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60° phase advance optics measurements in the Large Hadron Collider at CERN

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The Large Hadron Collider (LHC) arcs have been designed for a FODO optics with roughly 90° betatron phase advance per arc cell, but not necessarily with exactly the same optics in the eight sectors of the ring. Measuring an optics with a significantly different arc cell phase advance, e.g. 60° which is at the limit for aperture at LHC injection, offers the possibility of understanding the LHC in an unprecedented depth. Furthermore, this optics would allow focusing higher energy beams, since the required quadrupole settings are lower than for the standard 90° optics for the same beam energy. Such an optics has therefore been designed, respecting all constraints for one low intensity pilot bunch per beam, and tested during commissioning of LHC Run 3 in 2022. First measurements, performed only for one beam at injection, are presented and compared to results obtained for the nominal 90° optics.

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Footnotes

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Yes

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