Registration open until Sept. 17, 2018

KSETA Topical Courses, September 27 – October 12, 2018

All courses take place in building 30.23, room 10/1

Unitarity methods (deeper) ***theoreticians***	**Fernando Febres Cordero (Uni. Freiburg)**	**11.10.18** **12.10.18**	**13:30 - 16:45 h** **09:00 - 12:15 h**

The lecture series will be an introduction to modern calculational techniques in perturbation theory, based on unitarity, which are nowadays applied for the computation of multi-loop scattering amplitudes. Unitarity methods exploit scattering amplitudes as complex functions of the kinemetic variables and apply common methods from complex analysis to their computation. The course mainly addresses PhD students in Theoretical Particle Phyics with basic knowledge of Quantum Field Theory.

Probing the early Universe with Gravitational Waves (broader) ***experimentalists, theoreticians***	**Daniel Figueroa (EPFL)**	**01.10.18** **02.10.18**	**9:00 - 10:30 h & 15:15 - 16:45 h** **9:00 - 10:30 h & 15:15 - 16:45 h**

These lecture series aim to review early universe gravitational wave (GW) generation mechanisms, as well as the properties of the GW backgrounds they give rise to. We will cover four categories: GWs from inflation, GWs from post-inflationary non-perturbative preheating phenomena, GWs from first order phase transitions, and GWs from topological defects, and cosmic strings in particular. We will cover an extremely rich phenomenology, sometimes making some GW backgrounds to be within the reach of near-future detectors. We will discuss the feasibility of a future detection, and analyze how this will provide crucial information on the underlying high energy theory describing the early universe, probing energy scales well beyond the reach of particle accelerators.

Physics of cosmic accelerators (deeper) ***experimentalists, theoreticians***	**Foteini Oikonomou (ESO, Munich)**	**01.10.18** **02.10.18**	**10:45 – 12:15 h & 13:30 – 15:00 h** **10:45 – 12:15 h & 13:30 – 15:00 h**

The course will give an introduction to possible galactic and extra-galactic accelerators of cosmic-rays with comprehensive description, characteristics and overview. The course will provide the basics of acceleration mechanisms in a reference to recent theoretical and experimental results (e.g. AGNs, micro-quasars, GRBs, SNRs, pulsars) and will give current experimental data from different detection channels (gamma-rays etc.). It will also be discussed how this influences cosmic ray studies.

cosmology: expanding space and expanding confusion (deeper) ***theoreticians***	**Björn Malte Schäfer (Uni Heidelberg)**	**10.10.18** **12.10.18**	**09:00 - 12:15 h** **13:30 - 16:45 h**

Modern cosmological models are based on general relativity as a theory of gravity to explain the large-scale structure and dynamics of spacetime. In my course I would like to go through the fundamental concepts of relativity, cosmological models of the FLRW-type, conceptual ideas about cosmology and discuss light propagation, measurements of FLRW-cosmologies in detail, in particular supernovae and the cosmic microwave background. A short run through the thermal history of the Universe and the theory of structure formation concludes the course

Applied Bayesian Data Analysis in Astroparticle Physics (deeper) ***experimentalists, theoreticians***	**Kevin Kröninger (CERN)**	**08.10.18**	**09:00 - 16:45 h**

The Bayesian approach becomes more and more important in modern data analysis. The course will demonstrate the analysis of real data using established frameworks (e.g. Stan or BAT) with hands-on examples. This includes the correct choice of priors as well as the interpretation of the analysis results compared to frequentist analysis.

Nonrelativistic QCD (deeper) ***theoreticians***	**Alexander Penin (Univ. Alberta, Canada)**	**10.10.18** **11.10.18**	**13:30 - 16:45 h** **09:00 - 12:15 h**

When dealing with systems of particles moving with small relative velocities, such as bound states or in particle production close to their threshold, it is convenient to work in an effective theory adapted to the situation. In problems like Upsilon-resonances or Top-quark-pair-production in electron-positron collisions, this effective theory is called Nonrelativistic QCD (NRQCD): the relativistic degrees of freedom are integrated out and one only has to deal with the relevant d.o.f.

What to do after leaving science (better) ***all***	**Udo Erdmann (TIBER)**	**27.09.18** **28.09.18**	**09:00 - 16:45 h** **09:00 - 16:45 h**

The course will give an introduction to project management, business models as basis for management, technology and innovation management. Concrete job descriptions will show which skills and competences are helpful and how to apply for such a job in industry. On the second day the management aspects will be deepend by practical examples from the technology sector, consutling and finances/incurances sector. You will get an idea, which competences are important and which personal training is needed for a career in private enterprises and industry.

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Self-assessment and Application (better)	**Doris Brenner (extern)**	**04.10.18**	**09:00 - 16:45 h**
all		**05.10.18**	**09:00 - 16:45 h**

The application process starts much earlier than with writing application documents. With this workshop you get ready for the successful career entry after graduation. You receive targeted information about the entire career orientation and application process. These are not "patent recipes" that are to be adopted on a flat-rate basis, but individual approaches that are aligned with your personality and qualification profile. The application and selection process is also considered from the company's point of view. This behind-the-scenes look is important to understanding what the application is all about. Practical exercises help you to put what you have learned into practice.