Karlsruhe Institute of Technology

Karlsruhe School of Elementary Particle and Astroparticle Physics: Science and Technology (KSETA)

KSETA is the graduate school associated with the KIT Center Elementary Particle and Astroparticle Physics KCETA, which bundles experimental and theoretical research and education at the interface between astronomy, astrophysics, elementary particle physics and cosmology.

We hereby certify that the doctoral researcher

Julian Gethmann

has attended the following courses during his/her time in the graduate school KSETA.

Human made Climate Change: Facts, Mechanism, Causes.

Oct 07 2019 *Thomas Leisner (IMK) et al.*

This course will give an overview on the basics of climate parameters and aspects of climate change. The following topics will be discussed: energy budget of the earth, elements of the climate system (ocean, land, cryosphere), radiation transport and greenhouse effect, atmospherical dynamics and climate zones, aerosoles and clouds, carbon cycle, climate gas and photo chemistry, human intervention, feedbacks and tipping points, climate protection and climate engineering.

Understanding Machine Learning Methods

Oct 01 2019 *Stefan Wunsch*

Nowadays, Machine Learning methods play a vital role in different fields of data analysis. It is therefore crucial to understand what an algorithm such as a Neural Network actually learns from the given training data. The focus of this course is to give more insights into this complex challenge.

Scientific Journalism

Jun 03 2019 *Rolf Krauter (Deutschlandradio)*

Communicating your scientific research to the general public (for instance in conversations with interested laypersons, public talks or media contributions) requires skills which are generally different from those which are honed through writing down your thesis work and presenting it to a scientific audience. This course is aimed at providing this specific skill-set, starting from considering a suitable language and wording. Through hands-on training you will find out how to identify key messages, get “to the point” and break down complex aspects to a more tangible frame. The course will consider both written texts and oral presentations/interview situations.

Machine learning, deep learning

Apr 04 2019 *Prof. Dr. Gregor Kasieczka (DESY)*

Machine Learning has become a very relevant area of the scientific analysis, teaching a computer to understand the concepts based on a given data. The course will be focused on convolutional/recurrent neural networks and supervised/unsupervised learning. The main concepts and advantages/disadvantages of these methods will be introduced and followed hands-on training with a particular application in particle/astroparticle physics. The basic knowledge about machine learning would be advisable.

Self-assessment and Application 2018

Oct 04 – 05 2018 *Doris Brenner*

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.

Solid State Physics for Elementary Particle Physicists

Mar 20 – 21 2017 *Wulf Wulfhekel*

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.

Memorizing, reading and working strategies

Nov 07 - 08 2016 *Erika Magyarosi*

In the first part of the seminar, you get to know different memorizing strategies that help you to remember numerous kinds of information quickly and reliably ŏ096 names and dates, the content of a speech or presentation, as well as complex contents, whose acquirement extend over several months. Besides getting to know the methods, we will especially focus upon the adjustment of your own thinking model and structures. In this way, you will have the possibility to develop your own memorizing strategies during numerous practical exercises, which allow you to apply the mnemonic-techniques in your professional and private everyday life. The second part of the seminar deals with reading and working strategies, which enable a quicker and more efficient reading and working speed. We will do some exercises for rapid and disciplined eye movements. You will get to know verified learning and reading strategies and we will deal with themes such as reading motivation and reading assistance. Furthermore, we will learn how to improve concentration, to expand your vocabulary and to read more efficiently at your computer.

Multivariate data analysis: New techniques and developments in the recent years

Oct 15 – 16 2015 *Dr. Stefan Ohm (DESY Zeuthen)*

We live in a world where the amount of data in all areas of life is exploding. Multivariate analysis techniques are indispensable tools when trying to analyze and interpret this information. Physicists and Astronomers, for instance, are often faced with the situation where they have to crawl large data sets to search for small signals in a large background. In this course I'll give a short introduction to the field of data science, (a glimpse into) the statistics behind it and the topic of machine learning. The most common machine learning algorithms like neural networks, boosted decision trees or k-Nearest Neighbors are discussed in more detail. In the second, hands-on, part of the course we will have a look at real examples: How to get data samples, how to parameterize and prepare them for analysis, and finally how to extract information with multivariate analysis techniques.
- Laptop with python installed and the following packages: pandas, scikit-learn, numpy, astropy, scipy, argparse, pip, ipython
or:
- laptop with VirtualBox installed (an Ubuntu installation and all necessary tools will be provided)
- More details will come on the webpage: http://stefanohm.com

Time and Self-management in Science

Oct 06 – 07 2015 *Dr. Sita Schanne*

- Time-management techniques (long-term and short-term): How do I set up a project plan? How do I distribute my tasks over the week and avoid time pressure?
- Work-Life-Balance: Which goals and activities in the various areas of life are important to me?
- Motivation and resources: How do I bring myself to goal-oriented action? How do I realize my plans in practice? Where do I get support from?
- Communication: How do I communicate my plans effectively? How can I ask for feedback from supervisors and peers?

Goal: Participants have gained an overview on basic aspects of time and self management. By reflecting on their own experience they have been introduced to different time management techniques.

KSETA-Doktorandenworkshop

Jul 6 – 8 2015 *R. Derco, R. Podskubka, S. Richter, Mrs. C. Assmus, Mr. Ritter*

The KSETA Doctoral Workshop allows interested KSETA fellows to learn more about methods and tools that might support their research. Doctoral students of all KSETA research fields, from theoretical or experimental particle and astroparticle physics to software or cryogenic engineering, are invited to spend three interesting and inspiring days together and to benefit from the other participants' experience. One key aspect of the workshop are the tutorials given by all participating doctoral students. In groups, the participants prepare their tutorial "from doctoral fellows for doctoral fellows" on a topic that could be useful to others concentrating on other fields of research. This tutorial may cover introductions to useful tools, basic technologies for non-engineers, basics in physics for non-physicists, or applicable methods for research. Every tutorial lasts one hour and the presenter is free to use any didactic method like PowerPoint, whiteboard, or interactive methods such as exercises on programs installed on the students' laptops. The workshop program is complemented by invited talks and discussions.

Git is a "distributed software management system" which can help you by organizing your source code – may it be programming code or your (thesis') TeX code. This workshop is an introduction to the concepts of version control systems and its currently best implementation (Git) and some advantages of Git over SVN even for single user cases. As an appetizer for advanced features some aspects of the ecosystem around Git will be presented as well. This workshop is not meant to be a successor of the last time's workshop on Git, but a revision of it for those who couldn't participate the last time.

Effiziente Durchführung von Sitzungen und Besprechungen

Nov 17 2014 *Katrin Klink*

Ziel des Seminars:
Die Teilnehmer/innen können:
- Grundlegende Merkmale guter Moderation benennen
- Besprechungen zielführend planen und durchführen
- den Gesprächsverlauf aktiv steuern

Inhalt des Seminars:
- Grundlagen der Kommunikation und Moderation
- Strukturierung und inhaltliche Vorbereitung von Sitzungen und Besprechungen
- Umgang mit herausfordernden Situationen und Besprechungsteilnehmer/innen
- Besprechungsmethoden und Gesprächsstrategien

Karlsruhe, June 17, 2021

Dr. Irmgard Langbein
Managing Director