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LHC machine RF issues and developments

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The main RF system of the LHC, which uses 400MHz superconducting cavities, will be used to capture, accelerate and store the injected beam. A separate transverse damper system using electrostatic deflectors will be used to damp transverse oscillations. The associated low-level RF (LLRF) equipment is responsible for fast control of the accelerating voltage and phase in the cavities, the phase and radial position of the beam, and the synchronization of beam transfers between SPS and LHC. The LLRF system combines high-frequency analogue components with digital signal processing using FPGAs and DSPs. The extensive use of digital technology allows not only to achieve the required performance and stability but also to provide full remote control and diagnostics facilities needed in a machine where most of the RF system is inaccessible during operation.

Author: BUTTERWORTH, Andy

Presenter: BUTTERWORTH, Andy

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