

Contribution ID : **77** Type : **Short Talk**

Higgs decay into invisible particles

Friday, 23 October 2026 16:50 (0:10)

Abstract

This work investigates Higgs boson decays into invisible particles within extensions of the Standard Model featuring a new (U_D(1)) gauge symmetry associated with a massless dark photon. Two theoretical frameworks are considered: one involving fermionic mediators and another involving scalar mediators. Using one-loop amplitude calculations, several decay channels are studied, and their viability is assessed through experimental constraints and perturbativity requirements. The results show that the scalar mediator model can yield a larger branching ratio for (h\to AA') than the fermionic model, highlighting the potential of these processes as probes of new physics beyond the Standard Model.

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Session Classification : Short Talks