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Sorting strategies for the new superconducting magnets for the CERN HL-LHC

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In a circular collider, precise control of the linear optics in the vicinity of the interaction points plays a crucial role in ensuring optimal operational performance and satisfying the machine protection constraints. Superconducting magnets are affected by unavoidable field errors that impact machine performance, and mitigation strategies are usually put in place to improve the situation. Past studies performed on the LHC have shown the benefit of magnet sorting on both initial beta-beating, through compensation of magnetic field errors, and overall correction quality of the machine optics. This work aims at extending those studies in the context of the luminosity upgrade of the LHC by considering the possible impact on performance from various sorting strategies applied to the new triplet quadrupoles for the ATLAS and CMS high-luminosity insertions.

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