Articles and links

Useful sites

Clic/Ilc

- LCC website
- CLIC website
- ILC website
- CLIC wiki software page
- ILC software repository
- LCIO home page
- API documentation for the C++ version of LCIO

IlcRoot

- IlcRoot framework home page

Group's articles

See also the wiki page

	Muon colliders to expand frontiers of particle physics ***Nature Physics*** **volume 17, pages289–292(2021)** K. R. Long, D. Lucchesi, M. A. Palmer, N. Pastrone, D. Schulte and V. Shiltsev January, 28 2021 Muon colliders offer enormous potential for the exploration of the particle physics frontier but are challenging to realize. A new international collaboration is forming to make such a muon collider a reality. DOI: 10.1038/s41567-020-01130-x

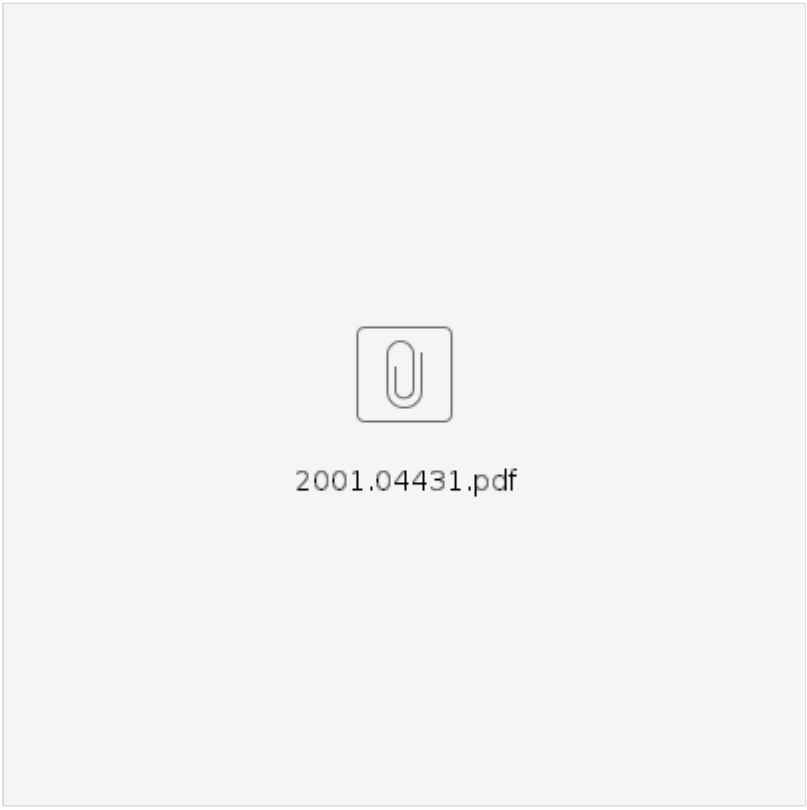
Muon Colliders:Opening New Horizons for Particle Physics

K. Long, D. Lucchesi, M. Palmer, N. Pastrone, D. Schulte, V.Shiltsev

August 3, 2020

ABSTRACT: Particle colliders have arguably been the most important instruments for particle physics over the past 50 years. As they became more powerful,they were used to push the frontier of our knowledge into previously uncharted territory. The LHC, the highest energy collider to date, at which the Higgs boson was discovered, is a prime example. To continue along the road into the Terra Promissa beyond the Standard Model requires colliders with energy reach even greater than that of the LHC. Beams of muons offer enormous potential for the exploration of the energy frontier.Since the muon is a fundamental particle, its full energy is available in collisions in contrast to protons which are composed of quarks and gluons.However, muon beams decay rapidly, which presents a special challenge for a collider. Recent research indicates that the technologies required to overcome this challenge are within our grasp and may offer a cost-effective and energy-efficient option to continue our explorations. A new international collaboration is forming to bring together the diverse expertise and complementary capabilities from around the world to realise the muoncollider as the next-generation energy-frontier discovery machine.

arxiv: 2007.15684.pdf



Detector and Physics Performance at a Muon Collider

Nazar Bartosik, Alessandro Bertolin, Laura Buonincontri, Massimo Casarsa, Francesco Collamati, Alfredo Ferrari, Anna Ferrari, Alessio Gianelle, Donatella Lucchesi, Nikolai Mokhov, Mark Palmer, Nadia Pastrone, Paola Sala, Lorenzo Sestini and Sergei Striganov

Jan 13, 2020

ABSTRACT : A muon collider represents the ideal machine to reach very high center-of-mass en-ergies and luminosities by colliding elementary particles. This is the result of the low level ofbeamstrahlung and synchrotron radiation compared to linear or circular electron-positron colliders.In contrast with other lepton machines, the design of a detector for a multi-TeV muon collider requires the knowledge of the interaction region due to the presence of a large amount of background induced by muon beam decays. The physics reaches can be properly evaluated only when the detector performance is determined. In this work, the background generated by muon beams of 750GeV is characterized and the performance of the tracking system and the calorimeter detector are illustrated. Solutions to minimize the effect of the beam-induced background are discussed and applied to obtain track and jet reconstruction performance. The +H b b process is fully simulated and reconstructed to demonstrate that physics measurements are possible in this harsh environment. The precision on Higgs boson coupling to b b is evaluated fors=1.5, 3, and 10 TeV and compared to other proposed machines.

DOI: 10.1088/1748-0221/15/05/P05001

LeptonPhoton2019_127.pdf	**Study of Physics Performances at Muon Collider** N. Bartosik,* N. Pastrone, A. Bertolin, A. Gianelle, L. Sestini, M. Casarsa, F. Collamati, A. Ferrari, A. Ferrari, D. Lucchesi, N. Mokhov, S. Striganov, P. Sala December 17, 2019 ABSTRACT : Muon Collider is a promising option for the next generation high-energy collider, possessing very low radiation losses due to synchrotron radiation. Treatment of the beam-induced background is one of the most critical issues in such a machine. Since the muon beams must be very intense to reach high luminosity, the muons decay products and subsequent particles from secondary interactions with the environment can reach the interaction point, limiting the physical performance of the detector. This talk presents a reconstruction strategy for a benchmark process, H->bb-bar, in the presence of the beam-induced background. DOI: https://doi.org/10.22323/1.367.0127
1905.03725.pdf	**Preliminary Report on the Study of Beam-Induced Background Effects at a Muon Collider** Nazar Bartosik, Alessandro Bertolin, Massimo Casarsa, Francesco Collamati, Alfredo Ferrari, Anna Ferrari, Alessio Gianelle, Donatella Lucchesi, Nikolai Mokhov, Stefan Mueller, Nadia Pastrone, Paola Sala, Lorenzo Sestini and Sergei Striganov May 9, 2019 ABSTRACT : Physics at a multi-TeV muon collider needs a change of perspective for the detector design due to the large amount of background induced by muon beam decays. Preliminary studies, based on simulated data, on the composition and the characteristics of the particles originated from the muon decays and reaching the detectors are presented here. The reconstruction performance of the physics processes $Hb\bar{b}$ and $Zb\bar{b}$ has been investigated for the time being without the effect of the machine induced background. A preliminary study of the environment hazard due to the radiation induced by neutrino interactions with the matter is presented using the FLUKA simulation program. arXiv:1905.03725

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