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## Bunch-by-bunch simulations of beam-beam driven particle losses in the LHC

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Recent experimental measurements in the Large Hadron Collider (LHC) have shown a clear correlation between beam-beam resonance driving terms and beam losses, with a characteristic bunch-by-bunch signature. This observation creates interesting conditions to study diffusive processes. Over the past few decades, early chaos indicators, frequency map analysis and dynamic aperture studies have been commonly used to study particle stability in circular machines. However, the underlying mechanisms driving particles to large amplitudes in the presence of high order resonances is still an open question. Leveraging on years of development on particle tracking tools, this paper presents full-fledged 6-dimensional bunch-by-bunch beam loss simulations in the LHC. The computed loss rates are shown to be in agreement with experimental observations from LHC Run 3.

### Footnotes

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North America

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