



KSETA Topical Courses, October 6 – 17, 2014

Supersymmetry in particle physics and cosmology	Wim de Boer	06.10.2014	9:00 – 12:15
		07.10.2014	9:00 – 12:15
		bldg. 30.23, Seminar room 3/1	

Target: theoretical + experimental physicists, beginner + advanced

Pedestrian course explaining why Supersymmetry (SUSY) is so popular as extension of the SM. It will discuss the topics at the level exercised during doctoral exams. The emphasis will be on the following topics:

- a) What are the essentials of a Grand Unified Theory (GUT)?, b) Which predictions follow from a GUT?, c) Inflation, dark energy and accelerated expansion of the universe, d) Prediction of the relic density in SUSY, e) Prediction of electroweak symmetry breaking in SUSY, f) Prediction of the top mass in SUSY, g) Prediction of the Higgs mass in SUSY, h) Prospects for discovering SUSY

Introduction and use of Raspberry Pi	Hermann-Josef Mathes	06.10.2014	13:30 – 16:45
		07.10.2014	13:30 – 16:45
	Kai Daumiller		Campus North, bldg 425, room 206

The Raspberry Pi is a credit-card sized computer on a single chip which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and others.

Particle physics for engineers	Marc Weber	08.10.2014	9:00 – 12:15
		13.10.2014	9:00 – 12:15
		14.10.2014	9:00 – 12:15
		Campus North, bldg 425, room 206	

This block course of 9 hours duration is targeting graduate students in electrical engineering, mechanical engineering and computer science. Requirements are some previous exposure to basics physics and mathematics. The course aims to clarify basics concepts and facts of particle physics and concludes with an overview of experimental techniques and current lines of research. Due to the limited duration the contents will be presented in a compact and somewhat superficial way with focus on intuition and analogies rather than formal correctness or mathematical rigor.

Scientific writing - publications	Beate Bornschein	09.10.2014	9:00 – 16:45
	Magnus Schlösser	Campus North, bldg 425, room 206	

Doctoral students in natural science need to generate one monograph publication during their graduation which is the PhD thesis. Furthermore, they are urged to publish their scientific results to a scientific journal as so-called paper contributions. In general the standing of scientist within the community is measured according to the quality (and quantity) of their publications. Therefore it is important that the fundamentals of writing of such publications are known and well-practiced. Within this seminar we will learn how to achieve a very good scientific paper and which written and unwritten rules are needs to be obeyed on the way to this goal. In particular, we will take a careful look on the usual scientific standards and the DFG rules ("safeguarding good scientific practice"). We will learn who is actually an author and what are his or her basic responsibilities towards the publication. A selection of topics:

- a) The 30 step approach from ideas to the final paper; b) the essence of the message „message“ and how to find it; c) the formalities during writing process; d) references, copyright and co; e) the review process ("Peer Review", "Editorial Review", "no reviewed, e.g. ArXiv", other forms, ...); f) various topics on request! Please inform us early!

Mentoring of Bachelor Students	B. Bornschein	10.10.2014	9:00 – 16:45
	Magnus Schlösser	Campus North, bldg 425, room 206	

In most cases the Bachelor's thesis is the first contact of physics students with the field "doing scientific work and writing a thesis". According to the examination regulations (§11) the physics student is required to demonstrate that he/she is able to solve a physics problem on his/her own within a limited time and by applying scientific methods. The scientific content of the thesis should comply to the usual scientific standards and with the DFG rules ("safeguarding good scientific practice").

These requirements do not only challenge the young Bachelor students but also their direct supervisors, mostly young doctoral researchers. They have to mentor/supervise the work and the writing and – in most cases - to do a first proofreading of the Bachelor's thesis without having a dedicated training in this field. As a consequence, the doctoral researchers feel unsure on how to behave.

This one-day seminar will improve the situation and will help the doctoral researchers to obtain the skills needed for a successful supervision/mentoring of Bachelor's students. At the end of the day there should be a „win-win-situation“ for the Bachelor's student and the doctoral researcher, i.e. the doctoral researcher should not only spend his/her time for the supervision/mentoring but also have some benefits by doing so. The benefits should be

- a) to have support for his/her own scientific work (i.e., the Bachelor's work should somehow be connected to the doctoral researcher's work); b) to obtain first experience in scientific guidance and in leadership; c) to obtain the necessary skills by attending dedicated courses and/or having feedback meetings with the senior scientists.



Data visualization and presenting	Simon Niemes	13.10.2014	13:30 – 16:45
		14.10.2014	13:30 – 16:45
Campus North, bldg 425, room 206			

This course is designed for all doctoral researchers independent from their discipline. Presenting Data in a meaningful and effective way is of great importance for every scientist. But even outside the scientific world, creating accessible infographs to convey a message is an important asset for a successful career. This course will give guidelines of how to create effective scientific plots. A good plot does not only delivers a message or visualizes the importance of data, a good plot is also easy to understand, respects barrier free access, and includes no 'chart junk'.

The course will cover the following areas:

- Advantages and disadvantages of different plot styles and when to use them.
- Effective graphic design.
- Formal rules of creating infographs.
- Differences in diagrams for written or oral presentations.

At the end of the course, participants should have a better understanding of how to produce meaningful figures and how to select the correct diagram type, depending on the message. This course works very well in conjunction with the courses offered by B. Bornschein and M. Schlösser.

Introduction into the concepts of theoretical particle physics for experimental physicists	Martin Wiebusch (Univ. Durham)	15.10.2014	9:00 – 16:45
		room tba	Campus South: EBI lecture hall, bldg 40.11

This course provides an introduction to theoretical particle physics tailored for people with an experimental background. It includes a (relatively non-mathematical) introduction to quantum field theory and discusses the guiding principles for model building in particle physics. It will focus in particular on the importance of symmetries and the relation between Lagrangians, Feynman diagrams and cross sections. Furthermore, the course provides an overview of the Standard Model of particle physics (SM), effective field theories, and, if time allows, the most popular models beyond the SM (e.g. extended Higgs sectors and Supersymmetry)

Giving feedback and moderation skills	Anne Zilles	16.10.2014	9:00 – 16:45
	Olga Kambeitz	Campus North, bldg 425, room 206	

The KSETA topical course "Giving feedback and moderation skills" will focus on open discussions accompanied by a moderator. The participants acquire the answers to open questions of this course by using methods of adult education. The goals are to develop feedback rules to give constructive feedback and to introduce the participants to tasks and concepts of moderating group discussions.

In the first part we want to encourage a discussion about giving feedback after rehearsals of talks. One goal of the course is to deduce a code of conduct for this situation, which can be used in our everyday (research) life. After a short introduction of general group discussion rules, we will introduce the group to a typical feedback situation.

Using this as a reference, the group will develop feedback rules using the 'Metaplan technique'. Those rules will help to raise awareness of how to give constructive feedback in a helpful and polite manner. Also the first part is needed to introduce the participants to the concepts of an open discussion accompanied by a moderator.

Based on this experience, in the second part the focus will be on possibilities to create a constructive and comfortable atmosphere in group discussions. The participants will be engaged in analyzing methods to support group discussion. They will acquire the role and tasks of a moderator in group discussions. In addition, participants get to know the basics of moderating a group discussion, which is a powerful tool to support successful cooperative work.

Galactic cosmic radiation	Iris Gebauer	17.10.2014	9:00 – 16:45
		room tba	Campus South, bldg 30.23, room 2/1

1. basics of galactic transport models (leaky box models, diffusion-convection models (numerical and analytical), limits of the respective models)
2. detectors for cosmic rays (balloon, space, ground) constraining transport parameters (relevant observables)
3. "selected topics" (e. g. positron-fraction, WMPA-haze, constraints from gamma-rays, cosmic ray escape from the galaxy, indirect DM searches and new sources, local transport)