

Muon Collider – Talk Proposal

The LHC at CERN has recently driven to the discovery of the Higgs boson, after a search that lasted for decades. However, a lepton collider would allow to study a number of Higgs couplings and any new physics related to Higgs production better than at the LHC.

At present there are various alternatives for a future multi-Tev lepton collider but the best option is still to be determined. It could be a muon collider, a linear electron-positron collider, an enlarged version of LEP or even a futuristic plasma accelerator.

Muons loose less energy for synchrotron radiation when accelerated in a ring and collisions of bunched muon beams have a smaller energy spread than bunched electron beams. This would allow the realization of a circular muon collider with higher energy in the center of mass, smaller size and better performance for physics than an electron collider.

Technological challenges of building a muon collider are many and diverse: since muons are unstable they must be produced, accelerated and collided quickly, before they decay. This requires developing new techniques of acceleration and cooling.

The muon accelerator program (MAP), has been working for many years to overcome these difficulties and has developed the concept of a muon collider that could fit into the Fermilab site. Many components that are used in this concept must still prove their feasibility, such as the injector, the target and the cooling channel. Among these, a necessary step is the success of the MICE experiment, hosted at RAL, which must give a proof of principle of the ionization cooling. This innovative cooling technique would cool a beam of muons by making them travel through a gas-filled absorbers and thereby loose energy in all directions, while accelerating them only in the longitudinal direction.

The Fermilab MAP project is involved in the realization and testing of many components of the MICE experiment as well as in the design of possible different solutions. The speaker is participating in this effort by testing and tuning a prototype 201 MHz RF cavity to be installed on MICE.

A survey of the merits of a muon collider will be given, comparing costs, dimensions and difficulties of several lepton colliders. A detailed description of the concept developed by MAP and of the MICE cooling experiment will be provided. An overview will be given of the activities at the MuColl Test Area at FNAL, an experimental facility designed to test RF components for a future muon collider.

Comments on the status of the overall project will conclude the presentation, in the attempt to understand if, how and when we could ever see the realization of a muon collider.

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