IRTG PhD days 2012

Report of Contributions

https://indico.desy.de/e/phddays2012

Contribution ID: **0** Type: **Lecture**

Quantum information and computation: foundations and current status - part 1

Tuesday 9 October 2012 09:40 (1h 20m)

In recent years we've seen the birth of an exciting new field known as quantum information (QI) theory. In these lectures I will introduce the basic concepts of QI, namely, qubits, quantum circuits, and quantum algorithms. I will also introduce some of the guiding problems of the field and describe recent applications of QI concepts to the study of strongly correlated physics.

Primary author: Prof. OSBORNE, Tobias (University of Hannover)

Presenter: Prof. OSBORNE, Tobias (University of Hannover)

Session Classification: Morning Lecture 1

Contribution ID: **1** Type: **Lecture**

Neutrino Physics - part 1

Wednesday 10 October 2012 09:30 (1h 30m)

In these lectures, I discuss three aspects of neutrino physics: neutrino oscillations, neutrino mass, and neutrino astrophysics. In neutrino oscillations, the recent measurement of the mixing angle theta13 has opened the possibility to discover leptonic CP violation, which would motivate the possibility that the baryon asymmetry of the universe is connected with neutrino physics. I discuss the current understanding of neutrino oscillations and briefly comment on the future perspectives. As far as neutrino mass is concerned, I focus on questions such as: Are massive neutrinos to be interpreted as physics beyond the Standard Model? What model ingredients are needed if neutrino mass is connected with physics as the TeV scale, and thus potentially observable at the LHC? What kind of "new physics" may be showing up in the neutrino sector only? What does the discovery of a large theta13 mean for the theory of flavor? In neutrino astrophysics, I highlight the possibility to test the sources of the ultra-high energy cosmic rays with neutrinos, and I illustrate how neutrino oscillations in the Sun work.

Primary author: Dr WINTER, Walter (Universitaet Wuerzburg)

Presenter: Dr WINTER, Walter (Universitaet Wuerzburg)

Session Classification: Morning Lecture 2

Contribution ID: **2** Type: **Lecture**

Physics and Nuclear Disarmament: Political and Technical Challenges of a World free of Nuclear Weapons

Wednesday 10 October 2012 19:00 (1 hour)

After the end of the Cold War, there was much hope that nuclear weapons can be reduced drastically. Despite some arms control successes, nuclear weapons still play a major role in world politics. The high nuclear arsenals between the USA and Russia are still based on Cold War doctrines facing new challenges such as the introduction of Ballistic Missile defense and precise conventional strike systems. technical expertise is necessary to analyse nuclear dismantlement and deep cuts in nuclear stockpiles, as well as the verification of fissile materials and the remocal of tactical nuclear weapons. The dispute on Iran´s ambivalent nuclear programmes reveals the thin line between civilian and military applications. Additional scientific-technical measures are necessary to strengthen non-proliferation and arms export control. The talk presents what scientists have done in the past to apply there skills for arms control and disarmament. Finally, the talk describes the scientific challenges of a world free of nuclear weapons and gives some examples of physical methods.

Primary author: Prof. NEUNECK, Götz (University of Hamburg)

Presenter: Prof. NEUNECK, Götz (University of Hamburg)

Session Classification: Evening lecture

Contribution ID: **3** Type: **Lecture**

Quantum information and computation: foundations and current status - part 2

Tuesday 9 October 2012 11:30 (1h 30m)

In recent years we've seen the birth of an exciting new field known as quantum information (QI) theory. In these lectures I will introduce the basic concepts of QI, namely, qubits, quantum circuits, and quantum algorithms. I will also introduce some of the guiding problems of the field and describe recent applications of QI concepts to the study of strongly correlated physics.

Primary author: Prof. OSBORNE, Tobias (University of Hannover)

Presenter: Prof. OSBORNE, Tobias (University of Hannover)

Session Classification: Morning Lecture 1

Contribution ID: **4** Type: **Lecture**

Neutrino Physics - part 2

Wednesday 10 October 2012 11:30 (1h 30m)

In these lectures, I discuss three aspects of neutrino physics: neutrino oscillations, neutrino mass, and neutrino astrophysics. In neutrino oscillations, the recent measurement of the mixing angle theta13 has opened the possibility to discover leptonic CP violation, which would motivate the possibility that the baryon asymmetry of the universe is connected with neutrino physics. I discuss the current understanding of neutrino oscillations and briefly comment on the future perspectives. As far as neutrino mass is concerned, I focus on questions such as: Are massive neutrinos to be interpreted as physics beyond the Standard Model? What model ingredients are needed if neutrino mass is connected with physics as the TeV scale, and thus potentially observable at the LHC? What kind of "new physics" may be showing up in the neutrino sector only? What does the discovery of a large theta13 mean for the theory of flavor? In neutrino astrophysics, I highlight the possibility to test the sources of the ultra-high energy cosmic rays with neutrinos, and I illustrate how neutrino oscillations in the Sun work.

Primary author: Dr WINTER, Walter (Universitaet Wuerzburg)

Presenter: Dr WINTER, Walter (Universitaet Wuerzburg)

Session Classification: Morning Lecture 2

Contribution ID: **5** Type: **not specified**

Welcome

Tuesday 9 October 2012 09:30 (10 minutes)

Session Classification: Morning Lecture 1

Contribution ID: **6** Type: **Talk**

The road to ALPS II – an experimental update

Tuesday 9 October 2012 14:30 (30 minutes)

The short talk will be an update of the talk last year. Main topics are the ALPS II experiment, the goals and status, the experimental process, and the status of the single photon detector (TES).

Primary author: Mr DREYLING-ESCHWEILER, Jan (DESY)

Presenter: Mr DREYLING-ESCHWEILER, Jan (DESY)

Session Classification: Student session

Contribution ID: **7** Type: **Talk**

Off-shell effects in new physics cascades

Tuesday 9 October 2012 15:00 (30 minutes)

New physics are highly anticipated to be observed in the near future at the LHC. Immediately ensuing a discovery is the determination of intrinsic properties such as masses and spins of new particles. However, many measurements rely on fundamental assumptions, which need not necessarily be fulfilled. One such possibility is a broad resonance at the beginning of a new physics cascade. Using the gluino as an example, we study the implications of off-shell contributions on mass and spin measurements and determine to what extent a discrimination between fundamentally different models is at stake.

Primary author: Mr WIESLER, Daniel (DESY)

Presenter: Mr WIESLER, Daniel (DESY)

Session Classification: Student session

Contribution ID: **8** Type: **Talk**

Linear colliders and the Furry Picture: How to deal with strong external fields.

Wednesday 10 October 2012 14:30 (30 minutes)

Future linear colliders like ILC and CLIC could be powerful machines for the discovery and the precision study of new physics Beyond the Standard Model. Due to the intense beams (high luminosity, high energy), strong fields may occur in the beam interaction region where the physical processes take place. In the context of precision HEP, the presence of these strong fields may yield sensitive corrections to the observed electron-positron processes. We are studying this intense external field corrections through the Furry picture of quantum states in order to understand their significance, also in the light of BSM searches.

Primary author: PORTO, Stefano (Hamburg University)

Presenter: PORTO, Stefano (Hamburg University)

Session Classification: Student session

Contribution ID: **9** Type: **Talk**

A generalization of States of Low Energy on Globally Hyperbolic Spacetimes

Wednesday 10 October 2012 16:30 (30 minutes)

The fact that the renormalized energy density smeared along a timelike curve on a globally hyperbolic spacetime possesses a lower bound stimulates the pursuit of an explicit construction of a state whose energy is minimal. Such a task was completed for Robertson-Walker spacetimes and these states were named States of Low Energy. In this communication we construct such states for more general spacetimes and show which obstacles prevent a completely general construction.

Primary author: Mr BRUM, Marcos (Hamburg University)

Co-author: Prof. FREDENHAGEN, Klaus (Hamburg University)

Presenter: Mr BRUM, Marcos (Hamburg University)

Session Classification: Student session

Contribution ID: **10** Type: **Talk**

Scattering Amplitudes in Strongly Coupled N=4 Super Yang-Mills

Wednesday 10 October 2012 15:00 (30 minutes)

In this talk, I will investigate scattering amplitudes in strongly coupled N=4 Super Yang-Mills. To leading order, the amplitude at strong coupling is given in terms of a minimal surface in AdS5. The area of this surface can be calculated by a set of non-linear integral equations, which, however, do not allow an analytic solution for arbitrary kinematics.
I will demonstrate that for special kinematics these equations simplify drastically and become algebraic equations, which are closely related to algebraic Bethe ansatz equations.

Primary author: Mr SPRENGER, Martin (DESY)

Presenter: Mr SPRENGER, Martin (DESY)

Session Classification: Student session

Contribution ID: **12** Type: **Talk**

Thermal equilibrium states in quantum field theories

Wednesday 10 October 2012 16:00 (30 minutes)

I review the approaches to descriptions of thermal equilibrium states in both quantum mechanics and quantum field theory. I argue, that the description via (Gibbs) density functionals is not sufficient to describe thermal equilibrium states in generic situations. I show a generalization of Gibbs states, the so-called KMS-states, and their application to quantum field theory.

Primary author: Mr LINDNER, Falk (II. Institute for Theoretical Physics, University of Hamburg)

Presenter: Mr LINDNER, Falk (II. Institute for Theoretical Physics, University of Hamburg)

Session Classification: Student session

Contribution ID: **13** Type: **Talk**

Particle Flow Performance Studies at ILC

Wednesday 10 October 2012 14:00 (30 minutes)

The physics program of the planned International Linear Collider (ILC) focuses on very high precision in measurements and searches of physics beyond the Standard Model. This places a strong demand on the ILC detectors' performance. One of the competing detector designs is the International Large Detector (ILD) which has been particularly optimised for the concept of particle flow reconstruction, using a GEANT4 based detector simulation. In order to reduce the CPU runtime necessary to obtain the large statistics for studying the physics reach of the ILC, a faster and more economic solution is needed. The Simulation a Grande Vitesse (SGV) is a fast detector simulation which determines the tracker response for any given detector geometry from first principles. This talk will describe the parametrisations implemented in SGV with the goal of making the fast simulation compatible with the particle flow paradigm.

Primary author: CHERA, Madalina (DESY)

Presenter: CHERA, Madalina (DESY)

Session Classification: Student session

Contribution ID: **14** Type: **Talk**

Interference effects in the MSSM

Wednesday 10 October 2012 17:30 (30 minutes)

The "narrow-width approximation" is a convenient tool for the factorisation of a more complicated process into production and subsequent decay of a particle with a small width compared to its mass.
However, this approximation cannot be applied in the case of sizable interferences between propagator contributions of different particles that are close to their mass shell. This may be relevant in models with an enlarged spectrum containing particles with a mass difference of the order of their decay widths. In order to deal with such a situation, a generalisation of the usual narrow-width approximation is analysed which allows for a consistent treatment of interference effects between such nearly mass-degenerate particles. This can be useful for the application to processes for which the factorisation into different sub-processes will be essential to enable the computation of higher-order contributions.
Phenomenological consequences with interference effects between neutral MSSM Higgs bosons will be discussed for the example process of Higgs boson production and subsequent decay from the decay of a heavy neutralino.

Primary author: FUCHS, Elina (DESY)

Co-authors: Prof. WEIGLEIN, Georg (DESY); Dr THEWES, Silja (DESY)

Presenter: FUCHS, Elina (DESY)

Session Classification: Student session

Contribution ID: **15** Type: **Talk**

DoIt

Tuesday 9 October 2012 14:15 (15 minutes)

Introduction and report from DoIt.

Presenter: Mr PFEIFER, Christian (II Institute for Theoretical Physics, Uni Hamburg)

Session Classification: Student session

Contribution ID: **16** Type: **Talk**

IRTG - Integrated Research Training Group

Tuesday 9 October 2012 14:00 (15 minutes)

Presenter: Dr BAUMGARTL, Marco (Uni Hamburg)

Session Classification: Student session

Contribution ID: **17** Type: **Talk**

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Wednesday 10 October 2012 17:00 (30 minutes)

Presenter: Mr HEISIG, Jan (University of Hamburg)

Session Classification: Student session

Contribution ID: **18** Type: **not specified**

Think outside the BOX

Tuesday 9 October 2012 16:00 (1 hour)