

## T 121: Hauptvorträge 5

Zeit: Freitag 11:15–13:15

Raum: H 1

**Hauptvortrag**

T 121.1 Fr 11:15 H 1

**From Multi-Wavelength to Multi-Messenger Astrophysics: a success story** — ●STEFAN FUNK — Erlangen Centre for Astroparticle Physics (ECAP), FAU Erlangen, Germany

The Universe is home to exotic phenomena that can be directly linked to fundamental physics. Mergers of black holes produce gravitational waves that allow us to address fundamental physics in strong gravity, shocks in Supernova remnants or jets of black holes produce high-energy particles arriving here in the form of cosmic rays and dark matter leaves potential signatures through annihilation or decay. All these processes typically release enormous amounts of energy in the form of either photons from radio to gamma rays or of elementary particles.

In particular the recent discoveries of astrophysical neutrinos and gravitational waves are promising to open a window on the exploration of the high-energy Universe. Combining neutrino with photon observations promises to help solve the long-standing question of the origin of cosmic rays. Finding electromagnetic counterparts of transient gravitational wave events as possibly witnessed by the Fermi satellite will provide important insight into the nature of progenitor objects and into fundamental aspects of gravity. Indirect searches for dark matter are probing deeper into possible annihilation cross sections. All these new probes of the Universe signal the dawn of Multi-Messenger astronomy in the quest for understanding fundamental aspects of our Universe. In this talk I will review the status of the field and give a perspective on future developments.

**Hauptvortrag**

T 121.2 Fr 11:55 H 1

**The Belle II Experiment** — ●CARLOS MARINAS — University of Bonn

The Belle II experiment at the asymmetric  $e^+e^-$  SuperKEKB collider

is a major upgrade of the Belle experiment, which ran at the KEKB collider at the KEK laboratory in Japan. The design luminosity of SuperKEKB is  $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$ , which is about 40 times higher than that of KEKB. Commissioning of the main ring of SuperKEKB has started in February 2016 and Belle II is expected to accumulate an integrated luminosity of  $50 \text{ ab}^{-1}$  well within the next decade. The experiment will focus on searches for new physics beyond the Standard Model via high precision measurements of heavy flavor and searches for rare signals. To reach these goals, the accelerator, detector, electronics, software, and computing systems are all being substantially upgraded. In this talk we present the status of the accelerator and of the different Belle II sub-detector upgrades.

**Hauptvortrag**

T 121.3 Fr 12:35 H 1

**Beyond the Standard Model: status and remaining hopes** — ●CHRISTOPHE GROJEAN — DESY Hamburg — Humboldt-Universität zu Berlin

The Standard Model is a triumph of the combination of the two pillars of twentieth-century physics: quantum mechanics and special relativity. While it offers a remarkably accurate description of the matter we are made of, it fails to describe 95% of the matter and energy the Universe is made of. Furthermore, its theoretical structure stumbles upon troubling problems seemingly calling for delicate tunings of its input parameters. Building upon these deficiencies, theorists have devised ultra-violet completions of the Standard Model featuring new particles and new interactions or going beyond the boundaries of our usual 4D space-time. The quest for these new phenomena beyond the Standard Model is an active field of research that requires intense collaborations between the LHC experimentalists and the theorists. In this talk, I shall review what has been learnt from the LHC and what could still be revealed.