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Impedance in matter

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The delivery of a high-brightness muon beam through ionisation cooling is essential to produce sufficient luminosity in a muon collider. The ionisation cooling technique has been demonstrated in principle by the Muon Ionisation Cooling Experiment (MICE) but the potential detrimental impacts of collective effects still need to be carefully investigated. Using the same formalism as the one developed two decades ago for the CERN LHC collimators (which revealed a new and beneficial physical regime), the longitudinal and transverse beam coupling impedances in matter have been computed analytically for the case of a cylindrically symmetric material characterised by any electrical conductivity, permittivity and permeability, surrounded by a perfect conductor and with a longitudinal size much larger than the transverse one.

Footnotes

Funding Agency

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Yes

Author: MÉTRAL, Elias (European Organization for Nuclear Research)

Presenter: MÉTRAL, Elias (European Organization for Nuclear Research)

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