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Oxygen deficiency detection in the LHC

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With the increased performance of the High Luminosity Large Hadron Collider (HL-LHC), gas leak detection in the vicinity of the superconducting magnets cooled with cryogenic helium becomes a challenge. To ensure operational safety and reliable detection of Oxygen Deficiency Hazard (ODH) for the next decade, the entire system will be refurbished during the LHC accelerator's long shutdown, scheduled to begin in 2026. The new design of the ODH detection system includes development of a detector and flashing lights that can not only cope with electromagnetic disturbances, but also with an increased radiation exposure, all while considering the restricted access for equipment maintenance. Understanding the nature and impact of these constraints at the design stage is key to specifying the requirements of the new safety systems. This paper describes the research and development work undertaken by CERN to analyse, test, and define oxygen deficiency detection taking into account lessons learned from the current systems and the future upgrade to the High Luminosity LHC.

Footnotes

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