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Latest results of searches for invisible Higgs Boson decays in the ATLAS experiment

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This report presents an overview of the latest results and research methodology of the search for Higgs boson decay into Dark Matter (DM) particles, using data obtained at first ($\sqrt{s} = 7$ TeV, 8 TeV) and second ($\sqrt{s} = 13$ TeV) Large Hadron Collider (LHC) Runs, corresponding to a luminosity of 4.9 - 19.7 and 139 - 140 fb⁻¹, respectively. Results were interpreted in the context of models where the Higgs boson acts as a portal to dark matter, where limits are set on the scattering cross section of weakly interacting massive particles and nucleons. Assuming the Standard Model cross section for the Higgs boson, an upper limit was set on the branching fraction into DM particles at 95% confidence level, obtained result is the most strict for ATLAS and CMS LHC experiments at the moment.

Further plans for the ATLAS experiment to study this process in Higgs Boson vector boson fusion production using partial Run 3 data are also presented.

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