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Sensitivity to invisible scalar decays at CLIC

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An electron-positron Higgs factory is regarded as the highest-priority next large-scale collider facility. Among others, two linear collider projects are being considered: the Compact Linear Collider (CLIC) and the International Linear Collider (ILC). Reaching energies at the TeV scale, both machines would allow us not only to study Higgs boson and top quark properties with very high precision but could also result in the direct or indirect discovery of New Physics. SM-like Higgs boson or new heavy scalar decays with the emission of invisible dark matter particles could be the only way to observe Beyond the Standard Model effects at achievable energy scales and establish the connection between the Standard Model and New Physics sectors.

We studied the possibility of measuring the invisible Higgs boson and additional heavy scalar decays with CLIC running at 380 GeV and 1.5 TeV. The analysis is based on the WHIZARD event generation and fast simulation of CLIC detector response with DELPHES. We estimated the expected limits on the invisible decays of the 125 GeV Higgs boson, as well as the cross section limits for the production of an additional neutral scalar, assuming its invisible decays, as a function of its mass. The results obtained are one order of magnitude more stringent than the current limits coming from the LHC.

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