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## Comparison between $\mu\text{-}\mu^+$ and $e\text{-}e^+$ colliders for charged Higgs production in the 2HDM

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We study the phenomenology of the charged Higgs boson at future muon colliders. We investigate the pair production  $\mu^+\mu^-\rightarrow H^+H^-$ , the single production  $\mu^+\mu^-\rightarrow W^\pm H^\mp$ , as well as the vector boson fusion (VBF)  $\{e^+e^-, \mu^+\mu^-\}\rightarrow \nu\nu^* H^+H^-$ . We show that the neutral Higgs exchange diagrams in the muon collider case can lead to a significant boost in the cross sections through their Yukawa couplings. Our results for the muon collider are systematically compared to the corresponding ones at  $e^+e^-$  machines. It is demonstrated that the VBF  $e^+e^-\rightarrow \nu\nu^* H^+H^-$  can compete with the mentioned  $2\rightarrow 2$  processes. We select benchmark points and perform signal-background analyses, taking into account detector simulations. We demonstrate the discovery region at  $5\sigma$  and the excluded region at  $2\sigma$  levels at a 3 TeV muon collider.

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