The 3rd Winter Toyama Mini-Workshop on Particle Physics and Cosmology "Basis of the Universe with Revolutionary Ideas 2018 (BURI2018)"

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

Tuesday 16 January 2018 14:00 (30 minutes)

In this talk, we consider the standard model extension with a dark sector with the  $U(1)_X$  Abelian 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 multi-step phase transitions can be detected by future observations such as DECIGO and LISA. 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 a collaboration with Katsuya Hashino, Shinya Kanemura, Mitsuru Kakizaki and Pyungwon Ko.

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