NEDERLANDSE NATUURKUNDIGE VERENIGING

SECTIES KERNFYSICA EN HOGE-ENERGIEFYSICA

NNV NAJAARSVERGADERING VRIJDAG 7 NOVEMBER 2008

'De Werelt' in Lunteren

Plenary programme

10.00 - 10.30	**Welcome and coffee**
10.30 - 11.10	**Jos Engelen - CERN** News from CERN
11.10 - 11.50	**Renate Loll - Univeristeit Utrecht** The Self-Organising Quantum Universe
11.50 - 12.30	**Ad van den Berg - KVI** The Pierre Auger Observatory: a telescope to observe the high-energy Universe
12.30 - 14.00	**Lunch**
14.00 - 16.45	**Parallel Sessions**
16.45-17.00	**Break**
17.00 - 18.00	**Gerhard Kraft & Wilma Weyrather - GSI Darmstadt** Heavy Ion Tumor Therapy: Biological and Physical Basis, Technical Realisation and Clinical Results
18.00 - ?	**Drinks**

Parallel session 1

14.00 - 14.20	**Martijn Gosselink** Studying $t\bar{t}$ + n-jet events in ATLAS
14.20 - 14.40	**Krijn de Vries** A macroscopic model for Extensive Air Shower simulations
14.40 - 15.00	**Manouk Rijpstra** ATLAS: Preparing for Little Higgs
15.00 - 15.20	**Manisha Ranjan** A cryogenic gas catcher for high energy radioactive ions
15.20 - 15.45	**Tea break**
15.45 - 16.05	**Lucian Ancu** Searches for the SM Higgs Boson at Tevatron
16.05 - 16.25	**Ivan Mous** First tracks in LHCb
16.25 - 16.45	**Erik Wessels** Geometric scaling at RHIC and LHC

Studying $t\bar{t}$ + n-jet events in ATLAS

Martijn Gosselink
Due to the high statistics which will be available after turn on of the LHC (roughly one top quark pair per second at a luminosity of 10^{33} $cm^{-2}s^{-1}$) it is expected that the total top quark pair cross section can be determined relatively fast with ATLAS. In this talk, I will focus mainly on top quark pair production with additional jets. Monte Carlo predictions have large uncertainties on the rates of additional jets, while these kind of events form an important background to $t\bar{t}H$ and SUSY searches. With the start up of the LHC this year, we are tantalisingly close to a first observation of $t\bar{t}$+ n-jet events at LHC energies.

A macroscopic model for Extensive Air Shower simulations

Krijn de Vries
An incoming Ultra High Energy Cosmic Ray into the Earth's atmosphere creates an Extensive Air Shower (EAS) where the particles travel with extremely high velocities. As a result they are concentrated a thin shower front, a "pancake". Electrons and positrons within the shower front are deflected in the Earth's magnetic field. In combination with retardation effects this causes the emission of an electromagnetic pulse. We will concentrate on the macroscopic description. With this description a model can be made to obtain realistic shower simulations. This can be used to determine the incoming particle and where it comes from.

ATLAS: Preparing for Little Higgs

Manouk Rijpstra
After many years of design, construction and testing, the Large Hadron Collider will start circulating beams of protons in spring 2009. Collisions in the center of the ATLAS detector will provide more insight into the Standard Model and its extensions. One of the possible extensions would be the Little Higgs Model, in which new particles arise with masses around the TeV scale. Before discovering any new particles, however, each of ATLAS' subdetectors needs to be to be thoroughly understood. At the same time we would like to be ready to make measurements that were out of reach for previous experiments. Several steps in the process of preparation for data taking and analysis will be discussed, focusing on the discovery potential of W_H, the heavy partner of the W boson which is predicted by Little Higgs theories.

A cryogenic gas catcher for high energy radioactive ions

Manisha Ranjan, P. Dendooven, S. Purushothaman, I. Moore, H. Penttila, A. Saastamoinen, J. Aysto, W. Plass, C. Scheidenberger, H. Weick, J. Neumayr, P. Thirolf, A. Popov
The Facility for Antiproton and Ion Research (FAIR) in Darmstadt, Germany, will allow studies of radioactive isotopes using laser techniques and ion traps. For this purpose, we are developing an ion catcher device that will stop high-energy ions from the Super-FRS in helium gas and extract them as a low-energy beam using DC and RF electric fields. The high purity of the helium gas will be ensured by operation at low temperature.

In order to demonstrate a cryogenic system that stops high-energy ions and extracts them as a low-energy beam, a cryogenic ion guide operating at liquid nitrogen temperature has been developed and has been tested at the IGISOL facility in Jyvaskyla, Finland. The performance of this simplified prototype at low temperature and using a high-energy ion beam will be discussed. The operational parameters for a cryogenic gas catcher have been analyzed defining the electrical and mechanical specifications of the system. A conceptual design of a cryogenic gas catcher will be presented.

Searches for the SM Higgs Boson at Tevatron

Lucian Ancu
Studies of the search for a Standard Model Higgs boson produced at the Fermilab ppbar collider at $\sqrt(s) = 1.96$ TeV are presented. Emphasis will be put on the D0 detector search of the associated production of a light Higgs boson with a Z boson in the $Z \to \ell^+\ell^-$ (ℓ = electron or muon) and $H \to b\overline{b}$ using 1.2 fb^{-1} of integrated luminosity of Run II data. Based on the combination of more channels the derived limits for the SM Higgs production are also presented.

First tracks in LHCb

Ivan Mous
The LHCb is one of the four experiments constructed around the Large Hadron Collider. Recent tests with the accelerator complex have allowed several sub detectors of LHCb to test their data taking- and reconstruction capabilities with real particle tracks. This presentation gives a brief overview of the results obtained during these measurements, in particular the results from the VELO detector.

Geometric scaling at RHIC and LHC

Erik Wessels
Hadrons, particles that build up matter, are made of quarks and gluons which carry colour charge. If a hadron is accelerated to very high energies, the density of gluons inside the hadron rises fast and eventually saturates. In experiments, such saturation is expected to exhibit a special kind of scaling of the scattering amplitude, known as geometric scaling. We investigate whether recent collider data show geometric scaling and point out how to establish gluon saturation at the new collider LHC. Thus we can test our current theoretical understanding of this largely unexplored corner of the strong interactions.

Parallel session 2

14.00 - 14.20	**Hossein Moeini** First feasibility experiment and simulations for EXL
14.20 - 14.40	**Praveen Shidling** Production of short-lived radium nuclides at the TRImP facility
14.40 - 15.00	**Marlene da Silva e Silva** Towards High-Precision Polarimetry for an EDM Search on the Deuteron
15.00 - 15.20	**Harm Schoorlemmer** Radio detection of cosmic rays: Testing detector simulation with galactic background
15.20 - 15.45	**Tea break**
15.45 - 16.05	**Simona Stoica** Dynamic Generation of Resonances in Nucleon Antinucleon Scattering
16.05 - 16.25	**Eric Jansen** Event visualization in ATLAS
16.25 - 16.45	**Erik van der Kraaij** Measuring the top/W ratio with first data from ATLAS

First feasibility experiment and simulations for EXL

Hossein Moeini

The EXL objective is mainly to focus on light-ion reactions in inverse kinematics using a universal detector system providing high resolution and large solid angle coverage in kinematically complete measurements. Hence one of the main parts of the project is the EXL Silicon Particle Array (ESPA) and EXL Gamma and Particle Array (EGPA). The analysis of the recoil detector data taken during the test run in 2005 has shown that having a comprehensive simulation package for the EXL setup is highly essential in order to fully understand the data. While there has been already some simulation activities going on for the EXL, we started with a Geant4 code to integrate all the necessary parts of the detection system in the simulations. These include ESPA, EGPA, forward detectors for high-energy particles, and the magnetic lattice of the ring leading to the heavy-ion detection systems. In this presentation, an overview of the simulations along with some results will be shown.

Production of short-lived radium nuclides at the TRImP facility

Praveen Shidling, for the Trimp group

Radium nuclides are of interest for the study of fundamental symmetries and interactions in physics, e.g. atomic parity non-conservation or violation of time reversal invariance. Short-lived radium isotopes have been produced at TRImP facility in inverse kinematics. Radium was produced in a fusion-evaporation reaction by directing a lead beam (^{206}Pb) of 7.8 MeV/nucleon on a ^{12}C (diamond like) target of 4 mg/cm^2 thickness. Radium isotopes were separated in flight from the abundance of other products using the TRImP separator. This method with a heavy beam and a light target provides a unique way of producing and separating heavy isotopes. Details on the production and on the separation process will be presented.

Towards High-Precision Polarimetry for an EDM Search on the Deuteron

Marlene da Silva e Silva, K. Jungmann, W. Kruithof, C.J.G. Onderwater, O. Versolato, H. Wilschut, L. Wilmann

A finite Electric Dipole Moment (EDM) in any fundamental system would constitute a signal for New Physics. The deuteron presents itself as an optimal candidate due to its high sensitivity for CP odd parts of nuclear forces, together with being easily polarizable and having a small anomalous magnetic moment. A new storage ring technique is being developed, for which a small change in the vertical polarization would be a signal of a non-zero EDM. A novel polarimeter concept is under investigation. Besides being highly efficient, this polarimeter allows for continuous monitoring of the beam polarization, guaranteeing optimal sensitivity. Detailed studies on systematic error control, in addition to the measurement of cross sections and analyzing powers were carried out at KVI-Groningen. Efficiency measurements were conducted at COSY-Julich yielding a high efficiency up to 1.5%. The (statistics limited) ability to track changes in polarization at the level of a few hundred parts-per-million has been demonstrated.

Further studies and developments to meet the final goal of sub-part-per-million sensitivity are in progress.

Radio detection of cosmic rays: Testing detector simulation with galactic background

Harm Schoorlemmer
Radio emission of cosmic ray induced air showers has been demonstrated in dedicated setups in the past. Currently, several radio detector setups are tested at the Pierre Auger observatory in Argentina. These setups consist out of relative simple antenna's that measure radio signals between 30 - 70 MHz. The main background component at these frequencies comes from radio emission from our galaxy. In this talk I will present a way to use this galactic background to test radio detector simulations.

Dynamic Generation of Resonances in Nucleon Antinucleon Scattering

Simona Stoica, O. Scholten, M.F.M. Lutz
The future PANDA experiment at GSI, Darmstadt, is designed to measure high quality data that allow a clean interpretation in terms of the predictions of nonperturbative QCD. In proton antiproton interactions, particles with gluonic degrees of freedom as well as particle antiparticle pairs are produced. To this end we have further developed a formalism that obeys constraints from analyticity, causality as well as crossing symmetry and unitarity. In the SU(3) symmetric interaction kernel scalar meson exchanges are included. The formalism allows for the dynamic generation of resonances, which will provide answer to the question to which extent one state should be interpreted as a genuine glue-ball or just as a dynamically generated state. First results will be given of calculations performed in a partial wave basis via a coupled channel dynamics.

Event visualization in ATLAS

Eric Jansen
Atlantis is an event visualization program for the ATLAS experiment at the Large Hadron Collider at CERN. It's primary goal is not just to create nice pictures for outreach, but also to provide physicists with a tool to visually investigate and understand events as a whole. Especially during the commissioning phase visualization is an important tool for our understanding of the hardware and software involved.

Using Atlantis we will take a closer look at the first events recorded in the ATLAS detector, and what conclusions we can draw from them.

Measuring the top/W ratio with first data from ATLAS

Erik vd Kraaij
ATLAS is to produce large amounts of top-anti-top events, which can decay into one lepton plus four jets and missing energy. To make use of the abundant amount of events in the first data with only two or three of the jets reconstructed, we have developed an analysis to measure the ratio of mis-reconstructed top

events to W+jets events, while at the same time measuring the b-tagging efficiency. Establishing this ratio is a new opportunity to look for first signs of deviations from Standard Model physics.

Parallel session 3

14.00 - 14.20	**Mohammad Eslami-Kalantari** Study of three-nucleon force effects in proton-deuteron break-up at 135 MeV
14.20 - 14.40	**Kalpana Singh** Ultra-High Energy Cosmic ray and Neutrino Physics using the Moon
14.40 - 15.00	**Aleksandra Biegun** Simulations for the future experiment - PANDA
15.00 - 15.20	**Ahmad Ramazani-Moghaddam-Arani** A study of all reaction channels in deuteron-deuteron scattering at 65 MeV/nucleon
15.20 - 15.45	**Tea break**
15.45 - 16.05	**Fabian Janssen** New physics in the loop
16.05 - 16.25	**Jorn Boomsma** Phases of quark matter with induced CP violation

Study of three-nucleon force effects in proton-deuteron break-up at 135 MeV

Mohammad Eslami-Kalantari, for the KVI, Cracow and Katowice collaboration
Presently, the progress of exploring the nuclear force in both theoretical and experimental fronts is remarkable. High-precision measurements of the pd break-up reaction have been performed in the past at KVI and elsewhere to study three-nucleon force effects. In the present work, we explored 3NF effects in the break-up scattering process by performing a measurement of vector analyzing powers and differential cross sections using a 135 MeV polarized-proton beam impinging on a liquid-deuterium target. For this experiment, the newly developed detection system BINA (Big Instrument for Nuclear-polarization Analysis) was employed. The results are interpreted with the help of state-of-the-art Faddeev calculations and will be presented.

Ultra-High Energy Cosmic ray and Neutrino Physics using the Moon

Kalpana Singh, for the NuMoon collaboration
When Ultra high energy ($> 10^{20}$ eV) cosmic rays impinge on a dielectric medium, radio waves are produced through the Askaryan effect. We explore this process to detect UHE cosmic rays and neutrinos when they impact on the moon. Searching for the emitted radio signals with the Westerbork radio telescope we are able to improve the limits on the UHE neutrino flux by an order of magnitude. First results will be presented. We will discuss the implementation of the NuMoon observation mode for the new LOFAR telescope with which we will be able to further improve on the observations.

Simulations for the future experiment - PANDA

Aleksandra Biegun on behalf of the PANDA collaboration
The Anti-Proton ANnihilation at DArmstadt (PANDA) experiment pro- posed at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt (Germany) will perform a high-precision spectroscopy of charmonium and exotic hadrons, such as hybrids, glueballs and hypernuclei. A highly intense beam of anti-protons provided by the High Energy Storage Ring (HESR) with an unprecedented resolution will scan a mass range of 2 to 5.5 GeV/c^2. In preparation for experiments with PANDA, careful and large-scale simulation studies are performed to determine analysis strategies, to provide feedback for the design, construction and performance optimization of individual detector components, and to design methods for the calibration and interpretation of the experimental results. Results of a simulation using a realistic description of the detector response and using advanced data analysis techniques will be presented. The simulations were carried out using the PandaRoot framework, which is based on ROOT and being developed by the PANDA collaboration.

A study of all reaction channels in deuteron-deuteron scattering at 65 MeV/nucleon

Ahmad Ramazani-Moghaddam-Arani, for the KVI, IUCF and Cracow collaboration

Few-nucleon systems can be used as fundamental laboratories for studying the details of the nuclear force effects. We performed a series of deuteron-deuteron scattering experiments at intermediate energies. The experiments exploited BINA and BBS experimental setups and polarized deuteron beams with kinetic energies of 65 and 90 MeV/nucleon. These experiments aim to measure differential cross sections, vector and tensor analyzing powers of all available reaction channels in deuteron-deuteron scattering. With these data we will provide a systematic database, which will be used to test present theoretical approximations and upcoming ab-initio calculations in the four-nucleon system. The analysis procedure along with the latest results of the elastic and three-body break-up channels will be presented.

New physics in the loop

Fabian Jansen

The decay of the neutral B-meson to a K^* and two muons ($B^0_d \rightarrow K^*\mu^+\mu^-$) is a rare decay, that is sensitive to "new physics". The B-meson is a bound state of a b-quark and a d-quark, while the K^* is a bound state of an s-quark and a d-quark. When the b-quark turns into an s-quark, it proceeds in conventional physics (i.e. the Standard Model) necessarily through loop diagrams. This makes that the decay rate for this decay channel is very small and that contributions to this decay from new physics can be of the same order as Standard Model physics and thus measurable. The loop is the place where the new physics particles like Super Symmetric particles can enter and leave their signature, even if they are too heavy to create directly. The decay $B^0_d \rightarrow K^*\mu^+\mu^-$ is one of the decay channels that is being investigated by the LHCb experiment, where its scientists and students are challenged with resolving the particulars of the loop and hopefully discover new physics.

Phases of quark matter with induced CP violation

Jorn Boomsma

The universe shows a remarkable asymmetry between matter and antimatter, which requires violation of CP invariance, the symmetry between particles and anti-particles. The weak interaction violates CP, but insufficiently. The strong interaction conserves CP, but this could have been different in the early universe. Studying the phase structure of quark matter, including CP-violating phases, is therefore interesting. The amount of CP violation can be tuned by the vacuum angle theta. At non-zero theta new phases arise, which will be discussed for a specific quark model. This allows us to show the crucial role played by topologically nontrivial solutions called instantons.

Routebeschrijving naar 'De Werelt'

CongresHotel De Werelt
Westhofflaan 2
6741 KH Lunteren
T (0318) 48 46 41

Openbaar vervoer

Per trein is Lunteren bereikbaar vanuit Amersfoort en Ede-Wageningen.

Vanaf het NS-station is een taxi te bestellen via telefoonnummer (0318) 48 45 55. Op uw verzoek regelt CongresHotel De Werelt graag taxivervoer voor u.

De wandeling vanaf NS-station Lunteren naar CongresHotel De Werelt duurt ongeveer 15 minuten.

Komende vanaf het NS-station uit de richting Ede:

U gaat rechtsaf over het parkeerterrein richting sauna en wandelt linksaf over de Boslaan het bos in. Bij de viersprong rechtsaf de Molenweg in. Daarna 1e weg links (Westhofflaan), waar een bord u verwijst naar de ingang van CongresHotel De Werelt.

Vanuit richting Amersfoort:

U steekt het spoor over. Dan gaat u rechtsaf richting sauna en wandelt linksaf over de Boslaan het bos in. Bij de viersprong rechtsaf de Molenweg in. Daarna 1e weg links (Westhofflaan), waar een bord u verwijst naar de ingang van CongresHotel De Werelt.

Eigen vervoer

LET OP: De verkeerssituatie in Lunteren is gewijzigd: volg de Rondweg en ga NIET door het centrum van Lunteren!

Vanaf de A1 (Amsterdam-Apeldoorn/Apeldoorn-Amsterdam):

afslag Barneveld/Ede (A30), richting Ede
afslag Lunteren (lees verder bij 'In Lunteren')

Vanaf de A12 (Utrecht-Arnhem/Arnhem-Utrecht):

afslag Ede-Noord/Barneveld (A30)
afslag Lunteren (lees verder bij 'In Lunteren')

Vanaf de A15 (Rotterdam-Nijmegen/Nijmegen-Rotterdam):

afslag Kesteren (N233); richting Rhenen/Veenendaal bij volgende rotonde richting Veenendaal bij volgende rotonde Veenendaal-West aanhouden (tweede afslag) volg N224 tot aan A30 neem de A30 richting Lunteren afslag Lunteren (lees verder bij 'In Lunteren')

In Lunteren:

Volg 'Alle Richtingen' (Rondweg Westzoom). Aansluitend de ANWB-borden 'De Werelt' volgen.