KSETA Topical Courses, March 9 – 13, 2020

Courses will take place on Campus South in building 30.23, room 10/1 (first week)

Graph Theory (with connection to Feynman diagrams) (broader) **theoreticians, exp.**	**D. Hespe, S. Lamm, T. Heuer (ITI)**	**9.3.2020**	**09:00 - 12:15 h** **13:30 - 16:45 h**	**bldg. 30.23, room 10/1**

Graphs are a powerful mathematical concept to model complex relations between objects of the real world. Graph theory sits at the intersection of mathematics, computer science and manifold applications from diverse fields. This course introduces fundamental graph theoretical concepts and algorithms with a special focus on applications relevant to modern physics.

Scientific writing (better) **All** **(number of participants limited to 12)**	**C. J. Fitzsimons (Fa. Uber)**	**10.03.20** **13.03.20**	**09:00 - 12:15 h** **13:30 - 16:45 h** **09:00 - 12:15 h** **13:30 - 16:45 h**	**bldg. 30.23, room 10/1**

Researchers increasingly need to publish their work in English in order to reach a wider audience and improve their academic standing. Sometimes their level of English leads reviewers to reject the papers or to misunderstand the contents. The seminar comprises two one-day interactive sessions that take participants step-by-step through the writing and revision of one of their papers at the conceptual, organisational and writing levels. First, participants learn how to ensure that the paper's content fits to their message and audience. Then, they learn how to organize a paper and structure a logical argument in English. Finally, participants learn how to revise their texts at the section, paragraph and sentence level. At each level we explore the main differences between papers in English and German. Between sessions, participants apply the theory to their own texts.

A short text (1/2 page) should be submitted before the course and you will receive feedback and suggestions for improvement of the texts from the workshop leader. By the end of the course each participant will have polished one paper and will be able to approach the next one confidently.

FPGA programming (with hands on sessions) (broader) **experimentalists**	**Oliver Sander (IPE)**	**11.03.20** **12.03.20**	**09:00 - 12:15 h** **13:30 - 16:45 h**	**bldg. 30.23, room 10/1**

In this course you will learn more about the use of FPGA's in physics experiments. What is possible with FPGA, where are the limits, what are the technologies behind and what are the trends. The course will contain practical examples, e. g. with Redpitaya or similar.

Introduction to Lattice Gauge Theory (broader) **exp. + theo. particle physicists**	**Tomasz Korzec (Uni. Wuppertal)**	**11.03.20** **12.03.20**	**13:30 - 16:45 h** **09:00 - 12:15 h**	**bldg. 30.23, room 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.

KSETA Topical Courses, March 16 – 20, 2020

Courses will take place on Campus South in building 30.23, room 3/1 (second week)

Interpretations of Quantum Mechanics (broader) **all**	**Roderich Tumulka (Uni Tübingen)**	**16.3.2020**	**09:00 - 12:15 h** **13:30 - 16:45 h**	**bldg. 30.23, room 3/1**

The mathematical formalism of Quantum Mechanics has proven to be successful in predicting the outcome of experiments targeted at small scales. In contrast, the physical interpretation of the abstract mathematics is not settled at all. While the Kopenhagen interpretation is nowadays the one accepted by most physicists, there are many others that lead to the same experimental conclusions. In this course, we will review some of these interpretations, like the many worlds interpretation, Bohmian mechanics or DeBroglie wave pilot theory.

Neutrino physics (broader) **Theoreticians, experimentalists, engineers**	**Th. Schwetz-Mangold (IKP)**	**17.03.20** **18.03.20**	**09:00 - 12:15 h** **09:00 - 12:15 h**	**bldg. 30.23, room 3/1**

This course should give an overview from basics and to current research in neutrino physics for experimentalists and theorists. The focus should be more on phenomenology, exiting things about neutrinos, nice images, etc....

Change of day and room!

Feynman Diagrams in Condensed Matter Theory (broader) **all**	**Markus Garst (TFP)**	**20.03.20** **23.03.20**	**13:30 - 16:45 h** **09:00 - 12:15 h**	**bldg. 30.23, room 3/1** **room 10/1**

The low-energy properties of condensed matter are often captured by effective field theories, that correctly describe the behavior of observables, e.g., in the limit of low temperatures or close to phase transitions. For the computation of perturbative corrections as well as the renormalization group flow around such theories Feynman diagrams need to be evaluated. We provide some illustrative examples for the application of the Feynman diagram technique in condensed matter and discuss corresponding experimental signatures.

Project management, technology and innovation management (better) **all**	**Udo Erdmann (Fa. TIBER)**	**19.03.20** **20.03.20**	**13:30 - 16:45 h** **09:00 - 12:15 h**	**bldg. 30.23, room 3/1**

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.