

Nb₃Sn MAGNETS FOR THE LHC UPGRADES

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Abstract

Insertion quadrupoles with large aperture and high gradient are required to achieve the luminosity upgrade goal of $10^{35} \text{ cm}^{-2} \text{ s}^{-1}$ at the Large Hadron Collider (LHC). In 2004, the US Department of Energy established the LHC Accelerator Research Program (LARP) to develop a technology base for the upgrade. The focus of the magnet program, which is a collaboration of three US laboratories, BNL, FNAL and LBNL, is on development of high gradient quadrupoles using Nb₃Sn in order to operate at high field and with sufficient temperature margin. Program components address technology issues regarding coil and structure fabrication, quench performance, field quality and alignment, length scale-up, quench protection, radiation hardness, conductor and cable. This paper reports the current status of model quadrupole development and outlines the long-term goals of the program.

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