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Final cooling with thick wedges for a muon collider

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In the final cooling stages for a muon collider, the transverse emittances are reduced while the longitudinal emittance is allowed to increase. In previous studies, Final 4-D cooling used absorbers within very high field solenoids to cool low-momentum muons. Simulations of the systems did not reach the desired cooling design goals. In this study, we develop and optimize a different conceptual design for the final 4D cooling channel, which is based on using dense wedge absorbers. We used G4Beamline to simulate the channel and Python to generate and analyze particle distributions. We optimized the design parameters of the cooling channel and produced conceptual designs (corresponding to possible starting points for the input beam) which achieve transverse cooling in both x and y by a factor of ~ 3.5 . These channels achieve a lower transverse and longitudinal emittance than the best design previously published.

Footnotes

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