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Impedance reduction of the beam wire scanners for the CERN LHC

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The beam wire scanners are instruments for precise transverse beam profile measurements by detecting the secondary particles generated from the interaction of the beam with a moving carbon wire. Following a completely new design of this device for the Large Hadron Collider (LHC), a detailed impedance calculation has been performed already in the design phase. This contribution presents the beam coupling impedance optimization and reduction strategy of the beam wire scanners for the High-Luminosity (HL) upgrade of the LHC. Prior to the construction of the prototype, extensive three-dimensional electromagnetic simulations of the proposed mechanical designs were performed to detect potential resonances and their sources. The mechanical model was improved to minimize the beam coupling impedance by geometrical modifications and coatings. We also present the beam-induced RF power loss calculation of the instrument.

Footnotes

Paper preparation format

LaTeX

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Europe

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