

Probing Higgs-Portal Dark Matter with VBF Signatures at the HL-LHC

Wednesday 16 July 2025 16:30 (25 minutes)

We investigate current and projected constraints on Higgs-portal dark matter (DM) models, focusing on both scalar and fermionic DM candidates, using vector boson fusion (VBF) production of the Higgs boson at the LHC. By analyzing the parameter space in the plane of DM mass versus the Higgs-DM coupling, we aim to reinterpret existing LHC VBF + MET searches to set bounds on the invisible Higgs decay channels.

To this end, we perform simulations in *MadGraph5_aMC@NLO* under LHC conditions to compute cross sections for VBF Higgs production followed by invisible decays. Experimental efficiencies are estimated through a recast of public analyses targeting the process $pp \rightarrow jj + \text{MET}$. We then rescale the integrated luminosity to project the reach of the High-Luminosity LHC (HL-LHC), identifying both currently excluded regions and those potentially probed with 3 ab^{-1} . Our results provide updated exclusion contours and projections in the Higgs-portal to DM parameter space.

Author: RODRIGUEZ, Cristian (Universidad de los Andes)

Presenter: RODRIGUEZ, Cristian (Universidad de los Andes)

Track Classification: Dark Matter