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C2Po1D-02: Thermomechanical optimization of actively cooled thermal shield in PIP II Cryogenic Distribution System

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Abstract The PIP-II Cryogenic Distribution System (CDS) connects the helium plant to the superconducting linac consisting of 23 cryomodules. The regulation of the helium stream flowing by the PIP-II CDS is carried out by means of control valves located in the Distribution Valve Box. The cryomodules are supplied of helium from individual Bayonet Cans. The entire CDS process lines are shielded from the thermal radiation from the ambient vacuum jacket by actively cooled thermal shields. High efficiency of the thermal shield has been achieved by state-of-the-art optimization of its thermalization system consisting of thermal bridges connecting the shield to the high temperature helium return pipe nominally at 80 K. The temperature and stress analyses of the thermal shield has been performed numerically. The analyses results obtained on the case of the thermal shield for PIP-II CDS Distribution Valve Box are compared with the solutions applied in other Big Science cryogenic machines.

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