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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

THEP Journal Club

April 26, 2018 at 1 p.m.
Minkowski Raum, Staudinger Weg 7, 05-119

Pizza & Physics at Lunchtime

Note: Masters defense, Medienraum, 03-431

Moritz Breitbach
JGU Mainz

Gravitational Waves from Cosmological Phase Transitions

In 2015, gravitational waves originating from a binary black hole merger were directly detected by the LIGO observatory, a revolutionary discovery which was awarded the 2017 Nobel Prize of Physics. The detection capabilities of planned pulsar timing arrays and space-based observatories herald a new era of astronomical and cosmological research, complementary to current and future collider experiments. Cosmological phenomena such as cosmic strings, the inflation and phase transitions are believed to generate a stochastic gravitational wave background.

We focus on cosmological phase transitions driven by the temperature dependence of the thermodynamical free energy density in the expanding and cooling universe. If such a transition occurs abruptly, i.e. if it is first-order, bubbles of the new phase nucleate, expand and finally collide. Collisions cause anisotropies acting as sources for gravitational radiation. After their production, the gravitational waves propagate through space undisturbed until they might be detected in the form of a redshifted stochastic background today. We present different models that feature dark matter candidates together with first-order phase transitions.

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