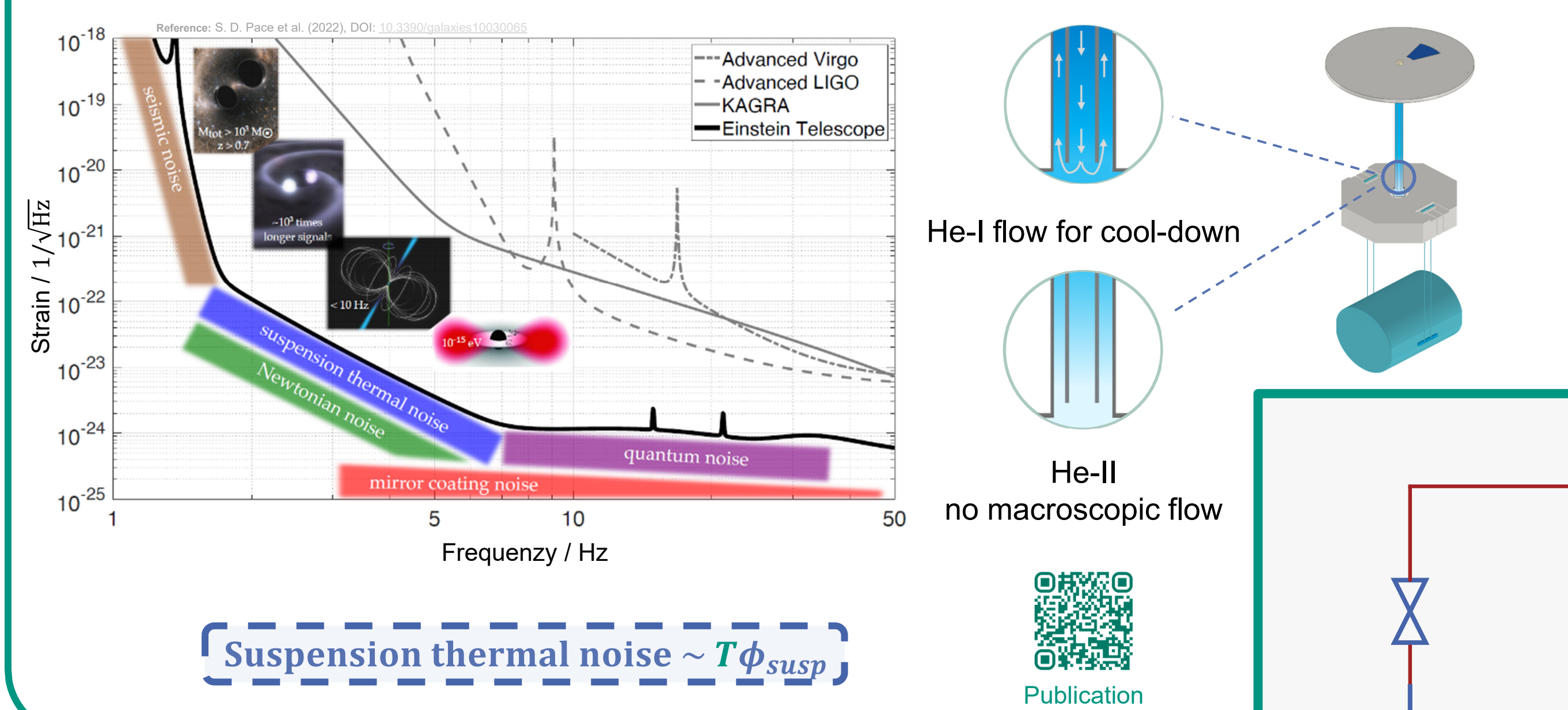


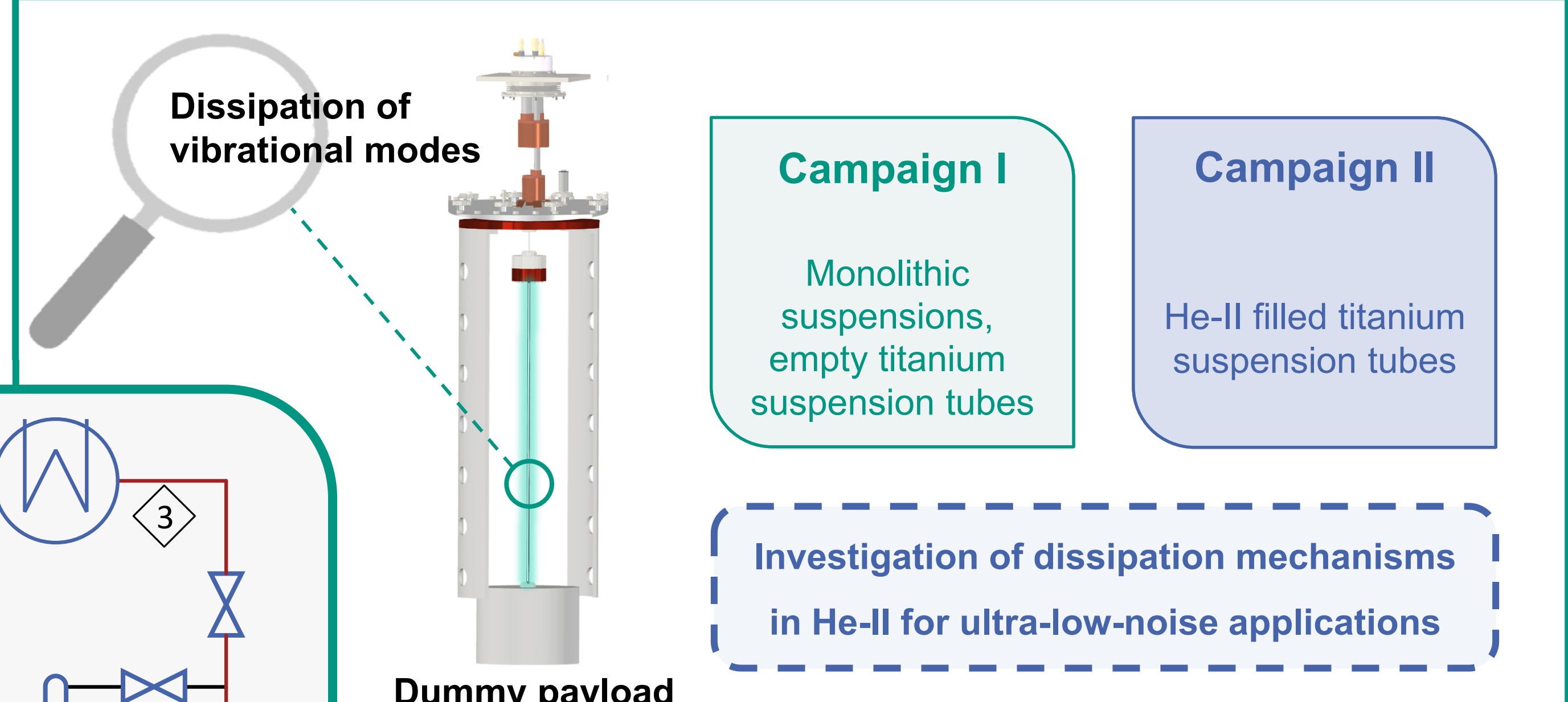
Conceptual design of a lab-scale low-noise He-II liquefier using a pulse-tube cryocooler with a Joule-Thomson cycle

Timo Weckerle*, Xhesika Korovesi, Steffen Grohmann

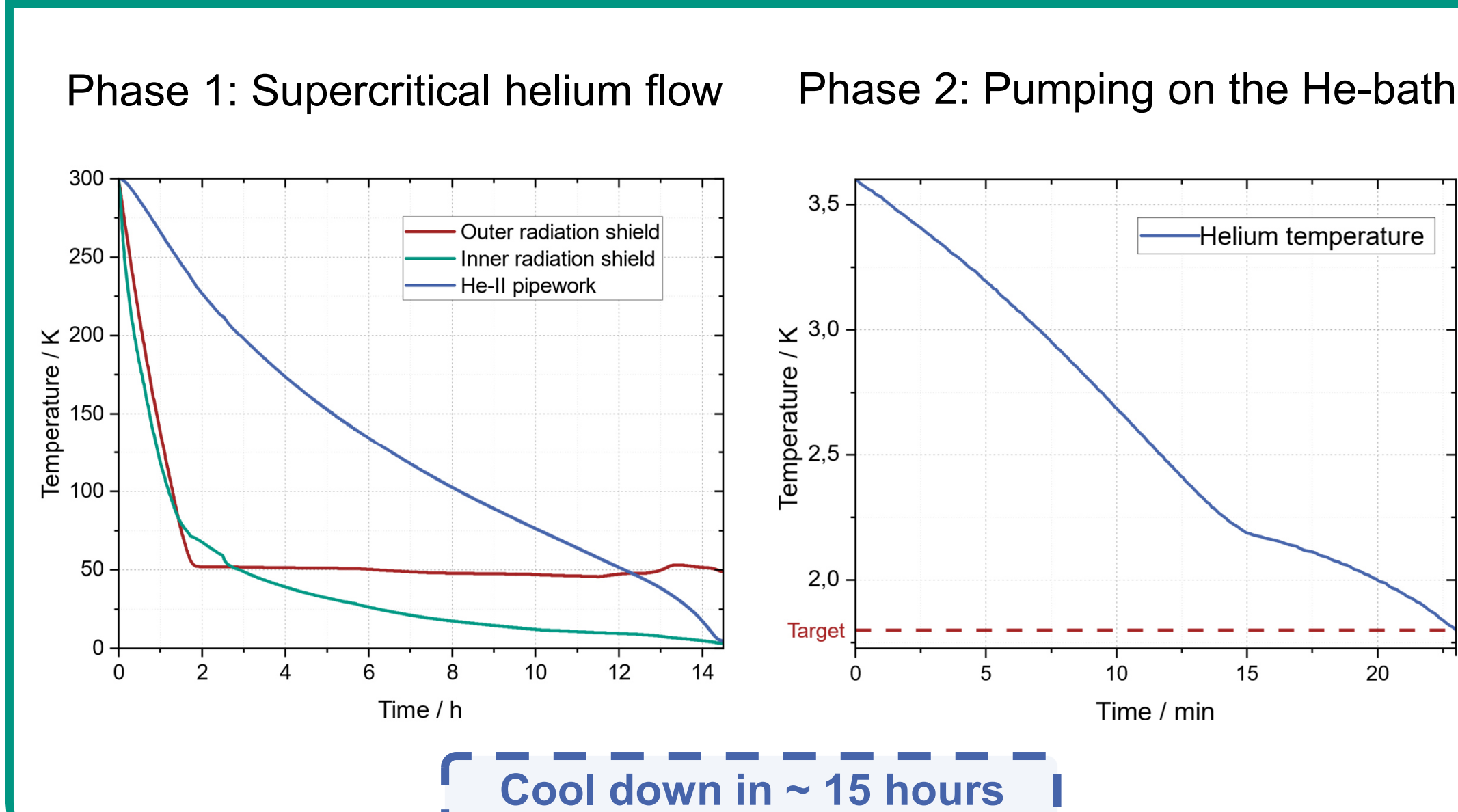
Einstein Telescope



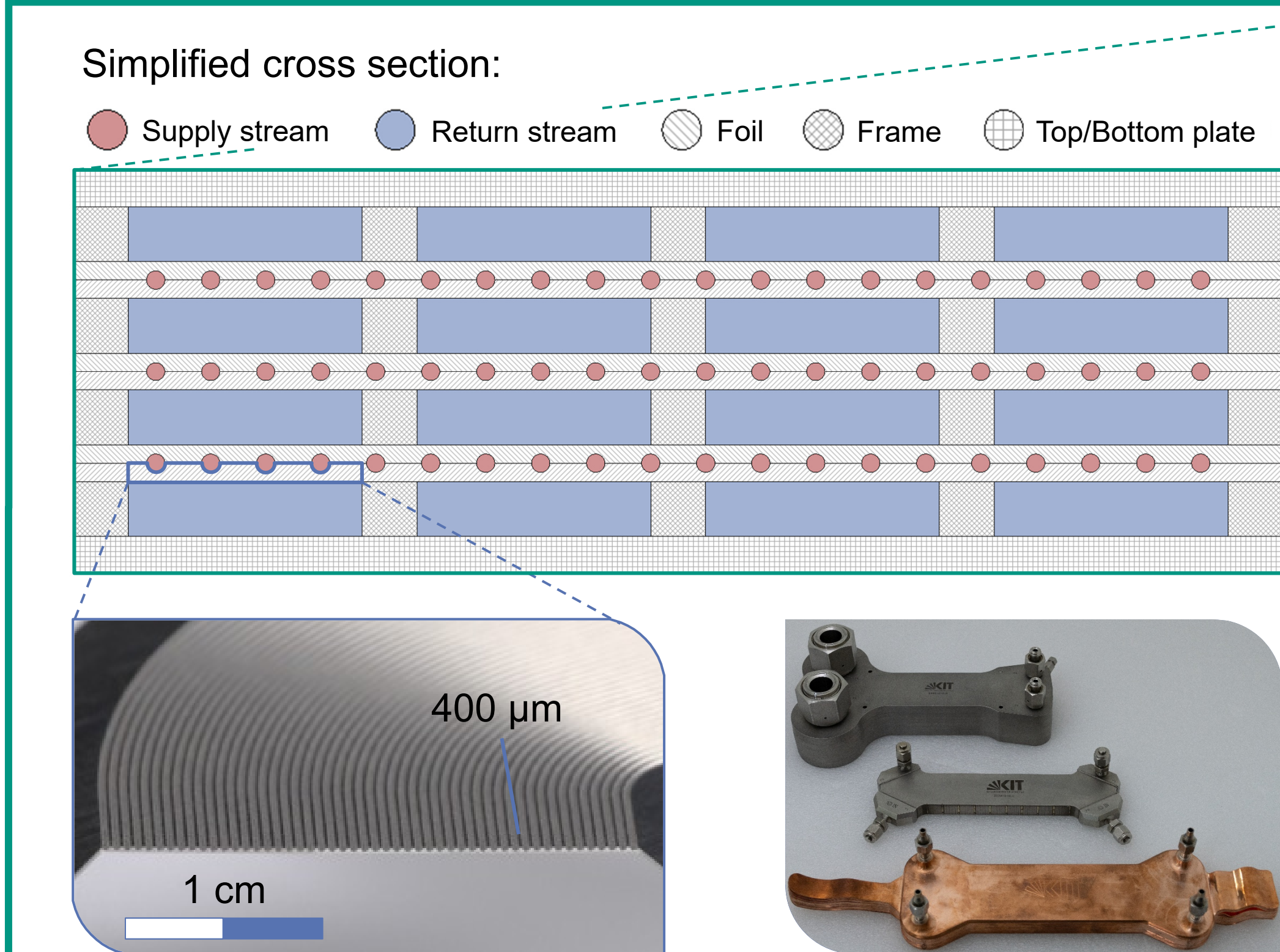
GRAVITHELIUM



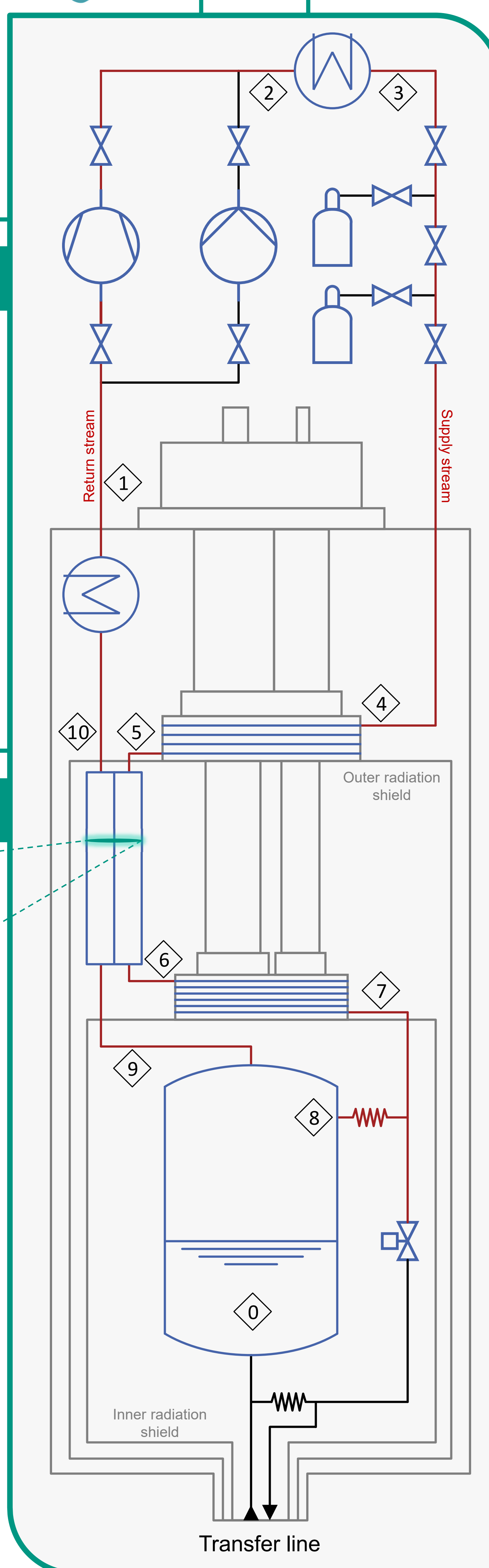
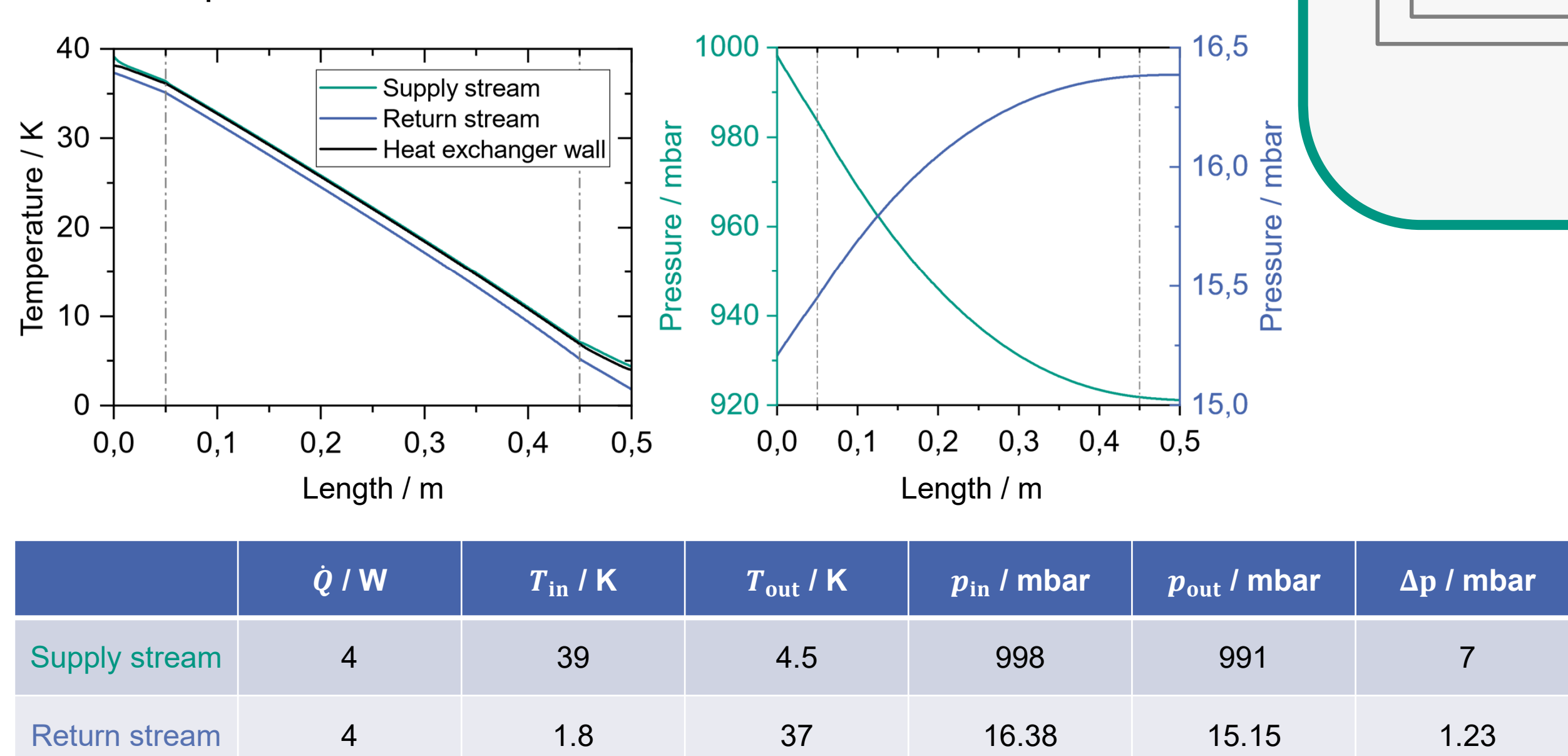
Cool-down



Foil-frame-counter-flow-heat-exchanger



Predicted performance:



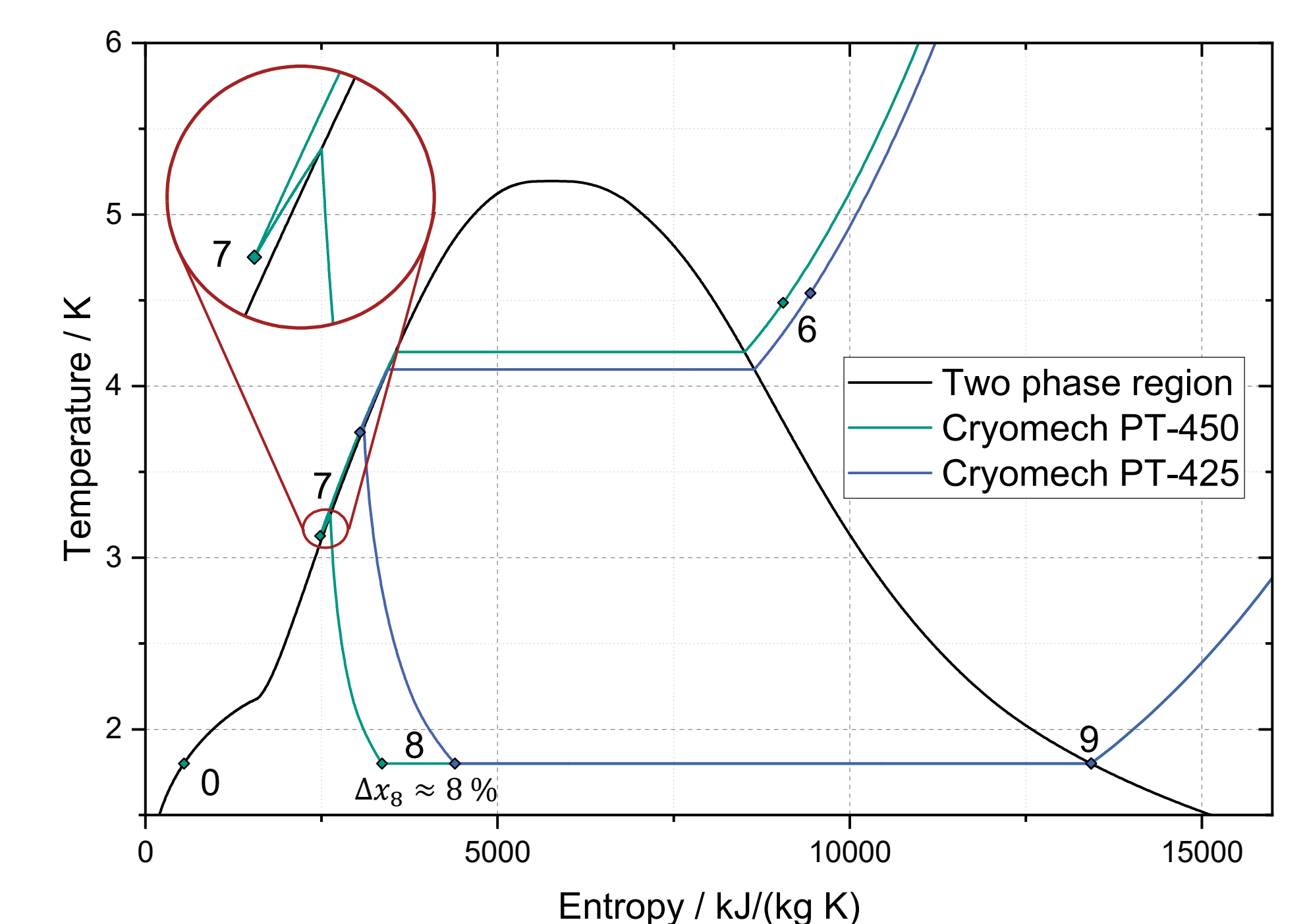
Maximum cooling power when point 7 is on the boiling line

Steady-state

	PT-425	PT-450	Bluefors [1]	Jahromi [2]
T_{He} / K	1.8	1.8	1.8	1.76
$\dot{Q}_c$ / mW	400	400	440	250
$\dot{Q}_{c,\text{max}}$ / mW	640	1000	-	-
x_8 / %	70	78	-	-
$\dot{M}$ / $\frac{\text{mg}}{\text{s}}$	24.7	22.2	-	-
P_{el} / kW	14	25	>12	8.8

[1] PT-425 1K Pulse Tube Cryocooler, Bluefors.com, Feb. 22, 2019, <https://bluefors.com/products/pulse-tube-cryocoolers/pt425-1k/>

[2] Amir E. Jahromi et al., Modeling, development, and experimental validation of a Joule-Thomson superfluid refrigerator using a pulse tube cryocooler



Maximum cooling power

