

First results from availability studies

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Reaching the challenging integrated luminosity production goals of a future circular hadron collider (FCC-hh) and High-Luminosity LHC (HL-LHC) requires careful design for high machine availability. However, the identification of the key factors that impact availability and cost is far from obvious due to the unparalleled complexity of such machines. A dedicated activity has been launched in the frame of the Future Circular Collider study to develop models to study possible ways to optimize accelerator availability. This contribution presents a probabilistic approach for Monte Carlo simulation of the machine operational cycle, schedule and availability for physics. The approach has similarities to common risk analysis methods. It relies on failure rates and repair times to model failure probabilities and consequences. The main source of information is therefore coming from operational maintenance data. The recent improvements in LHC failure tracking has enabled the accurate modelling of LHC operations. The model accuracy is discussed by comparing obtained results with past LHC operational data. Furthermore, the prerequisites for making predictions for FCC-hh operations are discussed, focusing on the differences between FCC and LHC, related to size and complexity, beam parameters, operational constraints (e.g. beam injection process) and technological progress.

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