

Non-decoupling scalars at future detectors

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The nature of the electroweak symmetry breaking remains the last theoretical unknown of the Standard Model (SM). In this work, we extend the SM with a set of simplified scalar models which are classified by their electroweak irreducible representations. We present a no-lose theorem for future experiments by showing that any additional particle to the SM that acquires a significant fraction of their mass from the Higgs mechanism is discoverable at the FCC-ee. In addition, these scalar extensions can also induce a strong first-order phase transition which may be detected by future gravitational wave interferometers such as LISA.

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