Type: Parallel

Gravitational waves from first order electroweak phase transition in models with the U(1)_X gauge symmetry

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In this talk, we consider models with the $U(1)_X$ gauge symmetry, which is spontaneously broken by dark Higgs mechanism. We discuss patterns of the electroweak phase transition and detectability of gravitational waves (GWs) when strongly first order phase transition occurs. We find the collider bounds exclude a part of parameter space that could generate detectable GWs otherwise. We show that GWs produced in the multistep phase transitions can be detected by future observations such as LISA and DECIGO. In addition, we expect that most of the parameter regions can be covered by direct searches for the singlet scalar boson and prediction measurements of various Higgs boson couplings. Furthermore, we discuss the complementarity of dark photon searches or dark matter searches with the GW observations in the models of the dark gauge symmetry. This talk is based on arXiv:1802.02947 with Hashino, Kanemura, Kakizaki and Ko.

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