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Large-capacity helium refrigeration: from state-of-the-art towards FCC reference solutions

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Abstract title

Large unit-capacity cryogenic plants are required to cool high-field superconducting magnets of FCC-hh, high-gradient superconducting RF cavities of FCC-ee as well as for the cooling above 40 K of heavily-loaded FCC-hh beam screens, thermal shields and current leads. Such cryogenic plants require (1) unit refrigeration capacity 3 to 4 times larger than the present state-of-the-art (FCC-hh), (2) non-conventional thermal load distribution with very large synchrotron radiation to the beam screens (FCC-hh) and (3) high-efficiency and high-reliability to minimise the operation cost and to increase the overall availability of the future accelerator complex. A preliminary review of the state-of-the-art of large-capacity helium plants will be presented and the roadmap to define reference solutions for the FCC cryogenic plants will be proposed.

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