



Registration before March 10

KSETA Topical Courses, March 20 – 24, 2017

Solid State Physics for Elementary Particle Physicist (broader)	Wulf Wulfhekel	20.3.2017	9:00 - 12:15 h
		21.3.2017	9:00 - 12:15 h
For particle physicists		bldg. 30.23,	New room: 3/1

In this intensive course, I will give an overview on the theory and experiments of condensed matter physics. Essentially, I will focus on phenomena that deal with periodic structures, many electron systems and their excitations and will highlight the connections to particle physics. Necessary prerequisites for the course are basic knowledge auf quantum mechanics and statistical mechanics. The course will include the special symmetries of the solid state, the lattice and its dynamics, Fermi liquid theory, thermodynamics of the lattice and electron gas, electron transport and superconductivity.

What do I need, if I will leave science towards industry? (better)	Udo Erdmann (TIBER)	21.3.2017	13:30 - 16:45 h
		22.3.2017	9:00 - 12:15 h
For all		bldg. 30.23, r 10/1	

As a graduating scientist or engineer, you are planning a next career step within industry. If this is the case, you definitely have to cope with management responsibilities. Therefore, skills in management and leadership will be expected. Planning to open an own business or start up requires knowledge in managing a company as well. In both cases the needed skills can be divided in three classes: corporate management, project management, technology and innovation management. Based on practical, handy examples the three aforementioned classes will be introduced (approximately 2 hours per class). After this one day introduction you will have a good overview of what will be expected of you outside of science. Additionally to that you will be empowered to make a better decision for the next career step based on your existing skills. You will be supplied with a better picture of the industrial and business world, and you will get hints which of your skills should be more sharpened and which skills should be developed from scratch. Additionally to that, fundamental questions concerning the application for an industrial job will be clarified: „How do I apply the right way?, and „How will I increase my chances in the interview?“, are just a few of them.

Introduction to General Relativity (broader)	Viacheslav Emelyanov	22.3.2017	13:30 - 16:45 h
		24.3.2017	13:30 - 16:45 h
For theoreticians/experimentalists		bldg. 30.23, r 10/1	

This course provides a brief introduction to General Relativity. We first introduce the basic principles behind of Special and General Relativity. By employing the Poisson equation, we derive the Einstein field equations and explain their physical content. The last two lectures are devoted to its two physical predictions, namely black holes and gravitational waves.

Fundamental physics studied with radio astronomy (deeper)	Michael Kramer (Uni Bonn)	23.3.2017	13:30 - 16:45 h
		24.3.2017	9:00 - 12:15 h
For astroparticle physicists		bldg. 30.23, r 10/1	

Radio photons are the least energetic ones used by astronomers. Yet, their origin is often associated with highly energetic processes, coming frequently from places of extreme conditions involving high energies, high gravitational or magnetic fields. As a result, this window of the electromagnetic spectrum is a doorway to an effective laboratory for fundamental physics. A prime example is the usage of radio astronomy for exploring gravitational physics. This course will describe the basic techniques and demonstrates their effectiveness with examples.



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KSETA Topical Courses, April 3 – 4, 2017

Low Temperature Detectors for Astroparticle Physics (deeper)	Loredana Gastaldo (Uni. Heidelberg)	3.4.2017 4.4.2017	9:00 - 12:15 h 9:00 - 12:15 h
For astroparticle physicists, engineers		bldg. 30.23, r 10/1	

In these series of lectures, a large variety of low temperature detectors for astro-particle Physics will be introduced. Large experiments using low temperature detectors to investigate neutrino properties, to perform direct detection of dark matter and to measure x-ray emitted by astro-physical objects are on-going or in the planning phase. I will discuss the status-of-the-art of cryogenic detectors and their important role for the astro-particle physics community.

Introduction to Lattice Gauge Theory (broader)	Stefan Sint (Trinity College Dublin)	4.4.2017 5.4.2017	13:30 - 16:45 h 9:00 - 12:15 h
For theoreticians/experimentalists		bldg. 30.23, r 10/1	

In this set of lectures I will give an introduction to lattice gauge theories including lattice QCD. On the one hand the lattice regularization is just that, a regularization which can also be used for perturbative calculations. On the other hand, it enables the non-perturbative formulation of gauge theories and numerical simulations as a tool to obtain quantitative results beyond perturbation theory. This numerical approach has its limitations but also offers opportunities, as the theory can be probed in circumstances which are not accessible to experiments.

Introduction to statistical methods in particle and astroparticle (broader)	Thomas Schwetz-Mangold	5.4.2017 7.4.2017	13:30 - 16:45 h 9:00 - 12:15 h
For theoreticians/experimentalists		bldg. 30.23, r 10/1	

In this course I will give an introduction to basic methods in probability and statistics from the point of view of an phenomenologist in particle and astroparticle physics. The course will cover frequentist and Bayesian methods and we discuss the problems of parameter estimation, goodness-of-fit and model comparison, as well as sensitivity estimates for future experiments. We will introduce concepts such as the likelihood and chi-squared statistics, discuss global analyses of several data sets, the problem of systematic uncertainties and nuisance parameters.

Axionic and WISPy Cold Dark Matter (broader)	Joerg Jaeckel (Uni. Heidelberg)	6.4.2017 7.4.2017	13:30 - 16:45 h 13:30 - 16:45 h
For theoreticians/experimentalists		bldg. 30.23, r 10/1	

The axion solving the strong CP problem is one of the best motivated dark matter candidates. In these lectures we will introduce the axion and look at some of its most important features. As it turns out the axion as well as a number of more general very light bosons are an intriguing possibility for the cold dark matter of the Universe. We will consider the production mechanism that makes such light bosons good candidates for the cold dark matter and discuss some of its features. Finding such very light dark matter candidates requires different techniques than employed in the hunt for WIMPs. We will discuss some existing experiments as well as future opportunities.