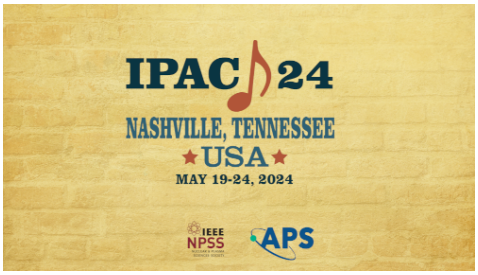

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An engineering prototype of a late stage ionization cooling cell for a muon collider

Wednesday, 22 May 2024 16:00 (2 hours)

Achieving the low emittances required for a muon collider requires ionization cooling. Much of that cooling occurs in compact cooling cells where superconducting coils and conventional RF cavities are closely interleaved [1]. The MICE experiment demonstrated the ionization cooling principle [2]. The real challenges for these cooling cells reside in their engineering challenges: high field solenoids, RF cavities, and absorbers, often designed near technological limits, placed in close proximity to each other. We thus propose to build a 1.5 cell prototype ionization cooling cell to demonstrate the capability of constructing an ionization cooling and to provide engineering input for the design of such beamlines. The cell will contain RF cavities for one cell, and magnets for two cells, the latter to ensure we have addressed the full range of interactions between the magnets. Essentially we will build the most challenging design from [1] or a similar study that can be constructed with currently available technology to ensure we are exploring technological limits.

Footnotes

[1] D. Stratakis and R. B. Palmer, "Rectilinear six-dimensional ionization cooling channel for a muon collider: A theoretical and numerical study", Phys. Rev. ST Accel. Beams 83, 031003 (2015).
[2] MICE Collaboration, "Demonstration of cooling by the Muon Ionization Cooling Experiment," Nature 578, 53–59 (2020).

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