Contribution ID: **284** Contribution code: **TUPD015** Type: **Poster Presentation**

Consolidation of the state control and surveillance system of the LHC Beam Dump system

Tuesday 23 September 2025 16:00 (1h 30m)

The Large Hadron Collider (LHC) Beam Dump System (LBDS) includes 15 extraction kickers (MKD) and 10 dilution kickers (MKB), each powered by a High Voltage Pulse Generator (HVPG), controlled by the State Control and Surveillance System (SCSS) based on industrial PLC technology. After almost 20 years of reliable operation, a consolidation of the LBDS SCSS is planned for deployment during the Long Shutdown 3 (LS3 2026–2029), to meet the demand of increased diagnostics, functionalities, and guarantee component longevity until the end of LHC operation (2041).
This paper describes the analysis conducted through a detailed review of the existing hardware, software, network layers, and ageing fieldbus components. It presents the motivations for modernizing the SCSS and the new control architecture with the improvement on the safety-functionalities implemented. It provides an overview of the new system's interlock state machine with its integration in CERN control middleware.

Footnotes

Funding Agency

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Session Classification: TUPD Posters

Track Classification: MC02: Control System Upgrades in Existing Facilities