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Development of technologies for new cryoplant concepts

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The preliminary conceptual design of FCC-hh refrigerators was proposed in the framework of an international collaboration and confirmed through the industrial engineering studies undergoing with the cryogenic world-leader industries. Proposed cryoplants (10 cooling units of 100kW equivalent at 4.5K) are based on advanced refrigeration process cycles with very large capacity precooling stages (up to 1 MW at 40 K) to fulfil the non-conventional FCC-hh heat loads distribution with important 16T-magnets cooling at 1.9 K (50% of total heat loads) and very large synchrotron radiation to the beam screens around 50 K (remaining 50%). Potential technical innovations have been identified to improve the existing technologies for compressors and turbo-expanders in order to lower below 200 MW the corresponding overall electrical consumption. The presentation will present identified new technologies to be assessed in the coming years and implemented in future cryoplants to fulfil the FCC challenging cryogenic requirements and to increase the overall efficiency of the cryogenic system by more than 10%.

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