



Contribution ID: 447

Type: Experimental poster

Search for $H \rightarrow ZZ^* \rightarrow 4\mu$ at a Multi-TeV Muon Collider

Thursday, 10 June 2021 18:45 (1 hour)

A muon collider represents the ideal machine to reach very high center-of-mass energies ($\sqrt{s}=1.5\text{-}10\text{TeV}$) and luminosities $O(0.5\text{-}10/\text{ab})$. A large number of Higgs bosons will be produced mainly through the Vector Boson Fusion (VBF) processes. The VBF through Z bosons (ZZH) production process could be difficult to disentangle to the dominant WWZ, since the final state VBF muons, produced in the very forward region, could escape the detector. As a consequence, the $H \rightarrow ZZ$ decay process turns out to be favoured to probe exclusively the Higgs bosons coupling with Z bosons at a multi-TeV muon collider. In addition, a feasibility study of $H \rightarrow ZZ$ search in such an environment is mandatory before assessing the feasibility of more appealing measurements such as the trilinear and quartic Higgs boson coupling.

We will present, for the first time, a feasibility study of the $H \rightarrow ZZ^* \rightarrow 4\mu$ process in a multi-TeV muon collider. The study of the 4 muons final state, performed on fully simulated Monte Carlo samples, allows to optimize the muon reconstruction, thus providing feedback for the detector design. Reducible background induced by the muons decaying in the beam pipe and irreducible backgrounds from Standard Model have been studied, together with dedicated Machine Learning techniques for their reduction. A first estimate on the Higgs coupling to Z bosons in the 4μ channel will be provided.

Primary author: ZAZA, Angela (Universita e INFN, Bari (IT))

Co-authors: COLALEO, Anna (Universita e INFN, Bari (IT)); AIME', Chiara (Universita and INFN (IT)); RICCARDI, Cristina (Universita and INFN (IT)); LUCCHESI, Donatella (Universita e INFN, Padova (IT)); MALTONI, Fabio (Universite Catholique de Louvain (UCL) (BE) and Universita di Bologna); ERRICO, Filippo (University of Florida (US)); VAL, Ilaria (Universita and INFN (IT)); BUONINCONTRI, Laura (Universita e INFN, Padova (IT)); SETTINI, Lorenzo (Universita e INFN, Padova (IT)); CASARSA, Massimo (INFN, Trieste (IT)); PASTRONE, Nadia (Universita e INFN Torino (IT)); BARTOSIK, Nazar (Universita e INFN Torino (IT)); MASTRAPASQUA, Paola (Universita di Bari e INFN); VENDITTI, Rosamaria (Universita e INFN, Bari (IT))

Presenter: ZAZA, Angela (Universita e INFN, Bari (IT))

Session Classification: Poster Session

Track Classification: Higgs physics