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Adaption of the LHC cold mass cooling system to the requirements of the Future Circular Collider (FCC)

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The cooling of the superconducting magnet cold masses with superfluid helium (HeII) is a well-established concept successfully in operation since years in the LHC. Consequently, its application for the cooling of FCC magnets is an obvious option. The 12-kW heat loads distributed over 10-km long sectors not only require an adaption of the magnet bayonet heat exchangers, but also present new challenges to the cryogenic plants, the distribution system and the controls strategy.

The poster recalls the basic LHC cooling concept with superfluid helium and define the main parameters for the adaption to the FCC requirements. Pressure drop and hydrostatic head is developed in the distribution and pumping systems; their impact on the magnet temperature profile and the corresponding cooling efficiency is presented and compared for different distribution and pumping schemes.

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