

# 4th Annual Meeting of the GRK 2044



24. - 26. September 2018

Hotel Schloss Hornberg



**DFG** Deutsche  
Forschungsgemeinschaft



## Monday, September 24th

09.30 - 10.15 Arrival and Coffee

10.15 - 12.00

**Harald Pfeiffer , Albert-Einstein-Institut, MPI Potsdam**

### **Gravitational Wave Astronomy - Part I**

*Direct gravitational wave observations from coalescing binary black holes and binary neutron stars have opened a new window to observe the universe, to learn about some of the most extreme objects within it, and to further our understanding of the fundamental theory of gravity. Particular notable were the first observation of a binary black hole merger on Sep 14, 2015, as well as the multi-messenger observation of two coalescing neutron stars on Aug 17, 2017. These lectures will give a brief overview of this subject area. After an introduction about gravitational waves, black holes & neutron stars, we will briefly describe the interferometric gravitational wave detectors and analysis methods at the heart of the current observations. We will do an in-depth tour of the results obtained since the first GW discovery on Sep 14, 2015. The lectures will close with an outlook on future plans and prospects, both in the currently active high-frequency band, as well as the low-frequency and ultra-low-frequency bands.*

12.00 - 14.00

Lunch break

14.00 - 15.45

**Igor Irastorza, University of Zaragoza**

### **Experimental searches for axions and axion-like particles - Part I**

*Axions and other very light axion-like particles (ALPs) appear in many extensions of the Standard Model, and are leading candidates to compose part or all of the missing matter of the Universe. They also appear in models of inflation, dark radiation, or even dark energy, and could solve some long-standing astrophysical anomalies. The physics case of these particles has been considerably developed in recent years, and there are now useful guidelines and powerful motivations to attempt experimental detection. Admittedly, the lack of positive signal of new physics at the high energy frontier, and in underground detectors searching for weakly interacting massive particles, is also contributing to the increase of the interest in axion searches. The experimental landscape is rapidly evolving, with many novel detection concepts and new experiments being proposed lately. I will review the different experimental strategies being followed to search for ALPs potentially composing our dark matter galactic halo, as well as ALPs emitted by the Sun or produced at laboratories. I will focus on the new experimental approaches and their complementarity, but will also review the most relevant recent results from the consolidated strategies and the prospects of new generation experiments under consideration in the field. I will discuss the prospects to probe a large fraction of relevant parameter space in the coming decade.*

15.45 - 16.15

Coffee break

16.15 - 18.00

**Stefania Gori , UC Santa Cruz**

**Beyond the Standard Model Higgs bosons and dark sectors at the LHC - Part I**  
*I will discuss the motivations and phenomenology of a set of models containing beyond the Standard Model Higgs bosons with a mass either above or below 125 GeV. I will show how Higgs bosons can be used to unravel the presence of dark particles, i.e. particles not charged under the gauge symmetries of the SM. I will particularly highlight the discovery prospects for these new degrees of freedom at the LHC Run III and at the HL-LHC.*

18.30 - 20.00

Dinner

20.00 - open end

Meeting of the PhD-students /Meeting of the faculty members

## Tuesday, September 25th

07.00 - 08.45

Breakfast

08.45 - 10.30

**Igor Irastorza - Experimental searches for axions and axion-like particles - Part II**

10.30 - 11.00

Coffee break

11.00 - 12.45

**Harald Pfeiffer - Gravitational Wave Astronomy - Part II**

12.45 - 14.00

Lunch break

14.00 - 15.45

**Stefania Gori - Beyond the Standard Model Higgs bosons and dark sectors at the LHC - Part I**

15.45 - 16.15

Coffee break

16.15 - 17.15

**PhD talks**

Alexey Elykov  
*Fast Trigger and Data Acquisition System*

Martin Rotzinger  
*Effective Field Theory Describing Higgs Physics Beyond the Standard Model*

17.15 - 19.00

Excursion

19.00 - 22.00

Dinner with social event

## Wednesday, September 26th

07.00 - 08.45 Breakfast

08.45 - 10.15

### PhD talks

Manuel Guth

*Advancement of the ATLAS framework for the Deep Learning flavour tagging algorithm*

Fabian Becherer

*Measurements of Simplified Template Cross Sections (STXS) in the  $H \rightarrow \tau \tau$  decay channel with the ATLAS experiment at  $\sqrt{s} = 13$  TeV*

Vasily Sotnikov

*Benchmarking Five-Parton Two-Loop QCD Amplitudes with Numerical Unitarity*

10.15 - 10.45

Coffee break

10.45 - 12.30

**Stefan Dittmaier**

**Presentation on "Good Scientific Practice"**

**Markus Schumacher**

**Presentation on Archiving**

**General Discussion**

12.30 - 14.30

Lunch

14.30 - 16.00

### PhD talks

Simona Gargiulo

*Observation of  $Hbb$  decays and  $VH$  production with the ATLAS detector*

Moritz Wiehe

*Annealing and Characterization of Low Gain Avalanche Detectors*

Alena Lösle

*Test of CP Invariance in vector-boson-fusion production of the Higgs boson in  $H \rightarrow \tau \tau$  decays with the ATLAS detector*

16.00 - 16.30

Coffee break

16.30 - 17.30

**Poster session**

*see more details on the last page*

18.00

**Departure**

## Postersession on Wednesday, September 26th from 15.00 - 16.00

1.	Thorwald Klapdor-Kleingrothaus	<i>Studies of MicroMegas Chambers for the New Small Wheel using Cosmic Muons</i>
2.	Ralf Gugel	<i>Measurement of the <math>H \rightarrow WW \rightarrow e\nu\mu\nu</math> Process with the ATLAS Experiment</i>
3.	Frank Sauerburger	<i>Search for <math>H \rightarrow \pi\pi</math> decays using multivariate techniques in proton-proton collisions at <math>\sqrt{s} = 13</math> TeV with the ATLAS Detector</i>
4.	Katharina Schleicher	<i>Search for lepton-flavour violating decays of the Higgs-Boson with the ATLAS detector</i>
5.	Dirk Sammel	<i>Test of CP Invariance of the Higgs boson in vector-boson fusion production using the Optimal Observable method in the semileptonic ditau decay channel</i>
6.	Benjamin Rottler	<i>Search for Higgs Boson Pair Production in the <math>b\bar{b}\pi</math> decay channel at <math>\sqrt{s} = 13</math> TeV with the ATLAS detector</i>
7.	Arianna Rocchetti	<i>Electronic recoil backgrounds in XENONnT</i>
8.	Julia Dierle	<i>Background simulations for the DARWIN experiment</i>
9.	Patrick Scholer	<i><math>u</math>TPC Position Reconstruction in Large Size Micromegas Chambers for the ATLAS NSW Project</i>
10.	Michael Ruf	<i>Quantum properties of <math>f(R)</math> gravity</i>
11.	Julian Wollrath	<i>Search for Top-Squark Pair Production at ATLAS</i>
12.	Jerry Dormans	<i>Building an NNLO Pheno Framework around BH2</i>
13.	Cedric Hönig	<i>NitroStrip : Gateway to improved radiation hardness</i>
14.	Diego Ramirez	<i>Material Selection for the XENONnT TPC</i>
15.	Evgenij Pascual	<i>Two-loop amplitudes from D-dimensional unitarity for multi-parton processes</i>
16.	Patrick Meinhardt	<i>Proportional Scintillation in liquid xenon</i>
17.	Justin Baier	<i>KWISP - Hunting Chameleons with the CAST Experiment at CERN</i>
18.	Gernot Knippen	<i>NLO corrections to WWW production at proton-proton colliders</i>
19.	Philipp Mogg	<i>Search for Top Squarks with ATLAS in the fully hadronic final state</i>

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20.     Nikolina Šarčević     *Electric field simulations for XENONnT*

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21.     Sven Mägdefessel     *Temperature and frequency dependent CV measurements of highly irradiated sensors*

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22.     Veronika Magerl     *Searches for R-parity violating and long-lived SUSY with the ATLAS detector*

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