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A Dark Matter Candidate from Inert Doublet Models

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In spite of the fact that the existence of dark matter in the Universe is established, its nature remains unknown. Our aim is to provide a model which offers a candidate for dark matter and simultaneously tries to address some potential problems like CP-violation. The model is an extension of 2HDM with an additional inert doublet along with an unbroken symmetry. The unbroken Z2 symmetry ensures that the lightest particle of this new doublet
is absolutely stable and that, it only couples very weakly to ordinary matter indirectly via the heavy gauge bosons. This very weak coupling is necessary in order not to be in conflict with laboratory data.
We present that in a significant part of the parameter space the inert charged scalar could be long-lived, leaving displaced vertex in the detector. It enables one to discover the inert charged Higgs over the Standard Model background at the LHC.

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