

Status of cryostat design for cryogenic payload suspension studies for the Einstein Telescope

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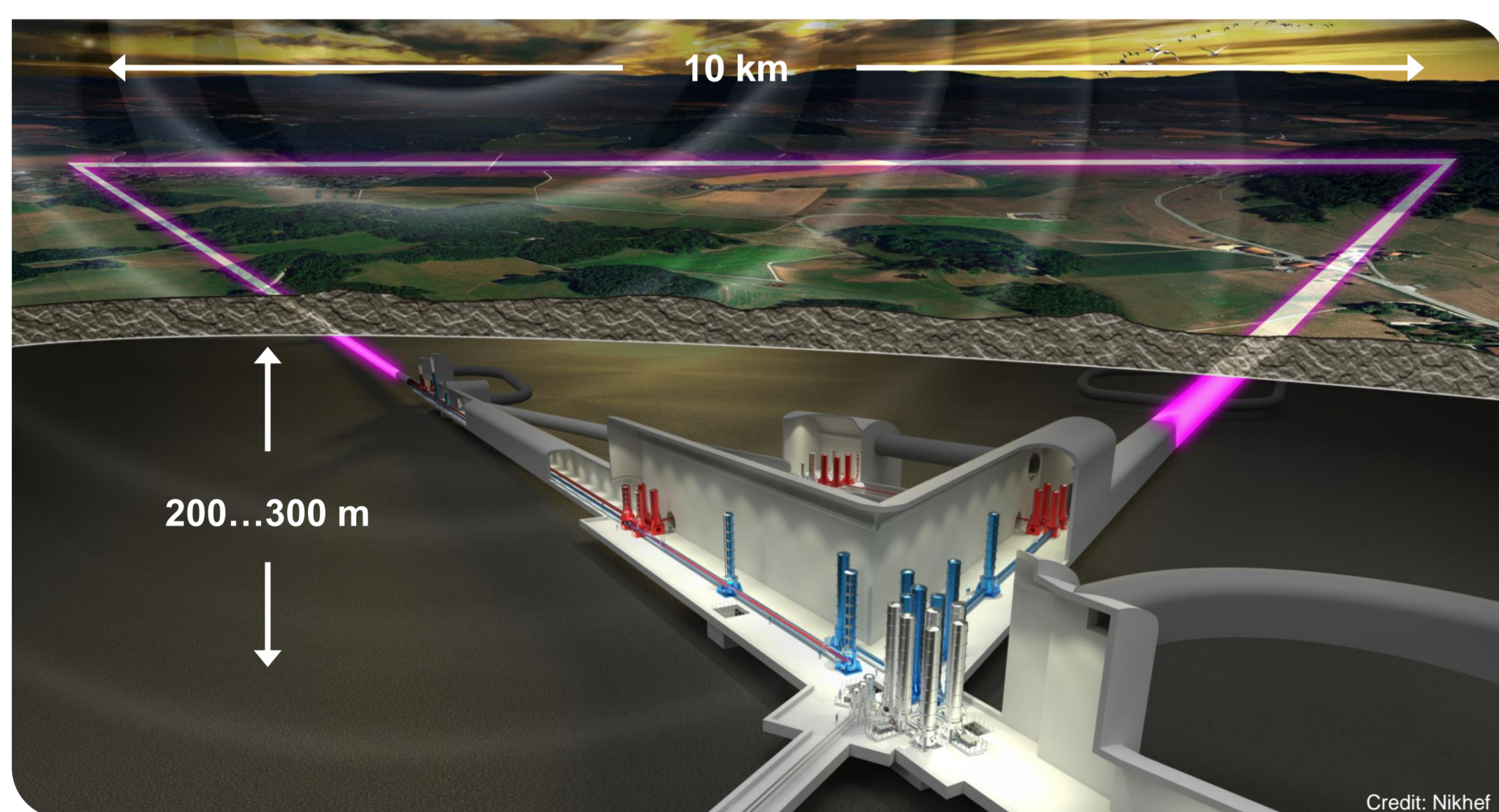
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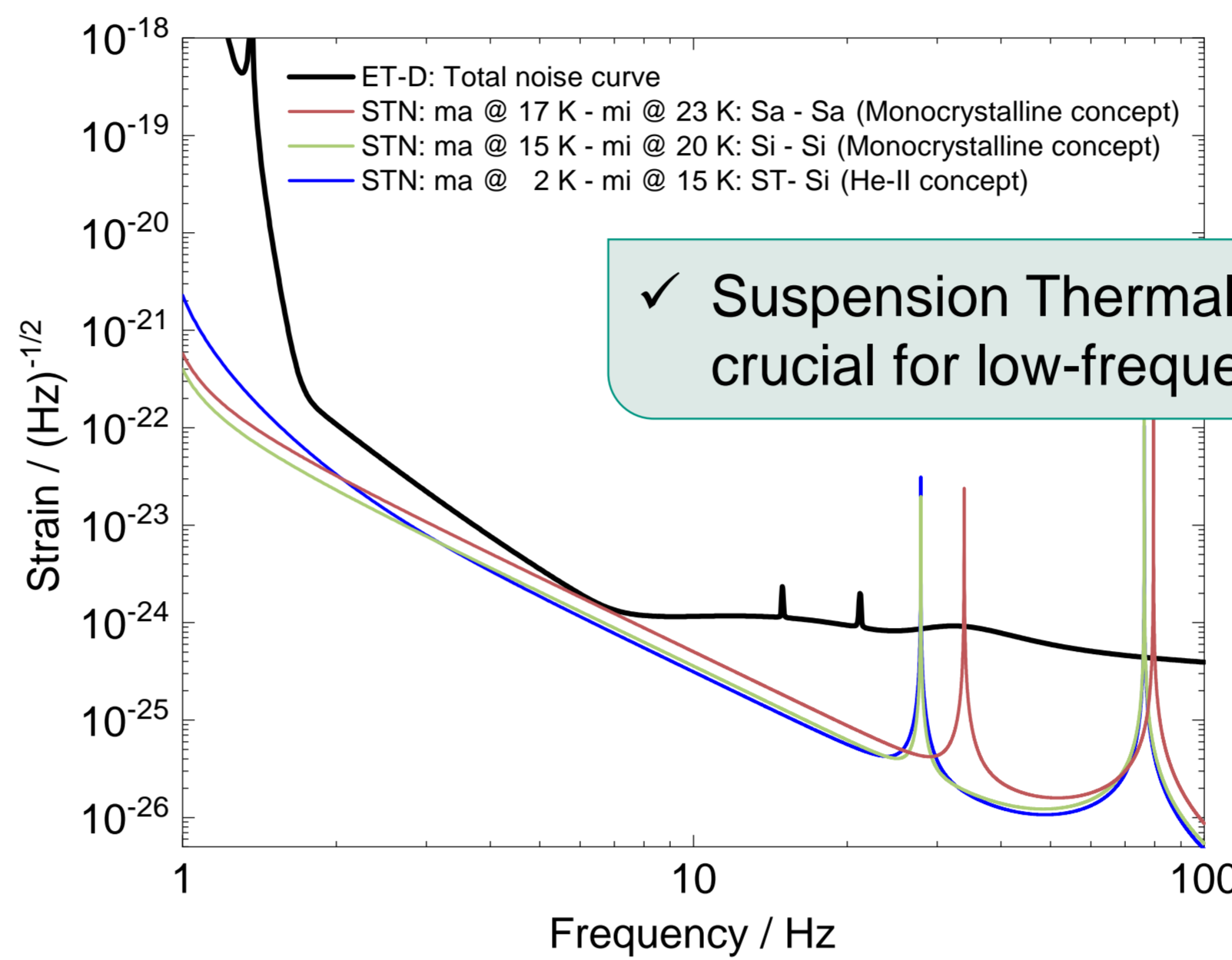
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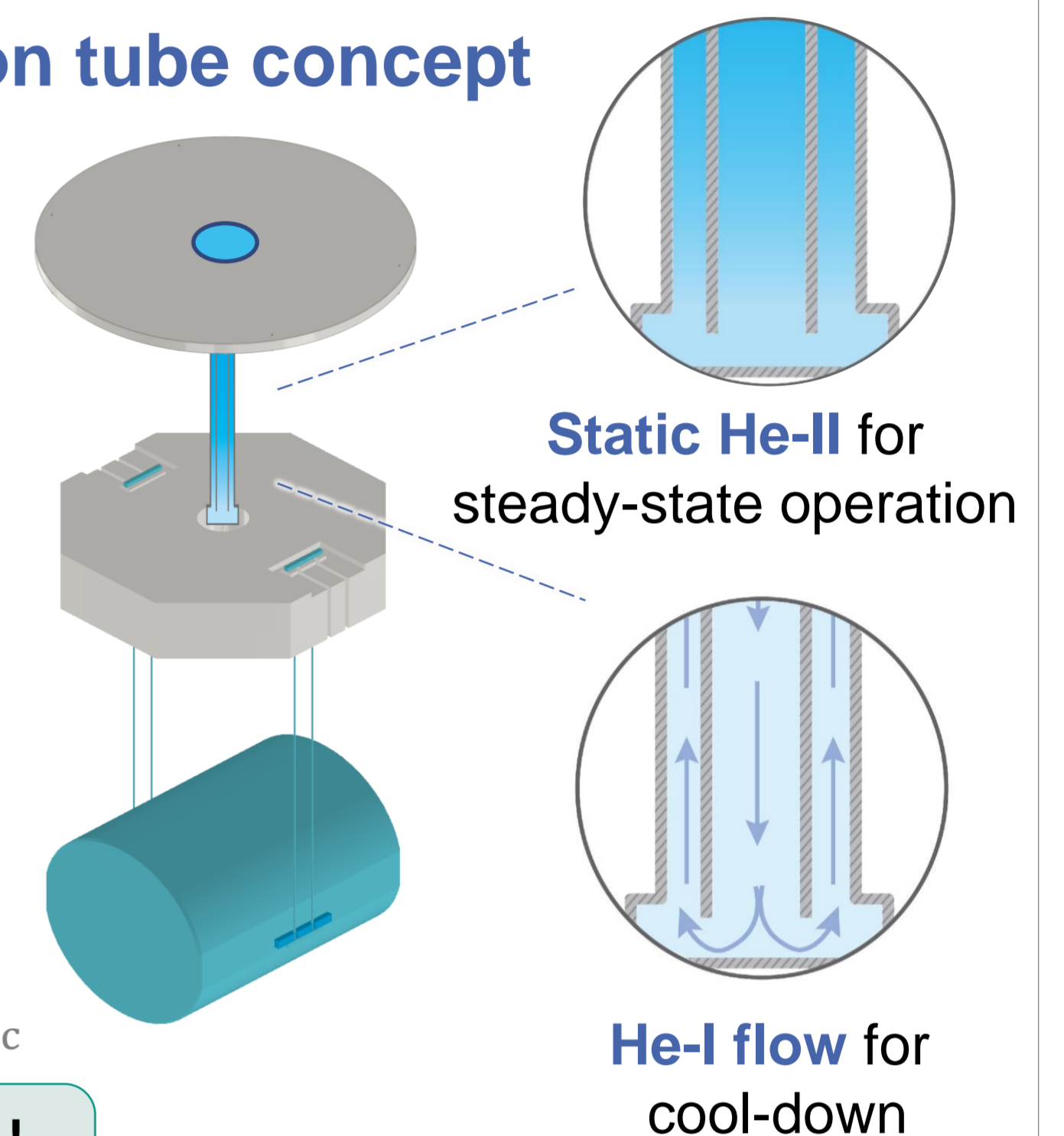
Baseline Design of Einstein Telescope Low-Frequency Cryogenic Payload



Planned Einstein Telescope infrastructure



He-II-filled marionette suspension tube concept



$Q^{-1} = \varphi$ (loss angle at resonance), a key parameter in STN modelling

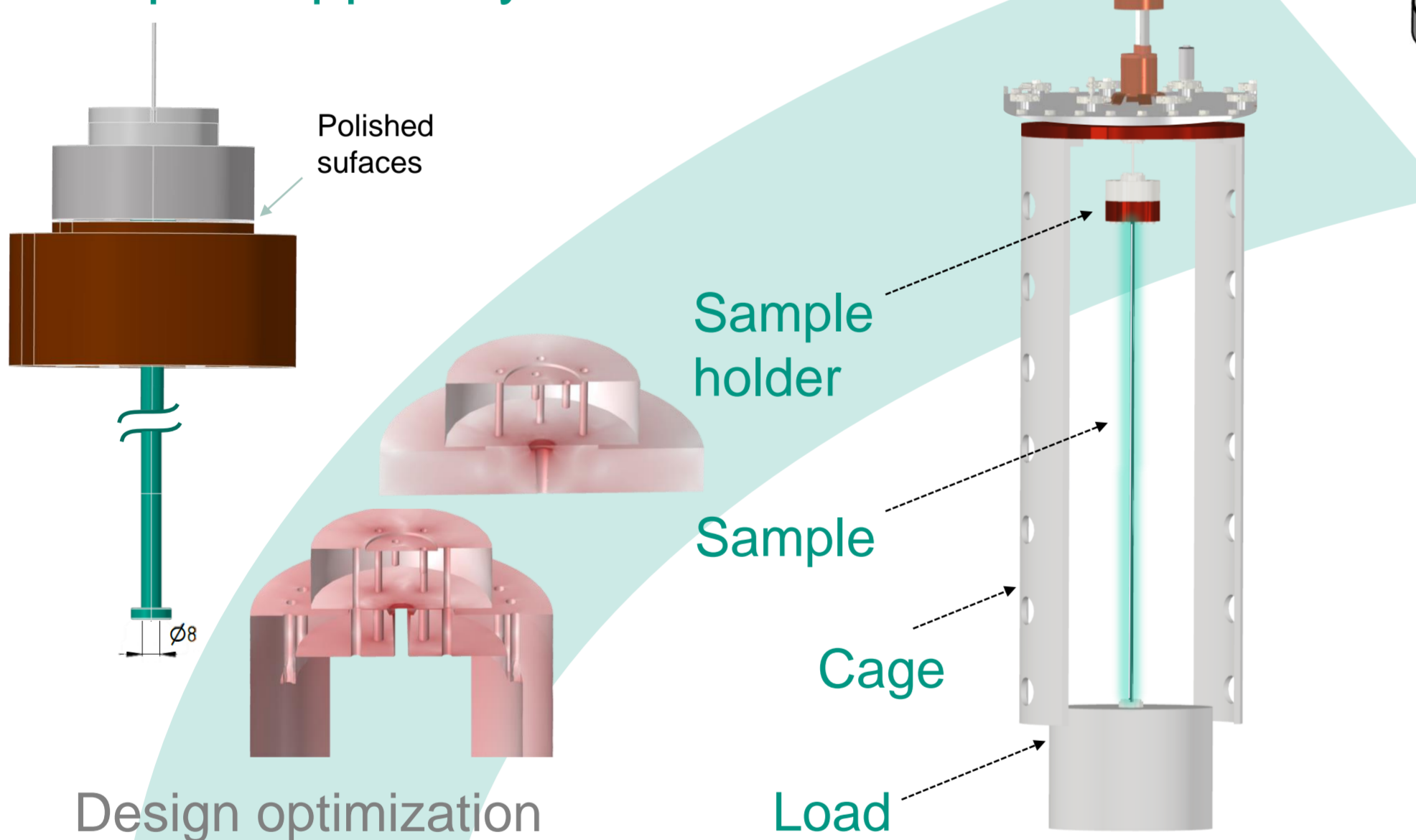
$$\varphi = \varphi_{\text{bulk}} + \varphi_{\text{thermoelastic}} + \varphi_{\text{surface}} + \varphi_{\text{extrinsic}}$$

Investigation of dissipation in suspensions via Q -measurements!

GRAVITHELIUM Cryostat for Cryogenic Suspension Studies

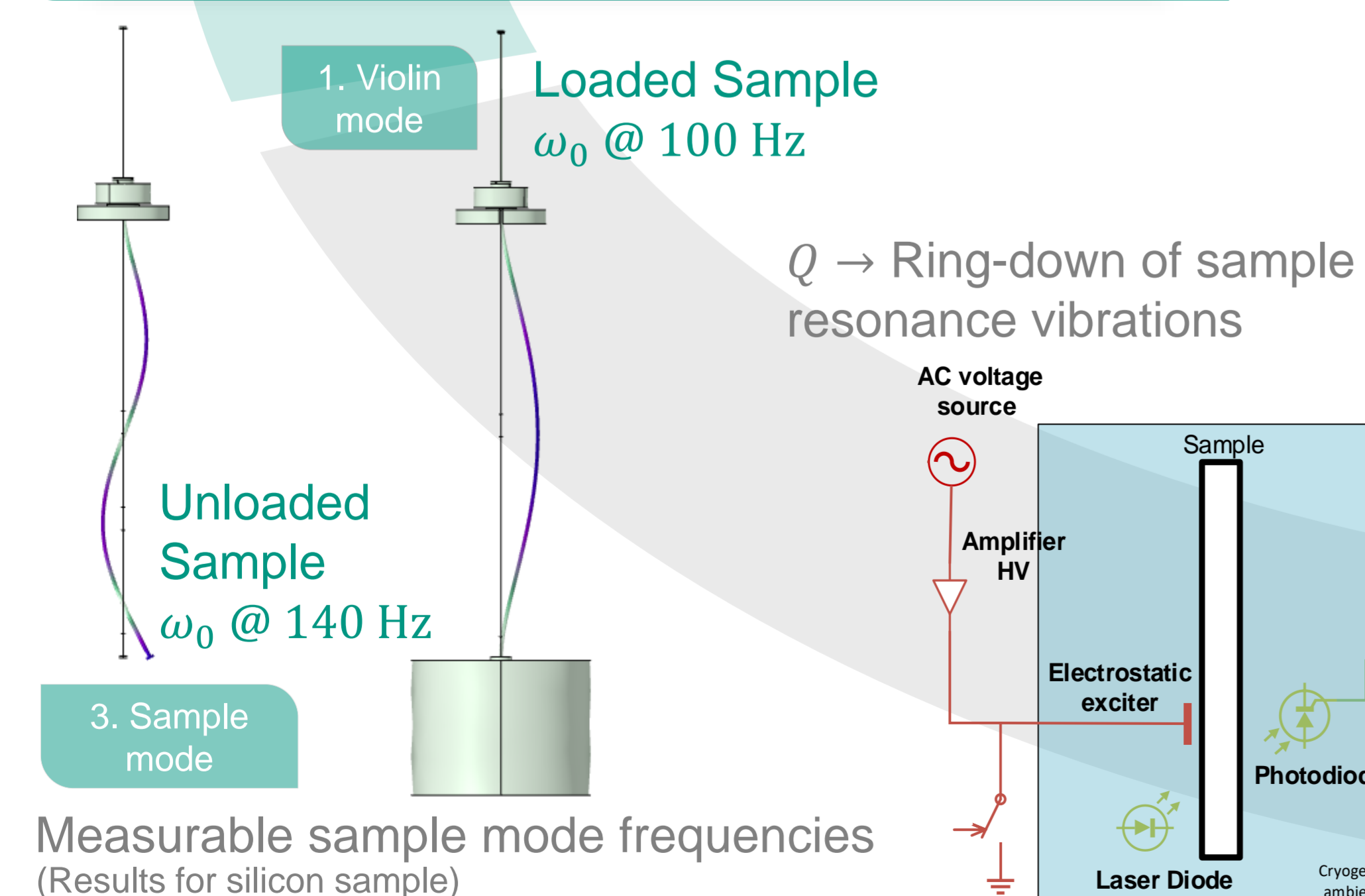
Phase I Experimental Campaigns Monolithic suspensions and empty titanium suspension tubes

Sample support system



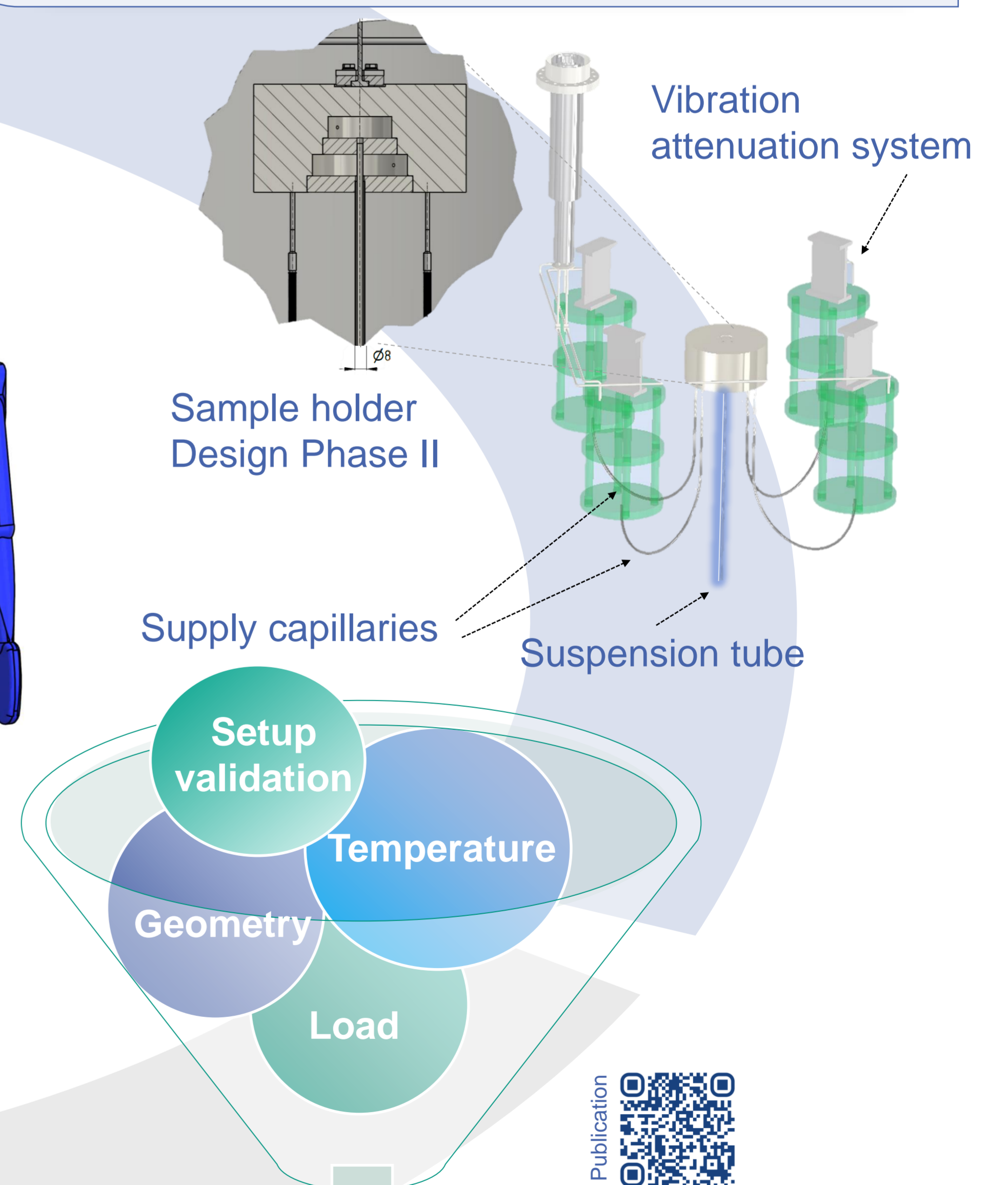
Design of sample support system

- ✓ Reduced dissipations via low strain at clamping region and massive sample holder
- ✓ Modal and frequency response analyses



Phase II Experimental Campaigns He-II filled suspension tubes

- ✓ Sample holder with He-II supply and suspension tube fitted for He-II leak-tightness
- ✓ Vibration attenuation system in COOP with leading industry manufacturer
- ✓ He-II from lab-scale, in-house-designed liquifier



Insights on dissipation in He-II for ultra-low noise applications

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