Mono-Z constraints on the fermionic dark matter model with pseudoscalar mediator at the LHC

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(Received 31 January 2017; in final form 02 May 2017)

Abstract
In this research we study the Mono-Z signature along with dark matter production at the LHC in a renormalizable dark matter model. We look at processes with $l^+l^- + \text{MET}$ in the final state. We simulate signal and background events at central mass energy $\sqrt{s} = 14 \text{TeV}$. We then evaluate the LHC sensitivities for some points in the model parameter space for two integrated luminosities $\mathcal{L} = 100 \text{fb}^{-1}$ and $\mathcal{L} = 1 \text{ab}^{-1}$. The main goal in this investigation is to constrain the relevant Yukawa coupling taking into account the Mono-Z plus dark matter signature, Invisible Higgs decay width measurements, observed dark matter relic density and Higgs physics. We find out that there are regions in the parameter space which remain viable after applying all the constraints mentioned above.

Keywords: dark matter, LHC, Mono-Z, relic density, new physics

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