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Measurement and modelling of decapole errors in the LHC from beam-based studies

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Studies of third-order chromaticity in the LHC during its initial two runs have consistently demonstrated a substantial discrepancy between the expected Q'' at injection and that observed in beam-based measurements. In 2022 during Run 3, for the first time, studies of Q'' have been complemented by measurements of chromatic detuning, being the momentum-dependence of amplitude detuning, and the decapole resonance driving term $\propto 1004$. In this paper, these beam-based measurements are presented and compared to the magnetic model. Potential sources of the previously identified Q'' discrepancy are discussed.

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Footnotes

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Yes

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