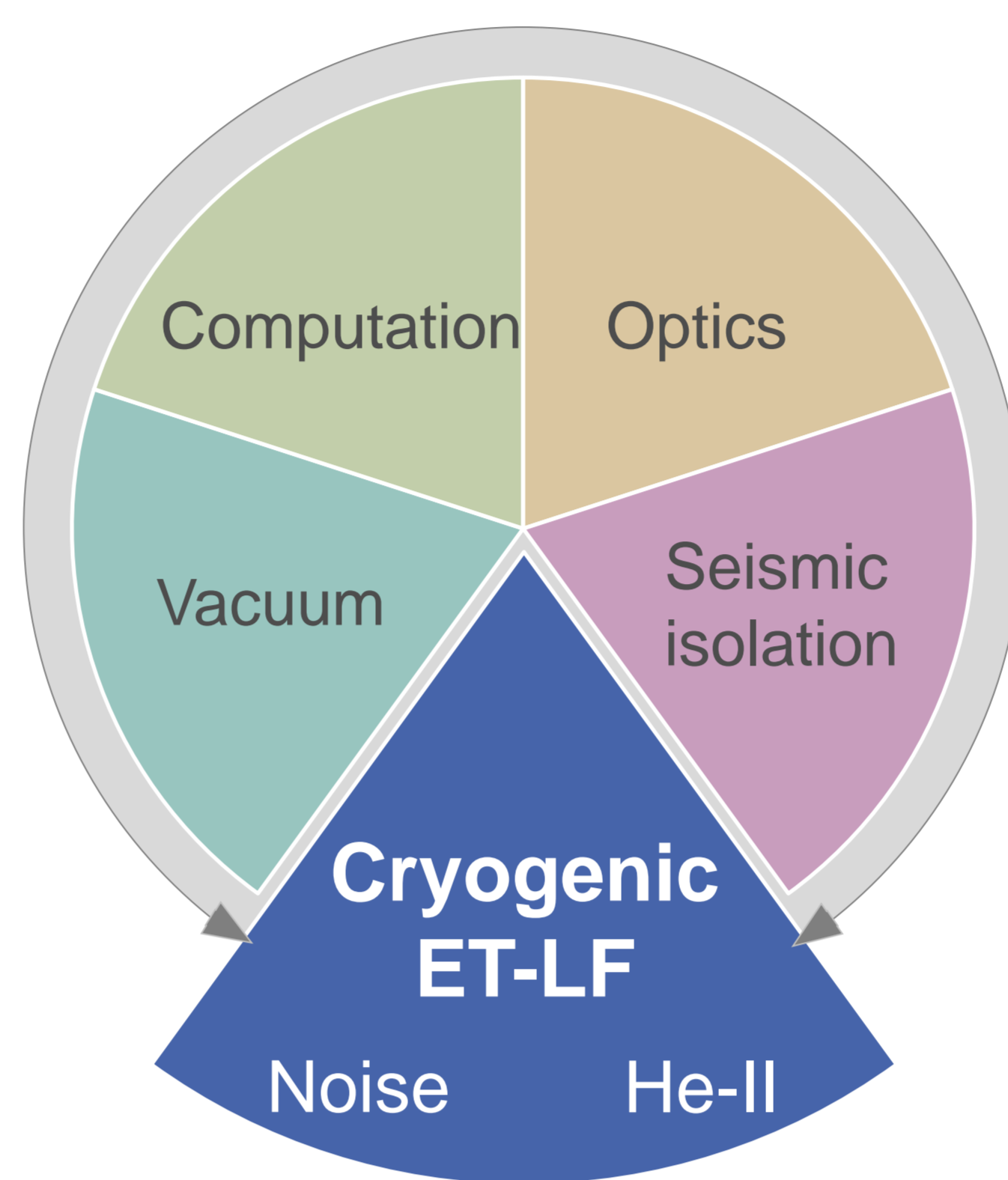


Cryogenic developments for the Einstein Telescope using superfluid helium

L. Busch, X. Korovesi and S. Grohmann



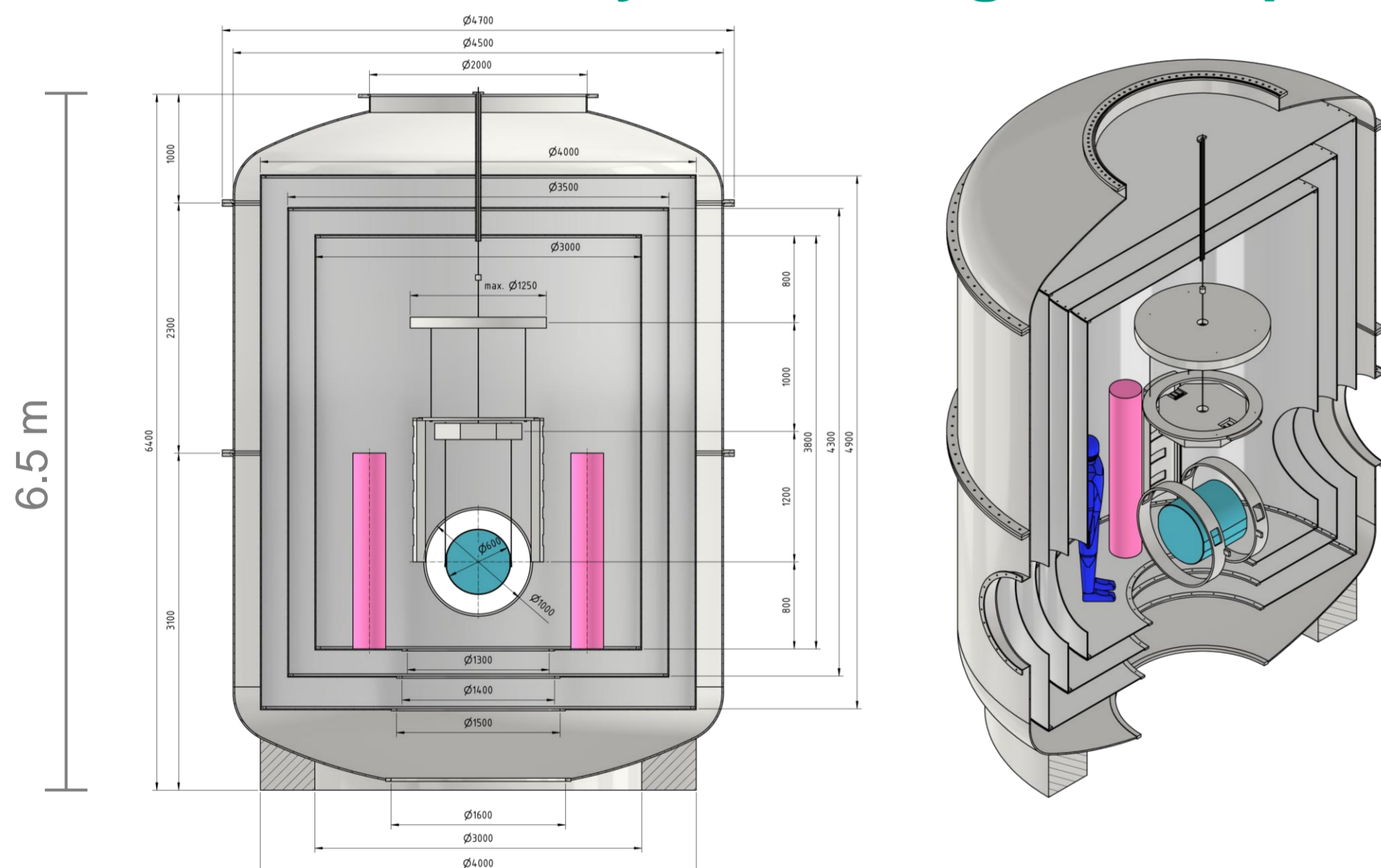
Planned Einstein Telescope infrastructure



Interferometric observatory layout

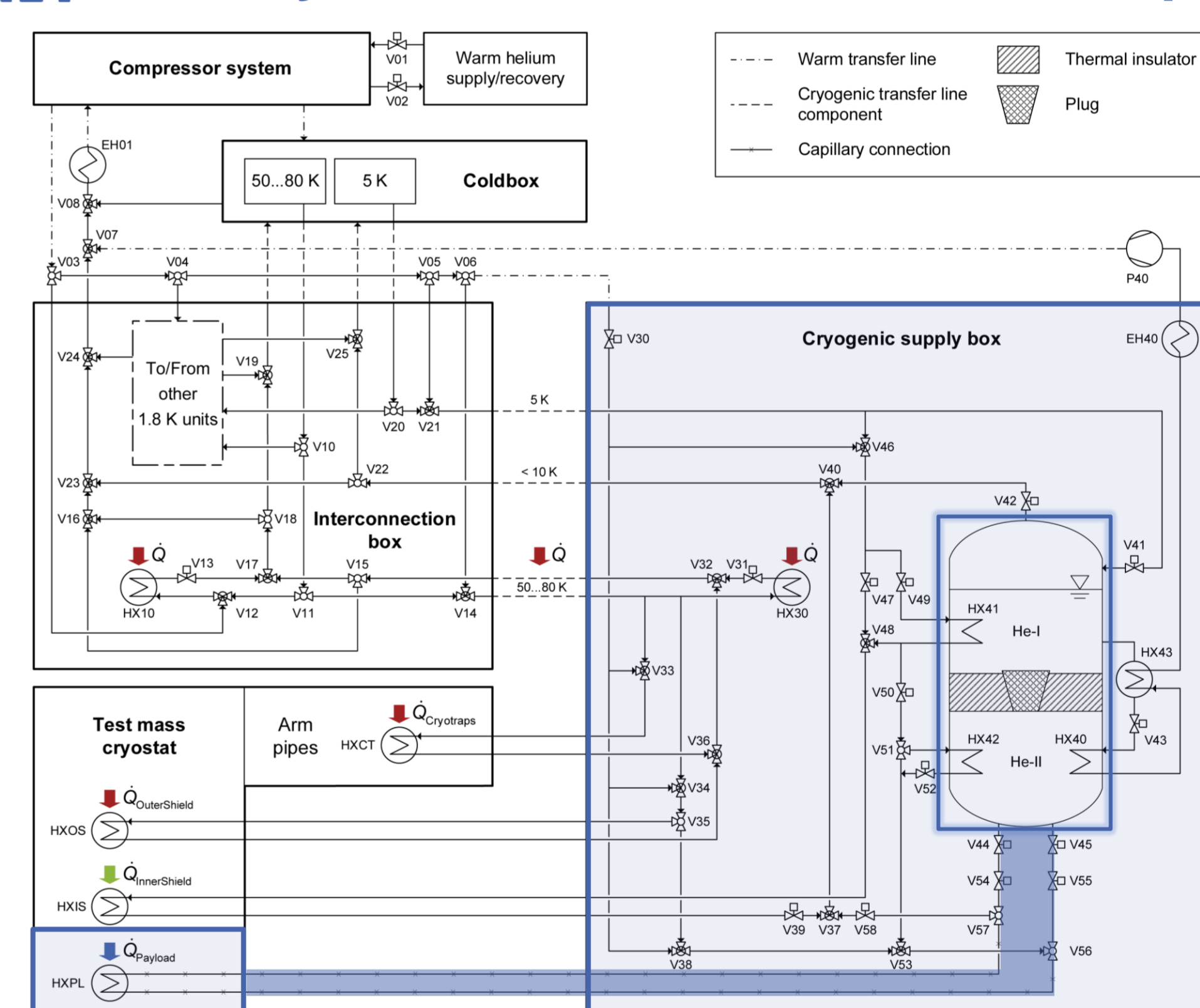
Key contributions to the cryogenic ET-LF interferometer development

First ET-LF cryostat design concept



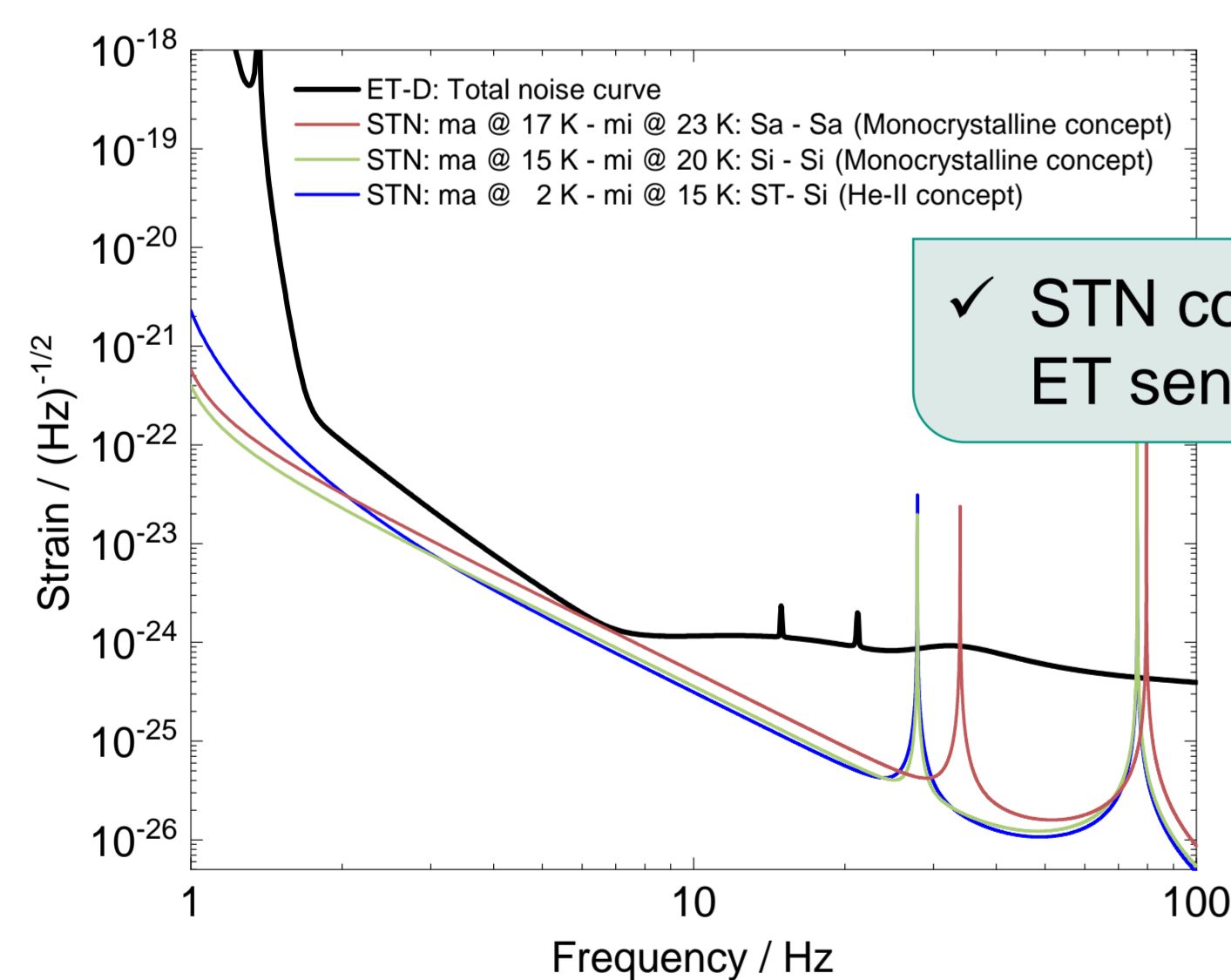
S. Grohmann:
Vacuum and Cryogenics Division co-chair
in ET Instrument Science Board (ISB)

Conceptual layout of a helium cooling system for the Einstein Telescope

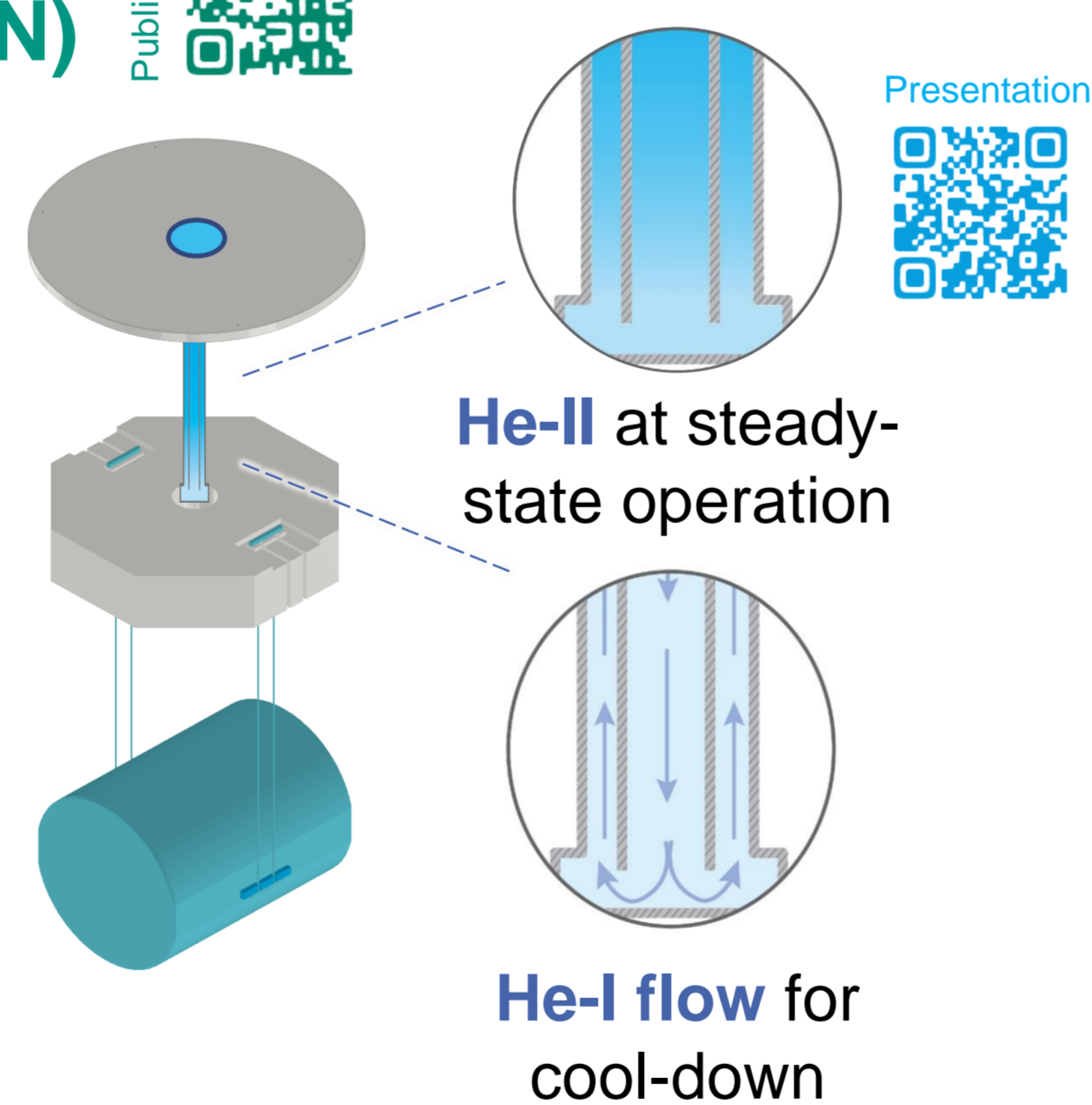


- ✓ Noisy equipment on surface
- ✓ Final refrigeration underground (→ 2 K)

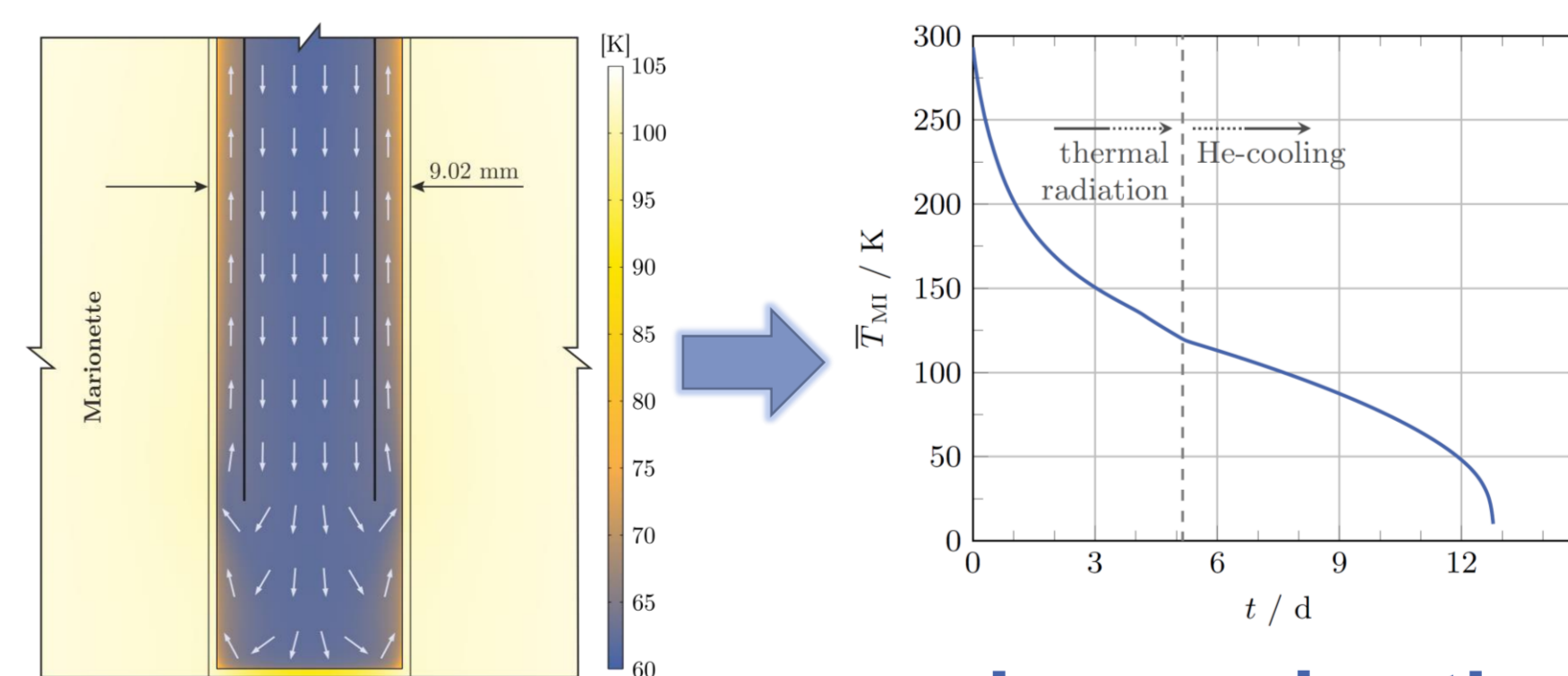
Cryogenic payload baseline design and suspension thermal noise modelling (STN)



✓ STN compatible with ET sensitivity goal



First cryogenic payload cool-down studies



Test mass
✓ cool-down
in ~2 weeks

Conceptual cryostat design for cryogenic payload suspension studies

- ✓ Investigation of full-size ET-LF suspensions
- ✓ Dissipations in He-II filled suspension tube

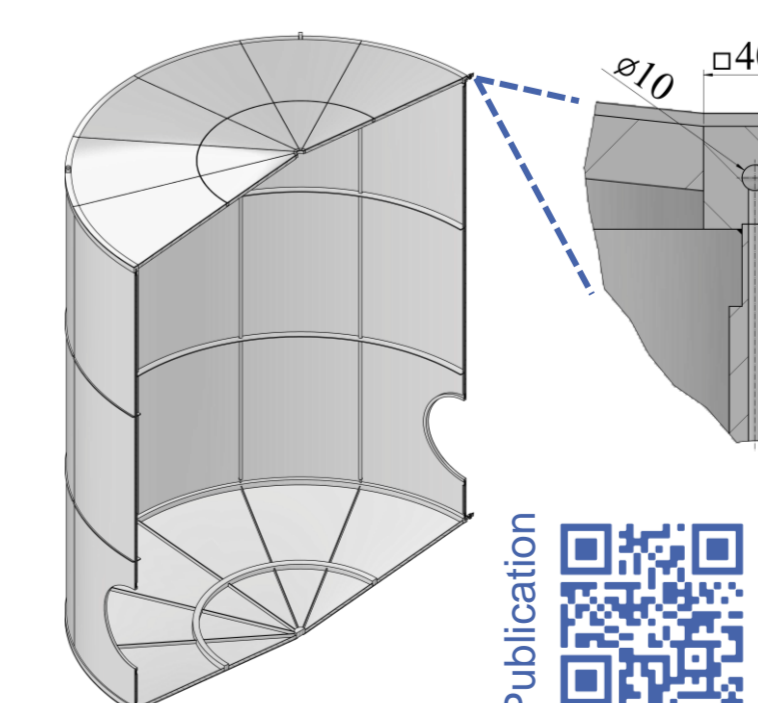


Collaboration publications

- *Science with the Einstein Telescope: a comparison of different designs (COBA Study)*
- *ETpathfinder: a cryogenic testbed for interferometric gravitational-wave detectors*



Low-noise thermal shielding around the cryogenic payloads



- ✓ He-II-cooled to 2 K
- ✓ Suspended + light
- ✓ Resonant frequencies outside ET-LF detection band

lennard.busch@kit.edu
xhesika.korovesi@kit.edu
steffen.grohmann@kit.edu

