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Status and prospects of the HL-LHC project

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The High-Luminosity LHC project aims to increase the integrated luminosity of the LHC by an order of magnitude and enable its operation until the early 2040s. This presentation will provide an overview of the current status of the HL-LHC project. By mid-2023, several achievements related to the HL-LHC can be reported, starting from the completion of the civil engineering to the successful demonstration of the new Nb3Sn magnet technology for the triplet magnets.

At the end of the nominal LHC operation period, radiation dose levels are expected to exceed 10 MGy for integrated luminosities above 300 fb-1 in the focusing triplet quadrupole magnets next to the main experiments by the end of 2025. Such radiation levels cause most epoxy and insulation materials used for magnet coil construction to become brittle and lose their mechanical strength, and are expected to result in the loss of mechanical integrity or degradation of the electrical insulation system for integrated luminosities between 400 fb-1 and 500 fb-1. But preparing the LHC machine for an integrated luminosity for the nominal target of 3000 fb-1 requires not only replacing the current triplet magnets with new, more radiation-tolerant magnets with larger apertures but additional technology developments in several areas. The HL-LHC project is therefore not only an upgrade of the LHC machine, but also a technology driver that develops technologies that will enable future accelerator projects such as the FCC and EIC.

Collaboration / Activity

High Luminosity LHC

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