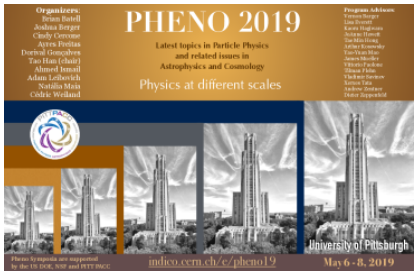

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RS phase transition, fixed points and gravitational waves

Monday 6 May 2019 17:00 (15 minutes)

Some of the solutions to the hierarchy problem use dimensional transmutation to explain the Planck-weak hierarchy. In these models, the hierarchy is explained by exponentiation of (the inverse of) a small anomalous dimension of the coupling that characterizes the deviation of the theory from scale invariance. The confinement-deconfinement phase transition in these models can be studied using holography, where the confined phase is dual to the compact Randall-Sundrum (RS I) model and the deconfined phase corresponds to an AdS-Schwarzchild geometry. In the minimal model, the transition rate from the confined to the deconfined phase has been previously shown to be suppressed by the same parameter that is controlling the hierarchy, leading either to a large supercooling or an empty universe. In this work we consider the possibility that the deformation grows in the IR and runs towards an IR fixed point. In this scenario, the rate of the phase transition can be controlled by the parameters of the IR fixed point, while the hierarchy is still set by the anomalous dimension corresponding to the UV fixed point. This makes it is possible for the phase transition to complete without undergoing a large supercooling. We then discuss the gravitational wave signal from this phase transition and how it can be distinguished from the minimal model. Remarkably, the gravitational waves may probe the characteristics of the IR fixed point even if it lies well below the confinement scale, i.e. even when confinement would hide the IR fixed point from collider experiments.

Summary

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