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Improved measurements of nonlinear integrable optics at IOTA

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Nonlinear integrable optics (NIO) are a promising novel approach at improving the stability of high intensity beams. Implementations of NIO based on specialized magnetic elements are being tested at the Integrable Optics Test Accelerator (IOTA) at Fermilab. One method of verifying proper implementation of these solutions is by measuring the analytic invariants predicted by theory. The initial measurements of nonlinear invariants were performed during IOTA run in 2019/20, however the covid-19 pandemic prevented the full-scale experimental program from being completed. Several important improvements were implemented in IOTA for the 2022/23 run, including the operation at higher beam energy of 150 MeV, improved optics control, and chromaticity correction. This report presents on the improved calibrations of the NIO for nonlinear invariant measurements.

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Footnotes

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Yes

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