

Development of Liquid Helium Flow Rate and Heat Transfer Models for LMQXFA Cold Masses

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The LMQXFA cold masses are quadrupole, superconducting magnets that function at 1.9 K that are slated to be used as upgrades for the High Luminosity LHC. To reach operating temperature, chilled gas and eventually liquid helium flows through the magnets' vents. If the cold mass is cooled too quickly, thermal contractions could damage internal components. The goal of this project was to create mathematical models for the flow rate and heat transfer in the magnets to 4.5 K, the temperature of liquid helium, using Engineering Equation Solver (EES). The models will help estimate the rate at which operators can safely cool the magnets.

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