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Design and Performance of the LHC beam-based Feedback Systems

The LHC deploys a comprehensive suite of beam-based feedbacks for safe and reliable machine operation. More than 3500 devices, distributed over the 27 km circumference, are involved in these feedbacks, making them one of the largest and most complex systems at any present or previous high-energy accelerator. This contribution evaluates the underlying feedback control loop architecture, its operational performance – strongly linked to the associated beam instrumentation, external beam perturbation sources and optics uncertainties –and compares them with the initial feedback design assumptions.

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