



Contribution ID: 395

Type: **Oral Presentation**

US CONTRIBUTION TO THE HIGH LUMINOSITY LHC UPGRADE: FOCUSING QUADRUPOLES AND CRAB CAVITIES

Thursday 1 August 2019 14:00 (20 minutes)

In the early 2000's, the US High Energy Physics community contributing to the Large Hadron Collider (LHC) launched the LHC Accelerator R&D Program (LARP), a long-vision focused R&D program, intended contribute to a quick LHC commissioning and to bring the Nb₃Sn and other technologies to a maturity level that would allow applications in HEP machines. Around 2015, the technologies developed by LARP, CERN and other institutions were mature enough to allow the spin-off of a major upgrade project to the LHC complex, the High Luminosity LHC (HL-LHC). The talk will focus on the US contribution to HL-LHC, namely the large-aperture low- β focusing Nb₃Sn quadrupoles and the Radio Frequency Dipole (RFD) Crab Cavities, located in close proximity to the ATLAS and CMS experiments.

This contribution, called the HL-LHC Accelerator Upgrade Project (HL-LHC AUP), focuses on production of these quadrupoles and cavities by sharing the work among a consortium of US Laboratories (FNAL, LBNL, BNL and SLAC) and Universities and in close connection with the CERN-led HL-LHC Collaboration. The collaboration achieved commonality of specifications and uniformity of performance. Final development of design, construction and first results from the prototypes are described to indicate the status of these critical components for HL-LHC.

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Session Classification: Accelerators

Track Classification: Accelerators