

ETP Weekly Meeting

News



Institut für Experimentelle
Teilchenphysik (ETP)

Institut für Experimentelle Teilchenphysik

```
def main(config):
    logger.info("config: %s", config)
    np.random.seed(int(config["seed"]))
    import ROOT
    ROOT.PyConfig.IgnoreCommandLineOptions = True
    import root_numpy
    import matplotlib.pyplot as plt
    import matplotlib.patches as mpatches
    import random
    import tensorflow as tf
    logger.debug(tf.__file__)
    tf.set_random_seed(int(config["seed"]))
    from keras import set_session
    tfconfig = tf.ConfigProto()
    tfconfig.gpu_options.allow_growth = True
    set_session(tf.Session(config=tfconfig))

    from sklearn import preprocessing, model_selection
    import keras.models
    from keras.callbacks import ReduceLROnPlateau,
    EarlyStopping, ModelCheckpoint

    # Extract list of variables
    variables = config["variables"]
    classes = config["classes"]
    logger.debug("Use variables:")
    for v in variables:
        logger.debug("%s", v)

    # Load training dataset
    if args.conditional:
        args.balanced_batches = True
        eras = ['2016', '2017', '2018']
    else:
        eras = ['any']
```



Markus Klute

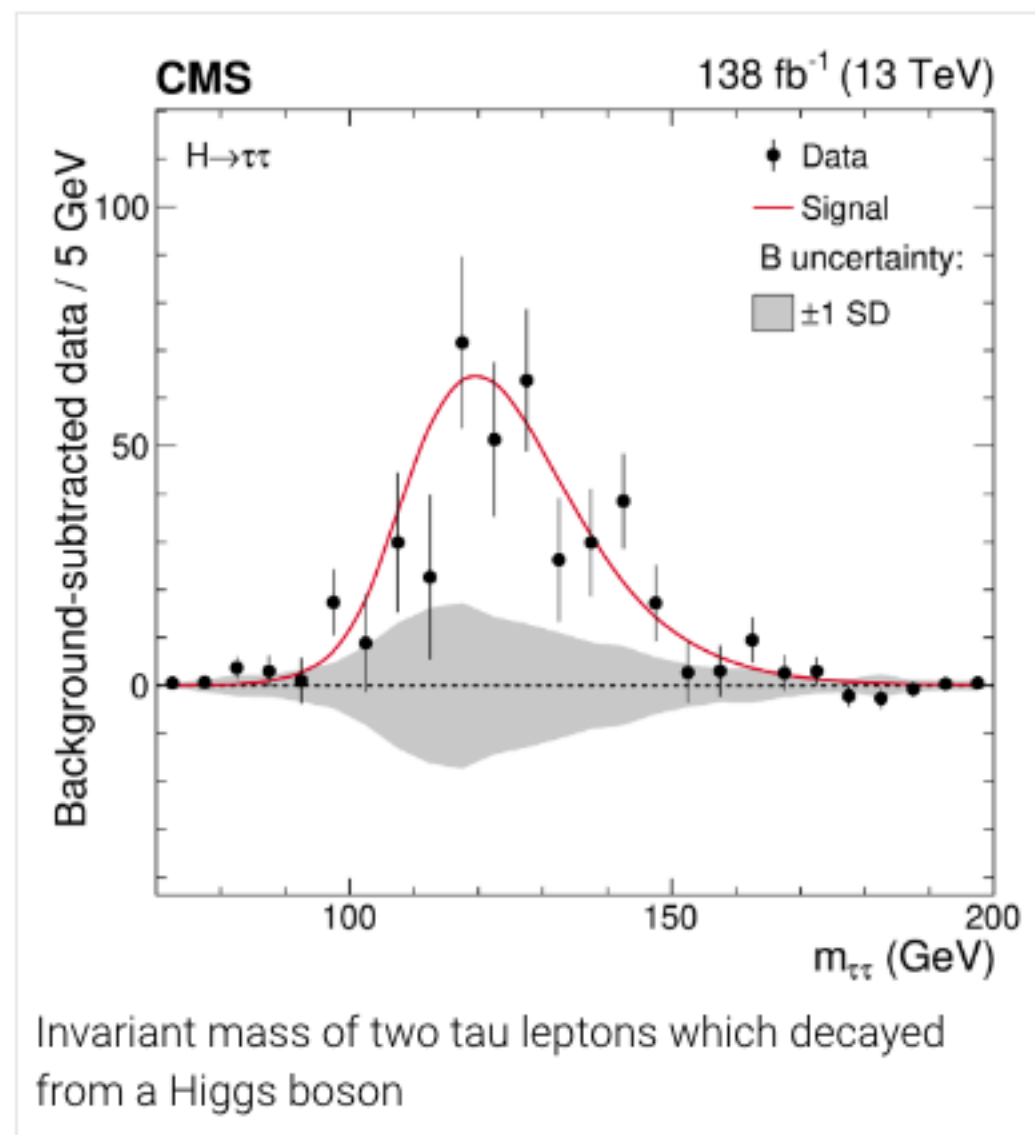
25.07.2022

New members or status changes

... since the last meeting

News

July 4, 2022 - Newest CMS publication about the Higgs boson with ETP contribution



Just in time for the 10th anniversary of the announcement of the discovery of the Higgs boson at the Large Hadron Collider (LHC) on July the 4th 2022 the CMS Collaboration has published a comprehensive study of the properties of this unique particle in the journal [Nature](#). The publication summarizes the current state of knowledge about the Higgs boson and relies on an analysis of the data that have been recorded during the years 2016 till 2018.

Young scientists at KIT have contributed to this important result. The decay of the Higgs boson into tau leptons has been investigated with significant contributions of a group of PhD students and students of the ETP. Dr. R. Wolf the leader of this working group notes: "This measurement provides the most accurate information about the coupling strength of the Higgs boson to fermions and thus matter particles, so far. For this measurement we have used state-of-the-art methods of machine learning and of statistical data analysis."

The figure shows the signal that is left by the Higgs boson decay in two tau leptons in the CMS detector after subtracting all other known processes with a comparable signature in the detector ("background processes"). In the figure the number of these decays is shown as a function of the relativistic invariant mass of the tau leptons, which should coincide with the mass of the Higgs boson of 125 GeV within the resolution of the detector for these decays.

News

Juli 4, 2022 - ETP celebration of the 10th anniversary of the Higgs boson discovery



Panel discussion

The 10th anniversary of the announcement of the Higgs boson discovery on July 4th 2022 was also appropriately celebrated at KIT. In KIT's Gerthsen lecture hall an evening lecture for the interested public, was given by Prof. Markus Klute, followed by a panel discussion. The program was moderated by Martin Besinger from SWR. More than 200 people of different ages between young and old found their way into the lecture hall, among those also witnesses who made personal contributions to the Higgs boson discovery, above all Prof. Klute himself. The questions during the presentation and the panel discussion took place in a very comfortable atmosphere, which was evidence of the rich interest of the audience.

After the official part of the evening the ETP members gathered for a small get-together with barbeque between the buildings of the physics faculty.



News

July 5, 2022 - Start of Run 3 @ LHC



After more than three years of optimization and maintenance, the Large Hadron Collider (LHC) at CERN resumed its work on Tuesday, July 5, 2022. The acceleration of protons to a record energy of 13.6 TeV marked the starting point of Run 3.

After focusing and stabilizing the proton beam to a diameter smaller than the thickness of a human hair, the alignment along the beam axis took place until the first collisions and their measurement with the CMS experiment occurred under the cheers of the assembled institute members.

The ETP congratulates the LHC team on the successful start and looks forward to the analysis of the first data.

News

July 6, 2022 - ETP now official member of the LUXE experiment



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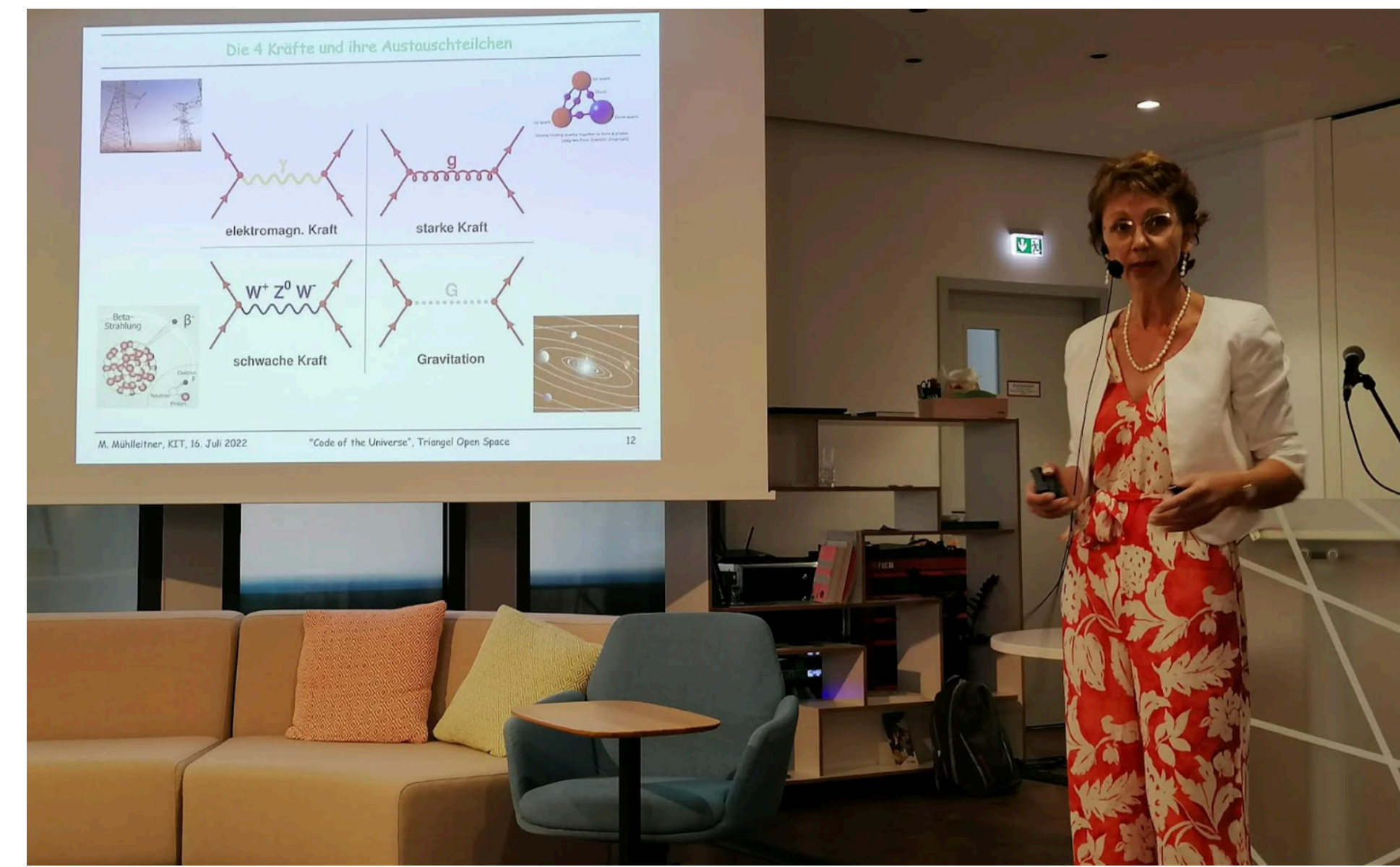
European XFEL tunnel

Prof. Dr. Torben Ferber, Prof. Dr. Markus Klute, and their research groups have officially joined the planned LUXE experiment at DESY. The collaboration board of LUXE has admitted ETP as one of its member institutions. With this step, the ETP expands its physics research program beyond the large collider experiments Belle II and CMS. LUXE (Laser Und XFEL Experiment) is a new experiment that is currently being developed at DESY and the European Free Electron Laser (XFEL) to study the strong-field regime of quantum electrodynamics (QED). In the collisions of electrons and an optical laser, a beam of high energy photons is produced. Researchers at ETP will use this photon beam to search for axion-like particles (ALPs). They are working on the design of the electromagnetic calorimeter and analysis methods to optimize the search.

News

... July 16th

- Vernissage for “The Code of the Universe”



News

... July 18th

- Wissenschaft in der Grundschule
 - needs ETP news!



News

... July 20th

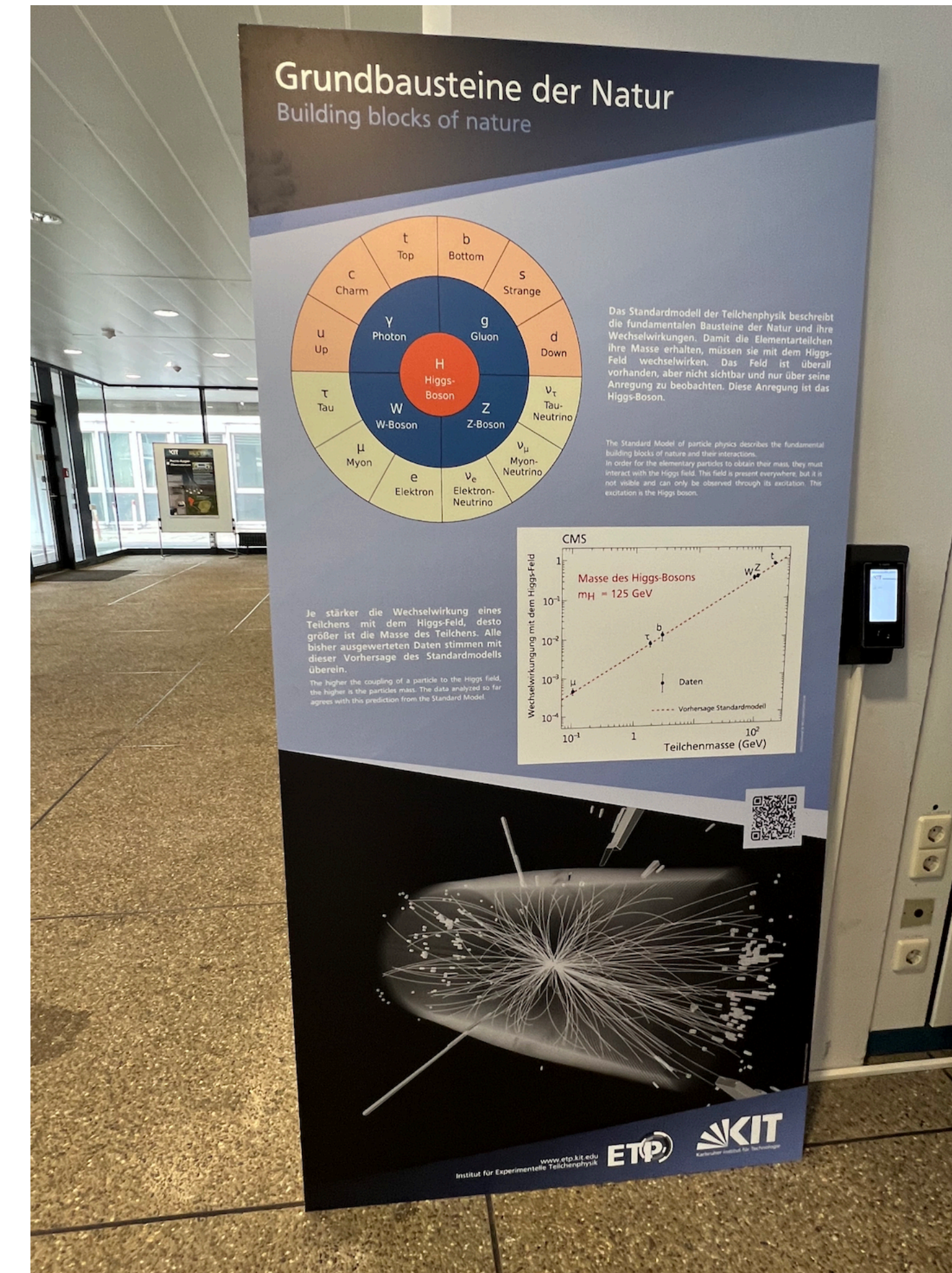
- Proton Soccer



Upcoming Events

... this week

- 26.07. - 15.45 Seminar - 6-1
 - Accelerator phenomenology of strongly interacting dark sectors - Elias Bernreuther (FNAL)
- 26.07. - 19.30 Effekte - Triangle
 - Antimaterie, Dunkle Materie, neue Materie?
- 28.07. - 15.45 Particles Colloquium - Kl. Hörsaal
 - Search for Light Charged Higgs at the LHC - Abdesslam Arhrib (Abdelmalek Essaadi)
- 29.07. - 15.00 Afternoon Science - Triangle
 - Was macht eigentlich das Higgs-Teilchen?
- 01.08. - 15.00 Afternoon Science - Triangle
 - Von klein zu groß - wie man in der Teilchenphysik neue Erkenntnisse aus großen Datenmengen gewinnt



Upcoming Events

... next ETP meetings

- 25.07. - 5pm ETP Meeting
 - Deep Learning for Event Classification with Ground-Based Interferometric Radar Data - Ian Steegmayer
- 01.08. - 5pm ETP Meeting
 - ICHEP - A summary - Soureek et al