



Contribution ID: 200

Type: **Asynchronous Talk**

Higgs boson couplings measurement at a Multi-TeV Muon Collider

A Multi-TeV muon collider providing $O(1/\text{ab})$ integrated luminosity will be a great opportunity to probe the most intimate nature of the Standard Model (SM) and the Electroweak Symmetry Breaking mechanism, allowing the precise measurement of the Higgs couplings to several SM particles. We will present an overview of the ongoing searches and first results on the sensitivity to the Higgs boson couplings with fermions (b and c quarks) and Z bosons in a Muon collider environment. In both studies, the dominant W Bosons Fusion production mechanism has been considered. Fully simulated samples for signal and main background processes have been reconstructed with the latest detector geometry and most updated tracking and jet reconstruction algorithms. Dedicated discriminators for b and c quark tagging, based on Machine Learning techniques have been developed, with the goal to improve the estimated precision of the corresponding Higgs boson coupling. The coupling with Z bosons is studied in the $H \rightarrow ZZ^* \rightarrow 4\mu$ channel, by developing dedicated selections and a multivariate discriminator with the goal to enhance the analysis sensitivity.

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Session Classification: Electroweak Interactions Session 2

Track Classification: Electroweak Interactions