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AUP progress: procurement and performance of crab cavities for the HL-LHC

Monday 22 September 2025 14:30 (3 hours)

The High Luminosity Upgrade of the Large Hadron Collider (HL-LHC), set for completion by 2029, is a technology frontier initiative aimed at increasing the collider's luminosity by a factor of 10, enabling unprecedented precision in measurements and expanding the potential for groundbreaking discoveries in particle physics. A key component of this upgrade is the implementation of advanced superconducting technologies, including crab cavities, which rotate particle bunches to maximize collision overlap, and high-field Nb3Sn quadrupole magnets for improved beam focusing. The U.S. Department of Energy's (DOE) Accelerator Upgrade Project (AUP) is playing a critical role in this effort, particularly through the development and delivery of cutting-edge bulk niobium crab cavities. This paper will provide an overview of the procurement process with industry vendors, and detail the processing and performance efforts at FNAL and JLab. We will also share lessons learned and outline the roadmap toward final cavity delivery to TRIUMF for string assembly and cryostating, culminating in the installation of the fully tested cryomodules in the LHC tunnel by 2029.

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Yes

Footnotes

Funding Agency

DOE

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