

Development of Six-Dimensional Helical Muon Beam Ionization Cooling Channel for Muon Colliders

Muon collider is a considerable candidate of the next-generation high-energy lepton collider machine. Six-dimensional (6D) muon beam ionization cooling channel is one of the most essential parts of the muon accelerator complex because the achievable luminosity is determined by its performance. Novel cooling concept was proposed to overcome several intrinsic issues of muon cooling. It consists of a helical dipole and solenoid magnetic components at the beam path to generate a continuous dispersion in a homogeneous ionization material. A helical quadrupole magnetic component is superimposed to stabilize a beam phase space. RF cavities are followed with a helical beam path to recover lost beam energy due to ionization process. The helical beam elements have been developed and verified experimentally for last decade. Recent research and development of the 6D helical cooling channel will be reviewed in this presentation.

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