T 110: Topical Workshop: Gravitational Waves and Particle Physics

Convenor: T. Konstandin, P. Schwaller

Zeit: Donnerstag 16:45–18:45 Raum: H 4

Eingeladener Vortrag T 110.1 Do 16:45 H 4

Gravitational waves from cosmological phase transitions — •Geraldine Servant — DESY and U. Hamburg

Strong first-order cosmological phase transitions produce a stochastic gravitational wave background. We discuss the resulting contributions from bubble collisions, magnetohydrodynamic turbulence, and sound waves, and estimate the total corresponding signal predicted in gravitational waves. We demonstrate that LISA is able to probe many well-motivated scenarios beyond the Standard Model of particle physics predicting strong first-order cosmological phase transitions in the early Universe.

Eingeladener Vortrag T 110.2 Do 17:15 H 4

Bubble wall dynamics - from friction to runaway — •Dietrich Bödeker — Bielefeld

In a first order electroweak phase transition bubbles of Higgs phase expand into the symmetric phase. Particles hitting a bubble wall cause friction and slow down the expansion. In some models this can be insufficient to compensate the pressure difference between the two phases. Then the bubble wall accelerates indefinitely, it 'runs away'. When two such bubbles collide, they can produce a large gravitational wave signal. The particles hitting the wall can emit radiation, causing additional friction which can prevent runaway.

Eingeladener Vortrag T 110.3 Do 17:45 H 4

The string soundscape at gravitational wave detectors — •Sven Krippendorf — Rudolf Peierls Centre for Theoretical Physics, University of Oxford, 1 Keble Road, Oxford, OX1 3NP, UK

We argue that gravitational wave signals due to collisions of ultra-relativistic bubble walls may be common in string theory. This occurs due to a process of post-inflationary vacuum decay via quantum tunnelling within warped throats. Though we study a specific string construction, we argue that our conclusions are more general. Many such transitions could have occurred in the post-inflationary Universe, as a large number of throats with exponentially different mass scales can be present in the string landscape, leading to several signals of widely different frequencies - a soundscape connected to the landscape of vacua. Detectors such as aLIGO, LISA, and observations with SKA and EPTA (pulsar timing) have the sensitivity to detect such signals. A distribution of primordial black holes is also a consequence, though reliable estimates of masses and their abundance require dedicated numerical simulations, as do the fine details of the gravitational wave spectrum due to the unusual nature of both the bubble walls and transition.

Eingeladener Vortrag T 110.4 Do 18:15 H 4

Probing Dark Sectors at Gravitational Wave Detectors and Elsewhere — •Joerg Jaeckel[1], Valya Khoze[2], and Michael Spannowsky[2] — [1]ITP Heidelberg — [2]IPPP Durham

In this talk we will briefly motivate the existence of dark sectors. We will then look at different ways to explore dark sectors. Special attention is devoted to the opportunities provided by gravitational wave detectors.