Symposium Gravitation – neueste Ergebnisse und Trends (SYGR)

gemeinsam veranstaltet vom
vom Fachverband Gravitation und Relativitätstheorie (GR)

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Übersicht der Hauptvorträge und Fachsitzungen

(Hörsaal Z6 - HS 0.004)

Hauptvorträge

SYGR 1.1	Di	14:00–14:30	Z6 - HS 0.004	**New horizons in gravity** — •Lavinia Heisenberg
SYGR 1.2	Di	14:30–15:00	Z6 - HS 0.004	**Binary neutron stars: Einstein's richest laboratory** — •Luciano Rezzolla
SYGR 1.3	Di	15:00–15:30	Z6 - HS 0.004	**Search for Dark Matter** — •Christian Weinheimer
SYGR 1.4	Di	15:30–16:00	Z6 - HS 0.004	**From QFT on curved spacetimes to effective quantum gravity** — •Kasia Rejzner

Fachsitzungen

SYGR 1.1–1.4	Di	14:00–16:00	Z6 - HS 0.004	**Symposium Gravitation - neueste Ergebnisse und Trends**

SYGR 1: Symposium Gravitation - neueste Ergebnisse und Trends

Zeit: Dienstag 14:00–16:00 Raum: Z6 - HS 0.004

Preisträgervortrag SYGR 1.1 Di 14:00 Z6 - HS 0.004
New horizons in gravity — •Lavinia Heisenberg — Institute for Theoretical Studies ETH Zürich — Trägerin des Gustav-Hertz-Preises

After giving an exhaustive introduction into modern cosmology, I will summarise the theoretical and observational challenges that we are facing in the standard model of cosmology. I will then introduce different ideas proposed in the literature to tackle these problems within modified gravity theories, among which I will pay special attention to theories based on affine structure, massive gravity, scalar-tensor theories and generalised Proca theories

Hauptvortrag SYGR 1.2 Di 14:30 Z6 - HS 0.004
Binary neutron stars: Einstein's richest laboratory — •Luciano Rezzolla — Theoretische Astrophysik, Goethe Universität Frankfurt

I will argue that if black holes represent one the most fascinating implications of Einstein's theory of gravity, neutron stars in binary system are arguably its richest laboratory, where gravity blends with astrophysics and particle physics. I will discuss the rapid recent progress made in modelling these systems and show how the inspiral and merger of a binary system of neutron stars is more than a strong source of gravitational waves. Indeed, while the gravitational signal can provide tight constraints on the equation of state for matter at nuclear densities, the formation of a black-hole–torus system can explain much of the phenomenology of short gamma-ray bursts, while the the ejection of matter during the merger can shed light on the chemical enrichment of the universe.

Hauptvortrag SYGR 1.3 Di 15:00 Z6 - HS 0.004
Search for Dark Matter — •Christian Weinheimer — Institut für Kernphysik, Universität Münster

Cosmology and astrophysics give strong evidence by different observables for the existance of 6 times more matter in the universe than baryonic matter. This Dark Matter is believed to be composed of a new type of particle. They are hunted in 3 different ways: By direct search experiments in underground labs looking for the scattering of Dark Matter particles off nuclei or atomic electrons, by looking for annihilation or decay products of Dark Matter particles in gamma or neutrino telescopes or by looking for their production in high energy collisions, e.g. at the Large Hadron Collider at CERN. No compelling evidence has been found so far.

Still, massive weakly interacting particles (WIMPs) are ideal dark matter candidates which would be created naturally at the right amount in the early universe. Currently underground liquid noble gas detectors, like XENON1T, and cryobolometers, like CRESST, are aiming to investigate the allowed parameter space down to the "neutrino floor", an ultimate background defined by coherent neutrino scattering. New approaches are aiming for axions and axion-like particles or sterile neutrinos, other candidates for dark matter.

In this talk the recent status of direct and indirect dark matter search is presented.

Hauptvortrag SYGR 1.4 Di 15:30 Z6 - HS 0.004
From QFT on curved spacetimes to effective quantum gravity — •Kasia Rejzner — University of York, York, United Kingdom

Quantizing gravity is one of the biggest challenges of modern theoretical physics. There are many conceptual problems that one has to address, including the non-locality of observables and the background independence. These issues appear already, if one tries to build effective theory of quantum gravity, treating metric perturbation like a quantum field on a curved background. In this talk, I will explain how these conceptual problems can be address in the modern approach to QFT on curved spacetime, where the central object to study is the algebra of observables of the theory, constructed independently of the choice of a state. I will also show how this approach applies to quantum cosmology.