3 Nuclear and Particle Physics

Tuesday, 1. Sept. 2009, Room B

Time	ID	**Nuclear and Particle Physics I: Mixed Opening** *Chair: B. Hiesmayr, Uni Wien*
14:00	**301**	**Der "International Linear Collider" (ILC) - Motivation, Herausforderung, Status** *Winfried Mitaroff* *Institut für Hochenergiephysik der ÖAW, Nikolsdorfer Gasse 18, 1050 Wien, Austria* Die Physik bei Energien im TeV-Bereich zielt auf fundamentale Fragen von Mikro- und Makrokosmos. Erste Hinweise werden ab 2009 von LHC erwartet; zum tieferen Verständnis bedarf es jedoch präziser Messungen bei Elektron-Positron-Kollisionen. Ein solcher Linear-Collider mit Schwerpunktsenergie bis 1 TeV wird seit 2004 als globales Projekt ILC vorangetrieben. Hinzu kommen Studien zu Physik und Detektoren, und es entstanden 3 Detektorkonzepte. Deren "Letters of Intent" wurden Ende März 2009 eingereicht, und sie werden von einem internationalen Gremium validiert. Die "Detector Design Phases" I und II sind 2010 bzw. 2012 vorzulegen. Zu den tiefliegenden Standortkandidaten des "Reference Design Reports" von 2007 (FNAL, CERN, Japan) gesellen sich die billigeren flachliegenden bei DESY und Dubna (RU). Mit dem "Konkurrenzprojekt" CLIC (einem Linear-Collider bis 3 TeV) wird bei Beschleuniger und Detektoren kooperiert. Die Entscheidung zwischen ILC und CLIC soll anhand der Erkenntnisse von LHC fallen. Das Institut ist Partner des "International Large Detector" (ILD) Konzepts, sowie der konzeptübergreifenden F&E-Kollaboration "Silicon for the Linear Collider" (SiLC) für einen hochpräzisen Spurdetektor.
14:30	**302**	**Austrian Federated WLCG Tier-2** *Gregor Mair [1], Peter Öttl [1], Katharina Nimeth [1], Wolfgang Jais [1], Reinhard Bischof [2], Dietrich Liko [3], Natascha Hörmann [3], Gerhard Walzl [3]* *[1] Astro- & Teilchenphysik Innsbruck, Technikerstraße 25/8, 6020 Innsbruck, Austria* *[2] ZID Innsbruck, Technikerstraße 23, 6020 Innsbruck, Austria* *[3] Hochenergiephysik, Österreichische Akademie der Wissenschaften, Nikolsdorfer Gasse 18, 1050 Wien, Austria* The LHC at CERN in Geneva plans to resume operation and start data acquisition in fall 2009. The High Energy Physics Group at the Austrian Academy of Science and the Astro- and Particle Physics Group at the University of Innsbruck are part of the CMS and the ATLAS experiments. Both experiments have a high demand on computing power and data storage. To allow Austrian scientists to analyze the produced data in 2008 the Austrian Ministry of Science signed the Computing Memorandum of Understanding (C-MoU) which defines the Worldwide LHC Computing Collaboration and its objectives. To conform to this C-MoU the two institutes installed a federated Tier-2 computing center.

14:45	**303**	**Tuning of the pT-ordered parton shower to e^+e^- data** *Gerald Rudolph* *Astro- and Particle Physics, Technikerstrasse 25, 6020 Innsbruck, Austria* QCD process generation in high-energy pp interactions by PYTHIA includes multiple parton-parton scattering, initial state and final state radiation, using transverse momentum as a common evolution variable. A new tuning of the pT- ordered final state parton shower to Z hadronic data from ALEPH has been performed. The results are compared with those from the more conventional mass-ordered shower.
15:00	**304**	**Lattice Design of the CERN PS2 Synchrotron** *Wolfgang Bartmann, CERN, 1211 Genève 23, Switzerland* The PS2 is foreseen as a replacement of the CERN Proton Synchrotron (CPS) to increase the LHC luminosity and to provide a high reliability of the LHC injector chain. In order to meet the beam constraints mainly coming from the LHC but also non-LHC physics experiments, various lattice types have been studied and compared. The choice between lattices crossing or avoiding transition will be explained as well as the decisions for the machine's circumference and shape. Two injection and three extraction systems are considered to provide the required range of beam types. Their conceptual design together with the impact on the lattice, in particular for the laser-assisted H- injection will be shown.
15:15	**305**	**Dark Matter at the LHC** *Sabine Kraml, LPSC, 53 Avenue des Martyrs, 38026 Grenoble France* Theories beyond the Standard Model (BSM) generically predict new particles at the Terascale, soon to be explored at the LHC. In many models, the ligtest of these particles is stable by virtue of a new discrete symmetry and can hence make an excellent dark matter candidate. This offers the exciting possibility to produce and study dark matter directly in the laboratory. I discuss the potential of experiments at the LHC to determine the properties of dark matter candidates put forward by BSM theories, as well as the interplay with direkt and indirect searches for dark matter.
15:30	**306**	**An analytical approach to space charge distortion for Time Projection Chambers** *Stefan Rossegger [1], Bernhard Schnizer [2], Werner Riegler [3]* *[1] CERN-ALICE & Technical University Graz, CERN, 1211 Geneva 23, Switzerland* *[2] ITP - TU Graz, Petersgasse 16, 8010 Graz, Austria* *[3] CERN, Geneva 23, 1211 Geneva, Switzerland* In a Time Projection Chamber (TPC), the possible ion feedback and also the primary ionization of high multiplicity events result in accumulation of static charge inside the gas volume (space charge). This charge introduces electrical field distortions and modifies the cluster trajectory along the drift path, affecting the tracking performance of the detector. In order to calculate the track distortions due to an arbitrary space charge distribution in the TPC, the Green's function for a TPC geometry was worked

		out. Three different representations were derived which, if combined, lead to fast converging expressions for every electric field component within a coaxial cavity. This analytic approach finally permits accurate predictions of track distortions due to an arbitrary space charge distribution by solving the Langevin equation. Furthermore, the inclusion of the magnetic field map allows to study the necessary corrections of the Lorentz angle due to the non-parralelism of the E and B fields within the TPC drift volume.
15:45	**307**	**Simulation von Teilchendetektoren** *Heinrich Schindler [1, 2], Werner Riegler [2], Rob Veenhof [2]* *[1] TU Wien* *[2] CERN, 1211 Genève 23, Switzerland* Computersimulationen stellen unverzichtbare Hilfsmittel bei der Entwicklung und Optimierung von modernen Teilchendetektoren dar. Im Beitrag wird ein Überblick über das Programmpaket "Garfield" gegeben und neue Entwicklungen in dessen Rahmen werden diskutiert: Der Trend zur Miniaturisierung der Detektorstrukturen bedingt u. a. steigende Anforderungen an den Detailgrad der Simulation. Im Zusammenhang mit der Simulation von Micropattern-Gas-Detektoren entwickelte Methoden zur Berechnung des Elektronentransports auf molekularer Ebene werden vorgestellt. Als Anwendungsbeispiel wird die Berechnung von Ladungsträger-Lawinen und deren Einfluss auf die Detektoreffizienz und -auflösung diskutiert. Bisher auf die Simulation von Gasdetektoren spezialisiert, soll Garfield in Zukunft auch für Halbleiterdetektoren - in Ergänzung zu bestehenden industriellen Programmen - Verwendung finden. Der Status der laufenden Aktivitäten in diesem Bereich wird präsentiert.
16:00		***Coffee Break***
		NUCLEAR AND PARTICLE PHYSICS II: NUCLEAR PHYSICS *Chair: M. Faber, TU Wien*
16:30	**311**	**Investigations of light ion induced nuclear reactions at the VERA facility** *Andreas Pavlik, Harry Friedmann, Oliver Forstner, Peter Hille, Johann Kühtreiber, Alfred Priller, Patrick Törnström, Anton Wallner* *Fakultät für Physik, Universität Wien, Währinger Str. 17, 1090 Wien, Austria* The Vienna Environmental Research Accelerator (VERA) is predominantly used as an Accelerator Mass Spectrometry (AMS) facility and can also be utilised for nuclear reaction studies. The 3-MV Pelletron tandem accelerator was used to bombard aluminium target foils with Li and Be ions with energies in the range from 3 to 13 MeV depending on the acceleration voltage and the charge state of the accelerated ions. Prompt and delayed gamma-rays were detected by a high-resolution HPGe-detector. The energies as well as the intensities of the gamma-lines as a function of time were used to identify the residual nuclei. Production rates and excitation functions for several reaction products were determined. These data can give insight into the reaction mechanisms involved at energies around the Coulomb barrier.

16:45 | **312**

^{36}Cl exposure dating with a 3-MV AMS facility

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^{36}Cl ($t_{1/2}$ = 0.30 Ma) is widely used for exposure dating of carbonate rocks such as limestone and calcite. Accelerator mass spectrometry (AMS) of ^{36}Cl at natural isotopic concentrations requires high particle energies for the separation from the stable isobar ^{36}S and was exclusively the domain of machines with 5 MV terminal voltage or beyond.

At VERA (Vienna Environmental Research Accelerator) we performed the first ^{36}Cl exposure dating measurement with a 3-MV tandem accelerator, operating our machine up to 20% above the nominal value, using foil stripping and a split-anode ionization chamber.

With a more complex detector setup, adding a time of flight and a silicon strip detector, we evaluate the performance of various detectors for ^{36}Cl. We have achieved a similar ^{36}S-suppression at 3 MV terminal voltage compared to 3.5 MV in our previous measurements. Recently we started investigations of the sulphur output from the ion source and tests of new target backing materials to reduce our measurement background. In the near future, we plan to develop an optimized ionization chamber based on the results obtained with our exploratory detector setup.

17:00 | **313**

Production of a ^{55}Fe-AMS standard and Neutron Capture on ^{54}Fe

Kathrin Buczak [1], Tamás Belgya [2], Max Bichler [3], Oliver Forstner [1], Robin Golser [1], Walter Kutschera [1], Claudia Lederer [1], Alfred Priller [1], Peter Steier [1], Anton Wallner [1]

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The interest in neutron capture on ^{54}Fe is linked to a variety of topics: studies of nucleosynthesis in stellar environments, radioactive waste generation in fusion reactors and the half-life value of the long-lived ^{59}Ni. In this regard, samples have been irradiated with neutrons (from thermal to MeV energies) at several facilities. The radionuclide ^{55}Fe ($t_{1/2}$=2.7 yr) produced in these activations, was measured at VERA (Vienna Environmental Research Accelerator) via accelerator mass spectrometry (AMS). Such isotope-ratio measurements, however, require an accurate ^{55}Fe-AMS standard as reference material to deduce absolute ^{55}Fe/Fe ratios:

(1) At VERA, iron samples, highly enriched in ^{54}Fe, were bombarded with 5.5 MeV protons to produce ^{55}Co ($t_{1/2}$=17.53 h), which decays to ^{55}Fe. The total number of daughter-nuclides ^{55}Fe was determined from the measured ^{55}Co-activity.

(2) Another, independent standard was produced by a dilution series of a certified ^{55}Fe-standard-solution.

For the measurement of the thermal neutron capture cross section $\sigma(^{54}Fe(n,\gamma)^{55}Fe)$, irradiations have been performed at the TRIGA reactor of the Atominstitut in Vienna, and with cold neutrons at the Budapest Research Reactor. The cross section value is expected to be accurate at a level of ±3% and is directly coupled to a previous ^{59}Ni half-life value. The measurement procedure and the latest results will be presented.

17:15 | **314** | cancelled

~~Measurement of the cross section $^{209}Bi(n,\gamma)^{210(g+m)}Bi$ with accelerator mass spectrometry at VERA~~

~~*Peter Kuess [1], Anton Wallner [1], Oliver Forstner [1], Robin Golser [1], Walter Kutschera [1], Alfred Priller [1], Peter Steier [1], Max Bichler [2], Georg Steinhauser [2], Gabriele Wallner [3]*~~

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~~*[2] Atominstitut der Österreichischen Universitäten, TU Wien, Stadionallee 2, 1020 Wien, Austria*~~

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~~An accurate value for the neutron-capture cross-section of ^{209}Bi became of importance since new nuclear technologies have triggered interests on the use of bismuth: as a coolant for fast neutron reactors and as spallation target in accelerator driven systems (ADS). In addition, in nuclear astrophysics, neutron capture of ^{209}Bi terminates nucleosynthesis of heavier elements in the s-process. The reaction product ^{210}Bi exists in its ground state (^{210g}Bi, $t_{1/2}$ = 5.013 days), and as long-lived isomer ^{210m}Bi ($t_{1/2}$ = $3{\cdot}10^6$ years). The reaction $^{209}Bi(n,\gamma)^{210(g+m)}Bi$ is studied with accelerator mass spectrometry (AMS) at VERA (Vienna Environmental Research Accelerator) for thermal energies (0.025 eV) and for the resonance region (keV). To explore the detection limit at VERA for measurements of the long-lived ^{210m}Bi, a series of bismuth samples was irradiated with thermal neutrons from the TRIGA reactor of the Atominstitut in Vienna. Our aim is to use AMS, for the first time, to study the neutron-capture of ^{209}Bi in the keV neutron-energy-range. The challenge of measuring ^{210}Bi with AMS is the interfering background, produced by $^{209}BiH^-$ injection, and the isobar ^{210}Po, the decay product of ^{210g}Bi. We will report on the status of ^{210m}Bi measurements at VERA.~~

17:30 | **315**

Production of ^{53}Mn in a nuclear fusion environment

Claudia Lederer [1], Anton Wallner [1], Iris Dillmann [2], Thomas Fästermann [2], Axel Klix [3], Gunther Korschinek [2], Johannes Lachner [2], Mikhail Poutivtsev [2], Georg Rugel [2], Klaus Seidel [3], Herbert Vonach [1]

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Since the feasibility of nuclear fusion devices as a potential energy source, there is a strong need for accurate cross-section data for estimation of activation products, particularly long-lived radioisotopes. ^{53}Mn ($T_{1/2}$=3.7 Myr) is considered to contribute significantly. It is mainly produced via interaction of 14-MeV (fusion) neutrons with Fe- and Ni-containing structure materials (predominantly via

		reactions on ^{54}Fe). Fe samples, enriched in ^{54}Fe, were irradiated with quasi-monoenergetic neutrons of energies from 13.4 to 14.9 MeV at the 14 MeV neutron generator of the TU Dresden. The number of produced 53Mn particles was quantified via Accelerator Mass Spectrometry (AMS), utilizing the 14-MV tandem accelerator at the Maier-Leibnitz-Laboratory of TU and LMU Munich. Previous measurements indicate nearly constant cross section values of about 200 mb around 14 MeV, whereas evaluations show an increasing excitation function between 400 and 600 mb. Our results, which are the first ones based on AMS, suggest even higher cross-sections. These new experimental data will allow to forecast ^{53}Mn activation for an ITER-like device with a significant reduction of present uncertainties.
17:45	**316**	**Nuclear structure approach to the microscopic optical potentials for composite particle scattering** *Denise Neudecker, Thomas Srdinko, Michael Feher, Helmut Leeb* *Atominstitut, TU Wien, Wiedner Hauptstr 8-10, 1040 Wien, Austria* Nuclear scattering reactions with composite projectiles or ejectiles e.g. alpha-particles, deuterons, etc. can be described by microscopic optical potentials. However, this approach is not fully satisfying for scattering at low incident energies. Therefore, we revisit the nuclear structure approach of optical potentials at this energy scale. For the target nucleus, a RPA description is used. Concerning the projectile, its composite nature has to be included in the model as well. We discuss the approach for alpha-nucleus scattering at astrophysically relevant energies. This work is partly supported by the EURATOM integrated project EUROTRANS.
18:00		***Nuclear / Particle Physics Evening on the Future of Particle Physics: Statements and Open Discussion***
19:30		***FAKT / TASK Common Dinner***

Wednesday, 2. Sept. 2009, Room B

Time	ID	NUCLEAR AND PARTICLE PHYSICS III: COLLIDER I (LHCb, BELLE) *Chair: V. Chiochia, Uni Zürich*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	421	***see session "Astrophysics"***
14:30	321	**You are so beautiful: Rare B decays at LHCb.** *Michel De Cian, Angela Büchler, University of Zürich, Physik-Institut, Winterthurerstrasse 190, 8057 Zürich, Switzerland* The LHCb detector at the LHC is a single-arm forward spectrometer, designed for the study of B mesons which are produced predominantely in the forward region at the LHC. The following decays were studied using simulated events: 1) $B_s \rightarrow \mu\mu$: This unobserved decay is heavily suppressed in the standard model with a predicted branching fraction of $3.3 \cdot 10^{-9}$, however it is highly sensitive to new physics. The latest Tevatron measurement excludes branching fractions above $4.7 \cdot 10^{-8}$ at 90% CL. With the expected 300 pb^{-1} in the first year of data taking at LHCb, we will be able to measure a possible $\mathcal{B}(B_s \rightarrow \mu\mu) \sim 10^{-8}$ with a 5 σ precision or exclude large parts of the region between the Tevatron result and the SM branching fraction. 2) $B \rightarrow ll$ K: This rare decays allow constraining new physics with several key variables: R_K, the ratio between $\mathcal{B}(B \rightarrow \mu\mu K)$ and $\mathcal{B}(B \rightarrow ee K)$, the forward-backward asymmetry A_{FB} and A_{CP}, the direct CP asymmetry. Furthermore, LHCb will be able to measure the branching fraction of $B \rightarrow \mu\mu K$ to a statistical accuracy below 5 % within the first year. We will give a short overview of the theoretical motivation for these rare B decays, present selection studies based on Monte Carlo data and also highlight the mutual relevance of the two measurement and their interpretation.
14:45	322	**The LHCb Vertex Locator** *Anne Keune, Laboratoire de Physique des Hautes Energies, Bâtiment des Sciences Physiques, EPFL, 1015 Lausanne, Switzerland* The Vertex Locator -VeLo- of the LHCb experiment is a silicon based sub-detector positioned around interaction point of the LHC beams. Located in a secondary vacuum system within the LHC beam vacuum, with its active silicon distanced only 8 mm from the LHC beams, its main task is to reconstruct primary and secondary vertices. Its unique $r\varphi$-geometry ensures fast standalone tracking to satisfy L1 vertex trigger requirements. EPFL has developed the off-detector L1 acquisition boards -TELL1s- and its responsibilities range from the transmission of the front-end analog signal to the firmware implementation of the programmable FPGAs on the TELL1 boards, which include noise reductive algorithms and zero suppression. I will present the VeLo detector, EPFL's contribution to this project and in addition the recent bit-perfect emulation of the FPGA algorithms, based on noise data and first tracks, which has verified the functionality of the FPGAs; an invaluable result for the validation of the detector's readout prior to the first LHC collisions.

15:00	**323**	**Alignment of the LHCb Silicon Tracker using LHC beam injection data** *Christophe Salzmann, Physik Institut der Universität Zürich, Winterthurerstrasse 190, 8057 Zürich, Switzerland* The LHCb experiment is one of the four main detectors at the Large Hadron Collider (LHC) located at CERN and is primarily designed to study CP violation and rare decays of B hadrons. It is a single-arm, forward spectrometer with planar subdetectors. The tracking system consists of four subdetectors of which three are silicon detectors (Vertex Locator, Tracker Turicensis and Inner Tracker). An accurate spatial alignment of the tracking stations is essential to ensure precise track and vertex reconstruction. First alignment results of the silicon tracking system will be presented. They were obtained using data taken during the LHC beam injection tests in 2008.
15:15	**324**	**Time resolution limits of Multi Wire Proportional Chambers** *Lukas Gruber [1], Burkhard Schmidt [2], Werner Riegler [2]* *[1] Atominstitut TU Wien / CERN, 01280 Prevessin-Moens, France* *[2] CERN, 1211 Genève 23, Switzerland* The LHCb Muon System is composed of 1380 Multi Wire Proportional Chambers (MWPC). The chambers consist of a wire plane with 2 mm wire spacing, symmetrically placed in a 5 mm gas gap between two cathode planes. To achieve the required efficiency and time resolution, the chambers have to be operated at the lowest possible threshold. Measurements performed on the chambers in the last few years are compared with a complete simulation. The simulation agrees well with these measurements and allows the individual time resolution limiting parameters such as ionization fluctuations, cluster position fluctuations, gas gain fluctuations, diffusion and electronics noise to be studied, to find out how these parameters contribute to time resolution and therefore affect the threshold settings. The Simulation is pushed further to point out the theoretical limit of time resolution of MWPCs with this geometry.
15:30	**325**	**Strange baryon production at LHCb** *Mathias Knecht, EPFL, SB IPEP LPHE1, 1015 Lausanne, Switzerland* We present a study of the measurement of the Lambda and anti-Lambda production within LHCb, a dedicated b-physics experiment at LHC. This is expected to be one of the first measurements achievable with approximately 100 million minimum bias events collected in the early phase of the experiment. The hadronization process responsible for strange baryon production is not yet fully understood. Current phenomenological models tuned on Tevatron data show divergences when extrapolated to LHC energies. Since LHCb is covering an angular region complementary to the other LHC detectors, such measurements will provide valuable input for understanding the hadronization and fragmentation models, and tuning the MC generators used by all LHC experiments. This work will also provide a starting point for the study of multistrange baryon production, as well as measurements in the heavy-flavour baryon sector.

15:45 **swaps time-slot with 367**	**326**	**The new Silicon Vertex Detector (SVD) for the Belle II Experiment** *Manfred Valentan, Thomas Bergauer, Marko Dragicevic, Markus Friedl, Christian Irmler, Manfred Pernicka* *Institute of High Energy Physics Vienna, Nikolsdorfergasse 18, 1050 Vienna, Austria* The Belle experiment at the KEK-B collider in Tsukuba, Japan, has been in operation since 1999. Both machine and detector will be upgraded between 2010 and 2013, aiming at an ultimate luminosity increase by a factor of 40 compared to the present peak rate. The Institute of High Energy Physics (HEPHY) was already involved in the construction of the present Silicon Vertex Detector and will take the lead role in the upgrade of both the detector and the readoutelectronics. This scope ranges from the design of the double-sided silicon sensors to the back-end data processing in electronics modules. This talk will shed light on our R&D activities for the Belle SVD upgrade.
16:00		***Coffee Break***
		NUCLEAR AND PARTICLE PHYSICS IV: COLLIDER II (BELLE) & THEORY *Chair: H. Markum, TU Wien*
16:30	**607**	***see session "Solid State Physics"; → go to room C***
17:00	**331**	**B_s^0 branching fractions measurements at Belle** *Remi Louvot* *EPFL-SB-IPEP-LPHE1, Bât. Sc. Phys. UNIL 610, 1015 Lausane, Switzerland* The general-purpose Belle dectector is located at the KEK B factory (Tsukuba, Japan). This asymmetric e^+e^- collider was designed to produce a large number of B^0 and B^+ meson pairs by running at a center-of-mass energy near the $\Upsilon(4S)$ resonance ($\sqrt{s} \approx 10.58$ GeV). By increasing the energy above the $B_s^0 \bar{B}_s^0$ threshold, the large potential of the B factories for exploring the poorly-known B_s^0 meson was quickly demonstrated. So far, the Belle detector have accumulated more than 50 fb^{-1} at the $\Upsilon(5S)$ energy ($\sqrt{s} \approx 10.87$ GeV) representing ~3 millions of B_s^0 pairs. This represents 99 % of the world's sample at this energy. The study of the B_s^0 is of high interest and the Belle sample, where the number of produced B_s^0 is accessible, is a unique chance to measure precisely an absolute branching fraction. The measurement of five B_s^0 branching fractions using the first 23.6 fb^{-1} of data will be described, and prospects for improving the precision through a better normalization will be discussed. The full reconstruction of a clean $B_s^0 \to D_s^- \pi^+$ sample (161±15 events) provided the current most precise measured B_s^0 branching fraction. Additionally, the B_s^* and B_s^0 masses and the B_s^0 production-mode fractions were also measured. A 3.5 σ evidence for its Cabibbo-suppress counterpart $B_s^0 \to D_s^{\mp} K^{\pm}$ was obtained. This analysis was recently extended to three other dominant modes including photons in their final states and led to the first observations of the $B_s^0 \to D_s^{*-} \pi^+$, $B_s^0 \to D_s^- \rho^+$ and $B_s^0 \to D_s^{*-} \rho^+$ modes.

17:15	**332**	**Measurements of the Cabbibo-Kobayashi-Maskawa matrix element $\|V_{cb}\|$ at Belle** *Wolfgang Dungel, Christoph Schwanda* *Institute for High Energy Physics, Austrian Academy of Siences, Nikolsdorfergasse 18, 1050 Wien, Austria* One of the main aims of pyhsics analysis at the Belle experiment is the investigation of the CKM mechanism of CP violation. Semileptonic decays of B mesons offer an excellent environment for the determination of the CKM matrix elements. Decays of the kind B → D* l ν have been investigated for both neutral and charged B mesons. Using a parametrization scheme, values of $\|V_{cb}\|$ and the form factors of these decays can be measured. Additionally, a model independent determination of the form factor shapes provides a cross check for the dependability of the parametrization.
17:30	**333**	**QCD phases with functional methods** *Mario Mitter, Tina K. Herbst, Bernd-Jochen Schäfer, Reinhard Alkofer* *Univ. Graz, Institut für Theoretische Physik, Universitätsplatz 5, 8010 Graz, Austria* The different phases of Quantum Chromodynamics (QCD) as well as their corresponding phase transitions are investigated with functional methods such as the Functional Renormalization Group (FRG), Dyson-Schwinger Equations (DSEs) and the n-PI action. We comment on the applicability of the different techniques as well as relations between them. An outlook for future studies is given.
17:45	**334**	**Non-commutative quantum field theory - physics at very small distances** *Arnold Rofner, Manfred Schweda, Daniel Blaschke, René Sedmik* *Institute for Theoretical Physics, Vienna University of Technology, Wiedner Hauptstrasse 8-10, 1040 Vienna, Austria* As of today, there are no indications, that at small distances space time behaves in the same manner we are used to. Indeed, a granular structure of space time could be expected, which would naturally lead to a consistent combination of quantum field theories and gravity. Motivated by this fact, numerous models of quantum field theories using non-commuting space-time coordinates have been studied in recent years. In order to guarantee physical significance such theories have to be renormalisable, i.e. one should be able to control the divergences appearing in loop integrals in a consistent manner. Yet, so far only some non-commutative scalar models in Euclidean space have been found to be renormalisable. In a recent letter, however, we proposed a promising candidate for a renormalisable non-commutative U(1) gauge field model in Euclidean space, which is a first and important step towards non-commutative theories relevant for particle physics.

18:00	**335**	**3D gravity and holography** *Daniel Grumiller [1], Roman Jackiw [2], Niklas Johansson [3]* *[1] Institute for Theoretical Physics, Vienna University of Technology, Wiedner Hauptstr. 8-10/136, 1040 Vienna, Austria* *[2] Center for Theoretical Physics, Massachusetts Institute of Technology, 77 Massachusetts Avenue, 02139 Cambridge, United States* *[3] Institute for Theoretical Physics, Uppsala University, Box 256, 75121 Uppsala, Sweden* Gravity in three dimensions strikes a balance between models that are tractable and models that are relevant in Nature. It may exhibit black hole solutions, graviton modes and asymptotically Anti-deSitter solutions that may have holographic CFT duals. I review some of the recent progress in this field, with focus on quantum gravity.
18:15	**336**	**Matrix Models, Emergent Gravity and Gauge Theory** *Harold Steinacker* *Fakultät für Physik, Universität Wien, Boltzmanngasse 5, 1090 Wien, Austria* A mechanism for 4-D gravity emerging from Yang-Mills matrix models is discussed. The matrix model describes space-time as noncommutative brane, which in the semi-classical limit acquires an effective metric. Nonabelian gauge fields and gravitons arise as space-time fluctuations. This leads to an emergent gravity intimately related to a quantum structure of space-time. The quantization is discussed qualitatively, which singles out the IKKT model as a candidate for a quantum theory of gravity coupled to matter. Cosmological solutions and a mechanism for avoiding the cosmological constant problem are discussed.
18:30	**337**	**On the collision of two shock waves in AdS(5).** *Maximilian Attems, Institute for Theoretical Physics, Vienna University of Technology; Wiedner Hauptstrasse 8-10/136, 1050 Wien, Austria* Gravitational shock waves in anti-de Sitter space-time may describe colliding heavy ions while the precise holographic dual to QCD is still missing. Black hole formation in collisions of dual of the nuclei in the bulk is interpreted as formation of a quark-gluon plasma. Studies of a high energy particle collision in a strongly coupled gauge theory are aimed to understand the early thermalization in the RHIC heavy ion experiments.
18:45		***FAKT Geschäftssitzung***
19:00		***END***

Time	ID	NUCLEAR AND PARTICLE PHYSICS V: LOW AND MEDIUM ENERGY I *Chair: C. Petitjean, PSI Villigen*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	421	***see session "Astrophysics"; ➔ go to room B***
14:30 time-slot used by 473	341 cancelled	see below
14:45	342	see below

14:30 — 341 — time-slot used by 473 — cancelled

~~Antiproton magnetic moment determined from the HFS of antiprotonic helium~~

~~*Thomas Pask, Eberhard Widmann, Beralan Juhasz, Susanne Friedreich, Oswald Massiczek*~~
~~*SMI, Boltzmanngasse 3, 1050 Vienna, Austria*~~

~~We report a determination of the antiproton magnetic moment, measured in a three-body system, independent of previous experiments [1]. We present results from a systematic study of the hyperfine (HF) structure of antiprotonic helium [2-3] where we have achieved a precision more than a factor of 10 better than our first measurement [4]. A comparison between the experimental results and three-body quantum electrodynamic (QED) calculations [5] leads to a new value for the antiproton magnetic moment $\mu_s^{\bar{p}} = -2.7862\ (83)\ \mu_N$, which agrees with the magnetic moment of the proton within $2.9 \cdot 10^{-3}$.~~

~~[1] T. Pask et al. arXiv:0905.0545v1.~~
~~[2] T. Yamazaki, N. Morita, R. S. Hayano, E. Widmann, J. Eades, Phys. Rep. 366 (2002) 183-392.~~
~~[3] R. S. Hayano, M. Hori, D. Horv'ath, and E. Widmann, Rep. Prog. Phys. 70 (2007) 1-71.~~
~~[4] E. Widmann et al. Phys. Rev. Lett. 89 (2002) 243402.~~
~~[5] V. Korobov and D. Bakalov, J. Phys. B 34 (2001) L519.~~

14:45 — 342

Preparations for HFS Spectroscopy of Antiprotonic ^3He

Susanne Friedreich, Oswald Massiczek, Thomas Pask, Eberhard Widmann,
Stefan-Meyer-Institut für subatomare Physik, Boltzmanngasse, 3, 1090 Vienna, Austria

Antiprotonic Helium (pHe) is a neutral exotic atom, consisting of a Helium nucleus, an electron and an antiproton. The interactions of the angular momenta and spins of its constituents cause splitting within the principle states.
The measured transition frequencies between hyperfine levels can be compared with three-body QED calculations as a test of the theory. Previous measurements have been performed on p^4He [1],[2]. The next two years will be dedicated to measuring a similar transition within p^3He. Due to the additional coupling to the helion spin, it consists of an octuplet of states instead of a quadruplet.
A new microwave cavity has been designed and is being constructed for the transition frequency of 11.14 GHz. This cavity has been simulated using the high frequency structure simulator HFSS to obtain the correct cavity dimensions. A new cryostat to cool the target is under construction. Numerical simulations are also in progress.

[1] E. Widmann, J. Eades, T. Ishikawa, J. Sakaguchi, T. Tasaki, H. Yamaguchi, R. S. Hayano, M. Hori, H. A. Torii, B. Juh·sz, D. Horváth, Yamazaki. Hyperfine Structure of Antiprotonic Helium Revealed by a Laser-Microwave-Laser Resonance Method, Phys. Rev. Lett. 89 (2002) 243402
[2] T. Pask, D. Barna, A. Dax, R. S. Hayano, M. Hori, D. Horváth, B. Juhász, C. Malbrunot, J. Marton, N. Ono, K. Suzuki, J. Zmeskal, E. Widmann. Collisional Effects on the Antiprotonic Helium Hyperfine Structure Measurement, J. Phys. B: At. Mol. Opt. Phys. 41 (2008) 081008

15:00 | **343**

A New Cryogenic Target and Microwave Cavity for Hyperfinestructure Spectroscopy of Antiprotonic Helium

Oswald Massiczek, Eberhard Widmann, Johann Zmeskal, Bertalan Juhász, Thomas Pask, Susanne Friedreich
Stefan-Meyer-Institut für subatomare Physik, Boltzmanngasse 3, 1090 Wien, Austria

A new cryostat with pulse tube refrigeration and gas-tight microwave cavity with a laser and antiproton window has been designed and built to study the hyperfine structure of antiprotonic Helium-3. The improvements between this and the old system [1] will be explained.

[1] J. Sakaguchi, H. Gilg, R. S. Hayano, T. Ishikawa, K. Suzuki, E. Widmann, H. Yamaguchi, F. Caspers, J. Eades, M. Hori, D. Barna, D. Horvath, B. Juhasz, H. A. Torii, T. Yamazaki, Cryogenic tunable microwave cavity at 13 GHz for hyperfine spectroscopy of antiprotonic helium, Nucl. Instrum. Methods in Phys. Research A 533, 598 (2004).

15:15 | **344**

time-slot used by 408 | **canceled**

~~Measurement of the ground-state hyperfine splitting of antihydrogen~~

~~*Bertalan Juhász, Eberhard Widmann*~~
~~*Stefan Meyer Institute for Subatomic Physics, Boltzmanngasse 3, 1090 Wien, Austria*~~

~~The hydrogen atom is one of the most extensively studied atomic systems, therefore its antimatter counterpart, the antihydrogen atom, is an ideal laboratory for studying the CPT symmetry. The ASACUSA collaboration at CERN's Antiproton Decelerator (AD) plans to measure the antihydrogen ground-state hyperfine splitting (GS-HFS) in an atomic beam apparatus similar to the ones which were used in the early days of hydrogen hyperfine spectroscopy. This method has the advantage that antihydrogen atoms of temperatures up to 150 K can be used. Simulations showed that with such an experiment a relative accuracy of ~10^{-7} can be reached. According to a theoretical model, however, it is not the relative precision of a measurement but its absolute precision on the energy scale which matters when doing a CPT test. Thus a measurement of the 1.42 GHz GS-HFS with a relative accuracy of only 10^{-4} can already be competitive to the measured relative mass difference of 10^{-18} between K^0 and $\bar{K}^0$, which is often quoted as the most precise CPT test so far.~~

15:30 | **345**

Measurement of antimatter gravity with antihydrogen atoms in the AEgIS experiment

Christian Regenfus
University of Zürich, CERN, PH/UCM , Bat.15 R-031, 1211 Genève, Switzerland

The AEgIS experiment at CERN (Antihydrogen Experiment: Gravity, Interferometry, Spectroscopy) has the primary goal of a first measurement of the gravitational interaction of pure antimatter to a precision of 1%, by applying techniques from

		particle and atomic physics, laser spectroscopy and interferometry to a beam of antihydrogen atoms. The recently approved experiment will be set up at the CERN Antiproton Decelerator and is currently in the phase of planning and development of individual experimental components.
15:45	**346**	**Kaonic X-ray experiments at DAFNE** *Michael Cargnelli, Stefan Meyer Institut der ÖAW, Boltzmanngasse 3, 1090 Wien, Austria, on behalf of the SIDDHARTA collaboration* We study the antikaon-nucleon interaction by measuring its influence on the kaonic hydrogen and deuterium X-ray transition energies. From the shift and width the isospin-dependent antikaon-nucleon scattering lengths can be derived, which are essential for the understanding of chiral symmetry breaking in the strangeness sector. Within the SIDDHARTA project new X-ray detectors were developed. We are using an array of large area silicon drift detectors (SDDs) having excellent energy resolution and providing timing capability which results in a drastic suppression of background. In the presentation the status of the currently running experiment will be reported.
16:00		***Coffee Break***
		Nuclear and Particle Physics VI: Low and Medium Energy II (UCN) *Chair: C. Regenfus, Uni Zürich*
16:30	**607**	***see session "Solid State Physics"; ➔ go to room C***
17:00	**351**	**Results from R&D experiments for building a new ultracold neutron source at PSI.** *Manfred Daum, TU München, Paul-Scherrer-Institut, WMFA/CON 60, 5232 Villigen, Switzerland, on behalf of the PSI UCN Project* In the framework of building a new and very intense ultracold neutron source at PSI, several R&D experiments have been performed, e.g., (i) determination of the material optical potential of solid deuterium, (ii) determination of the neutron velocity distribution from a superthermal solid deuterium UCN converter, (iii) determination of the transmission probability of UCN through thin aluminium alloy and Zircaloy foils, and (iv) determination of the material optical potential of diamond-like carbon (DLC). The results and their impact on the design of the PSI UCN source are reported at the conference.
17:15	**352**	**The ultracold neutron source at the Paul Scherrer Institut: cool-down soon!** *Bernhard Lauss, Paul Scherrer Institut, WMSA - B13, 5232 Villigen-PSI, Switzerland, on behalf of the PSI UCN Project* The Paul Scherrer Institut is constructing a source for ultracold neutrons with the goal of surpassing by a factor of ~100 the current ultracold neutron densities available for fundamental research such as the search for a neutron electric dipole moment. The source is based on neutron production via spallation of protons on lead followed by neutron thermalization in heavy water and cooling in a solid deuterium crystal. Commissioning of the source is scheduled for fall 2009. The working principle, present status and path towards first cool-down will be presented.

17:30 | **353**

Development of a Monitoring System for the Ultra-Cold Neutron (UCN) Source at PSI

Leonard Göltl,
Paul Scherrer Instiute, WMSA B14, 5232 Villigen, PSI, Switzerland,
on behalf of the PSI UCN Group.

At the Paul Scherrer Institute (PSI) in Villigen, Switzerland, the construction of a high intensity ultra-cold neutron source is nearing completion. It uses a 1.3 MW proton beam for the production of neutrons in a spallation target. After moderation the UCN enter a ~2 m^3 storage volume inside a biological shield. From there they can be transported to the experiments via UCN guides.
A detection system is being developed to monitor the UCN density inside the storage volume. The system will have to withstand a very high neutron and gamma radiation level of up to 13 MGy/y. The detector will have to operate in a clean vacuum and at a temperature of ~60 K. Furthermore, the detection system has to be small in order not to decrease the UCN storage properties of the storage volume substantially. The detector is based on a 1-2 mm^2 ^{6}Li-glass scintillator which is read out by a Geiger-Mode APD at the end of a 5 m long quartz light guide.
An overview of the ongoing development work will be presented.

17:45 | **354**

A New Experiment Searching for the Neutron Electric Dipole Moment

Andreas Knecht,
Paul Scherrer Institut, WMFA/C11, 5232 Villigen PSI, Switzerland,
for the nEDM collaboration

Neutron Electric Dipole Moment (EDM) experiments provide tight constraints on extensions to the Standard Model, which attempt to elaborate the mechanisms of CP violation. The latest result set the upper limit for the neutron EDM to 2.9×10^{-26} ecm.
Here, the new nEDM experiment being set up at the Paul Scherrer Institut is presented. Measurements are expected to start in spring 2010 with a sensitivity of 5×10^{-27} ecm. A new and improved apparatus will, at a later stage, yield an additional increase in sensitivity down to 5×10^{-28} ecm.

18:00 | **355**

The mercury co-magnetometer in the nEDM-experiment

Marlon Horras, Paul Scherrer Institut, Hauptstr. 60, 4455 Zunzgen, Switzerland

An experiment searching for the neutron electric dipole moment is currently set up by an international collaboration at the new ultracold neutron source at the Paul Scherrer Institut, Switzerland.
In order to control the magnetic field, an external field compensation system together with a 4-layer magnetic shield is used. Additionally, the magnetic field inside the storage chamber is measured by a mercury co-magnetometer. With the expected increase in sensitivity due to the increased UCN-densities, it has become essential to also improve the mercury co-magnetometer. The working principle and the planned improvements for the mercury co-magnetometer will be presented.

18:15	**356**	**Fast adiabatic spin flipper for ultra-cold neutrons in combination with a superconducting polarizer magnet.** *Edgard Pierre, Geza Zsigmond* *Paul Scherrer Institut, WMSA B15, 5232 Villigen PSI, Switzerland,* *for the nEDM collaboration* An international collaboration building the nEDM experiment at PSI Switzerland is searching for the neutron electric dipole moment. The latter, if found, would represent a new signature of CP violation beyond the Standard Model. This high precision measurement needs a polarized ultra-cold neutron (UCN) beam as input. A superconducting magnet (SCM) in the beamline is used to polarize the UCN. Downstream of the polarizer, a spin flipper allows to select the spin state sent to the experiment. The adiabatic fast passage radio-frequency spin flipper operates in the external magnetic field gradient of the SCM polarizer. The method for achieving 100% spin flip efficiencies will be explained, supported by experimental results obtained recently at the UCN source at ILL Grenoble.
18:30	**357**	**Berry Phase in Entangled Systems:** **A Single-Neutron Interferometer Experiment** *Stephan Sponar [1], J. Klepp [1], R. Loidl [1], S. Filipp [1], K. Durstberger-Rennhofer [1], R. A. Bertlmann [2], G. Badurek [1], Y. Hasegawa [1], H. Rauch [3]* *[1] Atominstitut der Österreichischen Universitäten, Stadionallee 2, 1020 Vienna, Austria* *[2] Faculty of Physics, University of Vienna,, Boltzmanngasse 5, 1090 Vienna, Austria* *[3] Institut Laue-Langevin, B.P. 156, 38042 Grenoble Cedex 9, France* We have observed the influence of the geometric phase on a Bell measurement, expressed by the Clauser-Horne-Shimony-Holt (CHSH) inequality, of a spin-path entangled neutron state in an interferometric setup, as proposed by Bertlmann et al. in (Phys. Rev. A 69, 032112 (2004)). It is experimentally demonstrated that the effect of the geometric phase can be balanced by a change in the Bell angles. Two schemes, polar and azimuthal adjustment of the Bell angles, are realized and analyzed in detail. The value of the S function always exceeds the boundary between quantum mechanic and local realistic theories.
18:45		***END***

Time	ID	NUCLEAR AND PARTICLE PHYSICS VII: COLLIDER III (CMS I) *Chair: M. Krammer, Österr. Akademie der Wissenschaften*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	361	**Status of the CMS experiment at the Large Hadron Collider** *Vincenzo Chiochia* *University of Zürich, PH Division - CERN, 1211 Geneve 23, Switzerland* The status of the CMS experiment is described. After a brief review of the detector design and construction of the Compact Muon Solenoid (CMS) experiment, the installation of its subsystems and the general commissioning strategy is presented. Particular emphasis is made on the performance measured with cosmic muons prior and after the collision data-taking and on the observation of the first beam events. Finally the talk will focus on the readiness of CMS for the exciting prospect of early physics measurements.
14:30	362	**Event selection by the trigger of the CMS experiment at CERN's LHC accelerator** *Christian Hartl [1], Claudia-Elisabeth Wulz [2], Anton Taurok [2], Janos Eroe [2], Ivan Mikulec [2], Manfred Jeitler [2], Herbert Bergauer [2], Vasile Mihai Ghete [2], Barbara Neuherz [2], Kurt Kastner [2], Michael Padrta [2], Thomas Schreiner [2], Florian Teischinger [2], Thomas Themel [2], Josef Strauss [2], Philipp Wagner [2], Bernhard Arnold [2], Markus Eichberger [2], Herbert Rohringer [2], Gregor Kasieczka [2], Franz Mittermayr [2]* *[1] CERN, route de Meyrin, Geneva 23, 1211 Geneva, Switzerland* *[2] Institute of High Energy Physics, Nikolsdorfergasse 18, 1050 Vienna, Austria* Large Collider Experiments such as the Compact Muon Solenoid at the LHC are characterized by high luminosity and thus high event rates. Every 25 ns two proton bunches (consisting of billions of protons) will collide ("bunch crossing"). Event data are registered every 25 ns and stored in a pipeline for 3.2 microseconds. To find the rare events of "New Physics" an efficient filter is needed. In CMS, this "trigger" consists of two stages. The Level-1 trigger, important parts of which have been developed and built by Austria's Institute of High Energy Physics (HEPHY), is implemented in hardware and uses only part of the detector data to reduce the readout rate from 40 MHz to 100 kHz. The second stage, the High-Level trigger, uses all the detector data for these pre-selected events to further reduce the rate. Finally, data are permanently stored at a rate of no more than 100 events per second. HEPHY developed the hardware and software for several fundamental components of the Level-1 trigger, such as the Drift Tube Track Finder, the Global Muon Trigger, and the Global Trigger, which calculates in parallel up to 128 "algorithms" based on all muon and calorimeter data. A selection of these algorithms, the "trigger menu", is used to decide every 25 ns if the complete data from this bunch crossing are read out or if they are discarded. The Trigger Control System then distributes

		trigger signals subject to rules for limiting the rate and based on the state of the various subsystems. The trigger system was continually used and successfully tested in CMS-wide efforts to commission the detector with data originating from cosmic radiation as well as from the first LHC beam.
14:45	**363**	**Application of the Kalman Alignment Algorithm to the CMS Tracker** *Edmund Widl, Rudolf Frühwirth* *Institut für Hochenergiephysik, Nikolsdorfer Gasse 18, 1050 Wien, Austria* One of the main components of the CMS experiment is the Silicon Tracker. This device, designed to measure the trajectories of charged particles, is composed of approximately 16,000 planar silicon detector modules, which makes it the biggest of its kind. However, systematical measurement errors, caused by unavoidable inaccuracies in the construction and assembly phase, reduce the precision of the measurements drastically. The geometrical corrections that are therefore required should be known to an accuracy that is better than the intrinsic resolution of the detector modules, such that the use of special alignment algorithms is mandatory. The Kalman Alignment Algorithm is a novel approach to extract a set of alignment constants from a sufficiently large collection of recorded particle tracks, and is suited even for a system as big as the CMS Tracker. To show that the method is functional and well understood, and thus suitable for the data-taking period of the CMS experiment, two significant case studies are presented and discussed.
15:00	**364**	**Vertex reconstruction and b-jet identification in CMS** *Wolfgang Waltenberger, Wolfgang Adam* *HEPHY Wien, Nikolsdorfergasse 18, 1050 Wien, Austria* Reconstruction of interaction vertices is an essential step in the reconstruction chain of a modern collider experiment such as CMS; the primary ("collision") vertex is reconstructed in every event within the CMS reconstruction program, CMSSW. However, the task of finding and fitting secondary ("decay") vertices also plays an important role, in particular for the decay of B-hadrons. In this application they constitute an important building block in the identification of b-jets, which is essential for a wide range of physics analyses. A vertex finding algorithm based on an adaptive vertex fitter and different algorithms for b-jet identification are presented.
15:15	**365**	**Inclusive Beauty Production at CMS** *Lea Caminada, ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* The study of heavy quark production will be an important research area at the Large Hadron Collider (LHC). B-hadrons will be produced with a large cross section at a yet unreached center-of-mass energy, enabling precision measurements to improve our understanding of b-quark physics. One of the first challenges after LHC startup will be the measurement of the inclusive b-quark cross section. The prospects for a measurement of the differential b-quark cross section using the semileptonic decay of b-quarks into muons and jets will be presented. The study is based on realistic simulations of the CMS detector including systematic effects and shows the potential for an analysis of the inclusive b-quark production at CMS in the very first LHC data.

15:30	**366**	**Study of Beauty Production using Secondary Vertices in CMS** *Lukas Wehrli, Christophorus Grab, Andrea Rizzi* *ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* At the Large Hadron Collider (LHC), beauty quarks will be predominantly produced in pairs through strong interaction. Predictions based on perturbative QCD calculations at the next-to-leading order describe the overall features of beauty production, but did not accurately describe the observed single quark production cross section at previous machines. Understanding the beauty production in detail is on the other hand a crucial ingredient for a discovery of new physics, because it will be one of the main sources of background processes for many high precision searches. In this study the long lifetime of the B hadron and the excellent tracking detector of the CMS experiment are exploited to tag one or even two B hadrons in QCD jets. Studies on B/Bbar correlations to gain more insight into the details of the beauty production mechanism are presented.
15:45 **swaps time-slot with 326**	**367**	**Search for Supersymmetry with the CMS experiment** *Robert Schöfbeck* *Institute for high energy physics, Nikolsdorfergasse 18, 1050 Wien, Austria* The CMS experiment at the Large Hadron Collider at CERN is preparing for the first proton-proton collision data, expected for the end of 2009. One of the primary topics will be the search for supersymmetry, one of the best studied candidates for physics beyond the standard model. The talk will give an overview of the search strategies developed in CMS with an emphasis on topologies containing jets, leptons and missing energy.
16:00		***Coffee Break***
		NUCLEAR AND PARTICLE PHYSICS VIII: COLLIDER IV (CMS II & HERA) *Chair: M. Weber, Uni Bern*
16:30	**451**	***see session "Astrophysics"***
17:00	**371**	**Search for Supersymmetry signatures with CMS detector in events with two same-sign electrons** *Predrag Milenovic* *ETH Zürich, CERN, Physics Department, Route de Meyrin 385, 1211 Geneva, Switzerland* Generic signatures of supersymmetry with R-parity conservation include same-sign isolated dielectron pairs, accompanied by energetic jets and missing transverse energy. The detection of these signatures relies on the observation of an excess of events over Standard Model background expectations. In this study we present different methods to control and estimate Standard Model backgrounds for same-sign dielectron final states. The study is performed for several mSUGRA benchmark points, with the full simulation of the CMS detector and for an integrated luminosity of 200 pb^{-1}.

17:15	**372**	**Jet veto systematics in the WW decay channel of the Higgs boson search with the CMS experiment** *Thomas Punz, ETH Zürich, Schafmattstrasse 20 , 8093 Zürich, Switzerland* The $t\bar{t}$ production is contributing a large fraction of the background in the WW channel. It can be drastically reduced with a jet veto. Therefore detailed studies of the jet systematics of the $t\bar{t}$ pair production and the impact on the Higgs search are needed and will be discussed. These studies have been carried out using a detailed Monte Carlo simulation of the detector response.
17:30	**373**	**Hadronic Event Shapes at CMS** *Matthias Weber* *ETH Zürich, Institute For Particle Physics, c/o CERN, PH Department, 1211 Geneva 23, Switzerland* In this presentation, a study of hadronic event shapes in QCD events at the Large Hadron Collider (LHC) is shown. The study is based on a Geant detector simulation of the Compact Muon Solenoid (CMS) detector. Calorimetric jet momenta, determined by the KT jet clustering algorithm, are used as input for calculating various event-shape variables, which probe the structure of the hadronic final state. It is shown that the normalized event-shape distributions are robust under variations of the jet energy scale and resolution effects, which makes them particularly suitable for early data analysis and tuning of Monte Carlo models.
17:45	**374**	**Preparation of a $W^{\pm}$-boson measurement using the CMS detector at the Large Hadron Collider and implications** *Wieland Hintz, Michael Dittmar* *ETH Zürich, CERN PH Department, Bldg 32/3-C21, 1211 Genève 23, Switzerland* The W±-boson in its leptonic decay channel $W^{\pm} \rightarrow e^{\pm}\nu$ has cross-section of 12 nb at the Large Hadron Collider at 10 TeV center of mass energy. With only a few pb^{-1} integrated luminosity one can find a clean sample of several ten thousands of these events using the CMS detector and measure their kinematics in detail. We present a $W^{\pm}$-boson analysis with emphasis on the electron identification and the reduction of the high QCD background. The simulated spectra of the W^{+}s' and W^{-}s' transverse momentums and rapidities are shown and their possible implications for the parton distribution functions of protons are briefly discussed. Finally, we point out the possible background from $W^{\pm}$ + Jets events for the Higgs-boson search in the $W^{+}W^{-}$ decay channel and for a Higgs mass of 155-180 GeV.

18:00	**375**	**Data analysis for the CMS experiment in the petabyte range at the Vienna Tier-2 centre** *Natascha Hörmann, Dietrich Liko, Gerhard Walzel* *Institute of High Energy Physics (HEPHY) of the Austrian Academy of Sciences, Nikolsdorfer Gasse 18, 1050 Vienna, Austria* High energy physics is exploring the nature of particles, which form our universe. The experiments at the LHC accelerator at CERN will deliver new insights on these fundamental questions. The search for new particles, like the higgs boson or supersymmetric particles is a central aim of these experiments. It is an enormous challenge for the data analysis to find the expected signal events out of the huge amount of data, which is in the petabyte range. The CMS experiment at CERN will use for this purpose a network of worldwide distributed Tier-2 centres, building up a worldwide grid. In the scope of the AustrianGrid project such a centre was built up at the Institute of High Energy Physics. With the start of data taking at the experiments in the autumn of this year the Vienna Tier-2 centre will reach its nominal size. The workflow and the tremendous computing challenge in searching signals for new physics within data in the petabyte range will be discussed.
18:15	**376**	**CMS Upgrade and new Challenges to Radiation Hardness of Silicon Detectors** *Georg Auzinger, T. Bergauer, M. Dragicevic, J. Hrubec, W. Kiesenhofer, M. Krammer, S. Haensel, Institute of High Energy Physics (HEPHY), Nikolsdorfergasse 18, 1050 Wien, Austria* As in September 2009 the LHC is finally scheduled to start operation, we are already involved in developing new strategies for the upcoming SLHC / CMS upgrade. The increased luminosity of this machine leads to higher particle rates that pose new requirements to the radiation hardness of silicon detectors as used in the tracker of CMS. Different sensor materials like magnetic Czochralski and epitaxial silicon will be compared to the standard float zone silicon, including different technologies (i.e. n strips in n bulk, n strips in p bulk). The ideal silicon sensor has to be found in terms of radiation tolerance and other characteristics that have to be studied after irradiation up to expected SLHC fluences. To prevent radiation damages from annealing ("healing" by diffusion etc.) during measurement, we designed and built an extension to our measuring unit with the capability of cooling silicon sensors that also allows heating to study beneficial annealing. This presentation will give an overview on the design and realisation of this unit and its capabilities along with an outlook on the tasks it will be used for.

18:30	**377** c a n c e l l e d	**Measurement of the photoproduction of b-quarks at threshold at HERA** *Michel Sauter, ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* The cross section of $b\bar{b}$ photoproduction at threshold is measured using the H1 detector at HERA. Events containing b-quarks are identified by exploiting the semileptonic decay $b\bar{b} \rightarrow ee\,X$. The analysis is based on data collected in the year 2007 with a dedicated low energy trigger, which combines track (Fast Track Trigger) and calorimeter information (Jet Trigger). With this new trigger events containing electrons at energies as low as 1.2 GeV were recorded. This allows for the study of b-quark production at low transverse momentum, comparable to the b-quark mass. The photoproduced b-quarks cross section is presented as function of the transverse momentum of the b quark and compared to predictions.
18:45		***END***
19:30		***Conference Dinner***

Time	ID	ASTRO- AND PARTICLE PHYSICS I: *Chair: S. Schindler, Uni Innsbruck*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	361	***→ go to room B***
14:30	441 - 446	***see session "Astrophysics"; → go to room F***
16:00		***Coffee Break***
		NUCLEAR AND PARTICLE PHYSICS IX: LOW AND MEDIUM ENERGY III *Chair: M. Daum, PSI Villigen*
16:30	451	***see session "Astrophysics"; → go to room B***
17:00	381	**Target Pulse Shape Analysis for the PEN Experiment** *Anthony Palladino, Paul Scherrer Institute, PSI, 5232 Villigen PSI, Switzerland* The experimental determination of the $\pi^+ \rightarrow e^+\nu$ (π_{e2} decay) branching ratio is one of the best tests of lepton universality (the three lepton generations having equal coupling strength to the weak boson). The PEN experiment at PSI aims to measure this branching ratio with an order of magnitude improvement in the uncertainty, reaching $\Delta B/B \leqslant 5 \cdot 10^{-4}$. The PEN detector system covers a ~3π steradian solid angle and features a pure CsI spherical calorimeter. A critical element of the data analysis requires distinguishing $\pi \rightarrow e$ events from the $\pi \rightarrow \mu \rightarrow e$ decay chain in the active target. The target signal is recorded at 2 Gsamples/s with a waveform digitizer. Due to the pion's short lifetime of 26 ns, most events contain pulses which overlap. An analysis program was designed using a modified χ^2 objective function to distinguish between the two different decay types with a high efficiency extraction of closely spaced peaks. The peak to peak (or overlapping pulse) separation methods and their relative merits will be discussed. This waveform information will play a crucial role in the subsequent maximum likelihood analysis and the determination of the branching ratio.
17:15	382	**FAST experiment at PSI** *Samuel De Laere* *University of Geneva, 24, Quai Ernest-Ansermet, 1211 Genève 4, Switzerland* The Fibre Active Scintillator Target (FAST) experiment at the Paul Scherrer Institute (PSI) is designed to measure the lifetime of the positive muon to better than 2 ps statistical precision. After including theoretical and experimental systematic uncertainties, this will determine the Fermi constant, GF, to 1 ppm precision. First results based on a sample of 10^{10} events taken 2006, published in April 2008 (Phys. Lett. B 663, 172-180) gave GF = 1.166 352(9) x 10^{-5} GeV^{-2} (8 ppm). This is

		comparable to the world average. With improved detector hardware and tuned online data analysis, a new data sample of 3 x 10^{11} events was collected during 2008. After a preliminary analysis the statistical error on the muon lifetime is already reduced to 3 ppm. To understand the systematic errors and eventually reach the final accuracy of 2 ppm, an additional data set of about the same amount of data will be taken during 2009. An overview of the FAST detector, of the online analysis and of the challenges to reduce the systematics will be presented.
17:30	**383**	**Muon Capture in Hydrogen and Deuterium** *Claude Petitjean, Paul Scherrer Institut, OFLC/005, 5232 Villigen PSI, Switzerland, for the collaborations Mucap and Musun* The Mucap and the Musun collaborations are conducting at PSI high precision muon lifetime measurements in Hydrogen and Deuterium gas to extract the singlet nuclear muon capture rate on the proton and the doublet capture rate of the deuteron, respectively. The goals of these experiments are to determine the induced pseudoscalar coupling constant g_P which is precisely predicted in low energy QCD by chiral perturbation theory, and in the deuteron case the axial two-body current term L_{1A} described by modern field theories which is of astro-physical interest ("calibrating the sun"). The muon-proton capture experiment (Mucap) is in its final evaluation stage. The apparatus with special TPC will be described and the first results presented. For the muon-deuterium measurements (Musun) a new cryo-TPC was designed. It will be described and first test results presented.
17:45	**384**	**Status of the MEG Experiment** *Jeanine Adam, Institute for Particle Physics, ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland, on behalf of the MEG Collaboration* The goal of the MEG Experiment, which is located at the Paul Scherrer Institute (Switzerland), is to measure the branching ratio of the lepton flavor violating decay mu->e+gamma with a sensitivity of 10^{-13}. Photons and positrons from possible mu->e+gamma decays are detected by different subdetector systems. The world's largest liquid Xenon scintillation detector is used to determine energy, position and timing information of photons while an innovative positron spectrometer provides positron information. This spectrometer consists of a superconducting solenoidal magnet to form a gradient magnetic field, a low-mass drift chamber system for precise momentum measurements and a double layer timing counter system providing precision timing measurements of positrons. In 2006 and 2007 commissioning runs were performed whereas during May-Aug 2008 calibrations took place. Since Sep 2008 the MEG Experiment is taking physics data. This talk will focus on the MEG Experiment design, its commissioning and the performance during data taking.

18:00	**385**	**The ArDM, a ton-scale liquid argon experiment for direct Dark Matter detection.** *Polina Otyugova* *University of Zürich, Winterthurerstrasse 190, 8057 Zürich, Switzerland* The ArDM is a 1-ton liquid argon based experiment which aims at the direct detection of Weakly Interacting Massive Particles (WIMPs). The detector is sensitive to the small signals of scintillation light and the ionization charge independently. The sufficient discrimination between nuclear recoils and the background is possible by the ratio of scintillation to ionization and by the different time structure of the scintillation. In the present time the experiment is under construction at CERN. The detector was recently tested being fully filled with Liquid Argon. Promising results on the light yield and on the detector performance were obtained.
18:15	**386**	**Operation of a Double-Phase Pure Argon Large Electron Multiplier Time Projection Chamber** *Filippo Resnati [1], Prof. André Rubbia [1], Andreas Badertscher [2], Leo Knecht [2], Devis Lussi [1], Alberto Marchionni [1], Gustav Natterer [2], Polina Otiougova [3], Thierry Viant [1]* *[1] ETH Zürich & PH Department, CERN, 1211 Geneva 23, Switzerland* *[2] ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* *[3] University of Zürich & PH Department, CERN, 1211 Geneva 23, Switzerland* We constructed and operated a double phase (liquid-vapour) pure argon Large Electron Multiplier Time Projection Chamber (LAr LEM-TPC) of 3 l of active volume, with a sensitive area of 10x10 cm^2 and up to 30 cm of drift length. The LEM is a macroscopic hole electron multiplier built with standard PCB techniques: drifting electrons are extracted from the liquid to the vapour phase and driven into the holes of the LEM where the multiplication occurs and the moving charges induce a signal on the anode and the LEM electrodes. Two multiplication stages in argon vapour provide a gain up to 1000 and the segmented upper face of the upper LEM and anode permit the reconstruction of X-Y spatial coordinates of ionizing events. The TPC is equipped with a Photo Multiplier Tube for triggering the ionizing events and an argon purification circuit to ensure long drift paths. Cosmic muon tracks and source events have been recorded and further characterization of the detector is ongoing. We believe that this proof of principle represents an important milestone in the realization of very large, long drift (cost-effective) LAr detectors for next generation neutrino physics and proton decay experiments, as well as for direct search of Dark Matter with imaging devices.

18:30	**387**	**A prototype liquid Argon Time Projection Chamber for the study of UV laser multi-photonic ionization** *Biagio Rossi, University of Bern - LHEP, Sidlerstrasse 5, 3012 Bern, Switzerland* We present the design, realization and operation of a prototype liquid Argon Time Projection Chamber (LAr TPC) detector. One goal of the prototype is the development of a novel online monitoring and calibration system exploiting UV laser beams. The multi-photon liquid Argon ionization is used to measure the lifetime of the primary ionization in LAr, which is in turn related to the LAr purity level. This technique could be exploited by present and next generation large mass LAr TPCs for which monitoring of the performance and calibration plays an important role. The calibration of the TPC is based on the fact that tracks produced by the laser inside the LAr detector volume have known ionization yield, position and time.
18:45		***END***
19:30		***Conference Dinner***

Time	ID	**Nuclear and Particle Physics X: Collider V (ATLAS I)** *Chair: G. Dissertori, ETH Zürich*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	**391**	**Status of the ATLAS Experiment** *Hanspeter Beck, Universität Bern, Sidlerstr. 5, 3012 Bern, Switzerland* ATLAS is a general-purpose particle physics experiment at CERN in Geneva, to exploit the full discovery potential of the Large Hadron Collider (LHC) accelerator. The primary goals of the experiment are fundamental milestones in particle physics: to investigate a missing piece of the Standard Model, the Higgs boson. The Higgs mechanism, which includes the Higgs boson, is invoked to give masses to elementary particles, giving rise to the differences between the weak force and electromagnetism by giving the W and Z bosons masses while leaving the photon massless. Super-Symmetry, which is the best-studied extension of the Standard Model predicting the existence of a novel symmetry between particles and the carriers of the fundamental forces, and perhaps hints about the existence of extra space dimensions in nature. The ATLAS detector has been under construction for several years, and has been tested extensively throughout 2009 using data from cosmic rays. The LHC accelerator is expected to provide proton collisions in October 2009 at an initial safe energy of 10 TeV or lower. In this talk, the status of the ATLAS Detector, its measured performance from cosmic ray data, and an outlook of the physics program with early data will be given.
14:30	**392** canceled	~~**The ATLAS Computing Model and Central Data Processing at the CERN Tier-0 Centre**~~ ~~*Armin Nairz, CERN, PH/ADP-CO Group, 1211 Genève 23, Switzerland*~~ ~~ATLAS is one of the two large multi-purpose LHC experiments at CERN, now (May 2009) being commissioned for data-taking in Autumn 2009, when the LHC is foreseen to deliver its first collisions.~~ ~~Handling and processing the unprecedented data rates expected at the LHC poses a huge challenge on the computing infrastructure. The ATLAS Computing Model foresees a multi-tier hierarchical model to perform this task, with CERN hosting the Tier-0 centre and associated Tier-1, Tier-2, ... centres distributed around the world. The role of the Tier-0 centre is to perform prompt processing of the raw data coming from the online DAQ system, to archive the raw and derived data and to distribute them to the associated Tier-1 centers. The Tier-0 is already fully functional. It has been successfully participating in all cosmic and commissioning data taking periods since May 2007.~~ ~~The first part of this presentation will give an overview of the ATLAS Computing Model. The second part will describe the Tier-0 system, its data and work flows and operations model, and will review the operational experience gained in the past years.~~

14:45	**393**	**Distributed Data Management in the ATLAS Experiment** *Mario Lassnig, CERN, PH/ADP-DDM 40-3-D16, 1211 Geneva, Switzerland* ATLAS presents data management requirements on an unprecedented scale. Without the advent of grid computing it would be near impossible to process and analyse the vast amounts of data generated by the experiment in a timely manner. We have developed a novel system, DQ2, which has been designed to address these problems and provide scientists easy access to a global distributed grid-storage infrastructure. We present the system's design, discuss its fault tolerance and scalability properties, and describe results from its daily usage in the experiment. We focus on the challenges faced during the last years and describe the solutions we have implemented to accommodate the changing ATLAS requirements. Finally, we anticipate the evolution of distributed data management for the next years as ATLAS moves into the physics analysis phase.
15:00	**394**	**Vertex Reconstruction in the ATLAS Experiment at the Large Hadron Collider at CERN** *Andreas Wildauer, Instituto de Física Corpuscular, Apartado de Correos 22085, 46071 Valencia, Spain* The Large Hadron Collider (LHC) at CERN is designed to collide two proton bunches at an energy of 7 TeV per beam and a rate of 40 million bunch crossings per second. In each bunch crossing, 23 proton-proton interactions are expected on average. While the overwhelming majority of those interactions will result in particles with low energy in the detector, it is the few hard (deep inelastic) interactions that are of great interest for the discovery of new physics. Efficient reconstruction of the primary vertices which stem from the deep inelastic collisions is of great importance for physics analyses at the LHC. In addition, many secondary vertices are created after the collisions due to conversions of photons into electron-positron pairs or decays of unstable particles. These vertices need to be reconstructed with high efficiency in order to enhance the potential of discovering new physics at the LHC. Presented in this contribution are the strategies for vertex reconstruction in the ATLAS experiment at CERN. The algorithms for the reconstruction of primary and secondary vertices are described. The performance of the algorithms has been studied in great detail on Monte Carlo samples and preliminary results are presented.
15:15	**395**	**FATRAS - The ATLAS Fast Track Simulation** *Andreas Salzburger* *DESY & CERN, CERN, mailbox E25620, 1211 Geneva 23, Switzerland* The Monte Carlo simulation of underlying collision physics events and the detector response is an inevitable technique of modern particle physics. Precision studies to be done at the LHC detectors, however, require large event samples to control the statistical error and correctly estimate the background influence. The very detailed detector simulation, nowadays based on common simulation toolkits such as Geant4 is a very CPU cost intensive process and the desired statistics can not be fully done in such a way. To comply with the computing budget of the

		experiments, fast simulation techniques are thus in general needed. In the ATLAS experiment, fast simulation has been for a long time dominated by a very fast parametric approach. Tracking related studies, however, have been not possible in such applications. In the last two years a completely new track simulation program, FATRAS, has been developed that builds together with a fast calorimeter simulation the backbone of the new ATLAS ATLFAST II simulation. FATRAS is a full Monte Carlo simulation based on the reconstruction geometry description and reconstruction modules. It allows to run the full ATLAS reconstruction chain while increasing the execution speed in the simulation step up to a factor of 100. Reasonable good agreement with results from full simulation will be shown as well as calibration techniques aimed to adapt the fast simulation to first collision data.
15:30	**396**	**Calibrating the ATLAS liquid argon calorimeter** *Robert Fröschl, TU Wien / CERN, CERN PH-ADE-CA, 1211 Genève, Switzerland* ATLAS is one of the experiments built to exploit the data created in proton collisions at the Large Hadron Collider. Starting with a short overview of the status of the ATLAS experiment this presentation will outline a calibration strategy for the ATLAS liquid argon calorimeter. After a summary of the results obtained in the combined test beam in summer 2004 for the electron performance of the liquid argon calorimeter, a method for intercalibrating the momentum/energy scales of the inner tracking detector and liquid argon calorimeter will be introduced. The performance of this method is demonstrated for the combined test beam and then extended to ATLAS Monte Carlo simulation with electrons coming from W boson decays. Finally, the intercalibration method is compared to the standard calibration method using electrons from Z boson decays using ATLAS Monte Carlo simulation.
15:45	**397**	**ATLAS calibration with E/p from first data** *Valentina Gallo, Sigve Haug* *LHEP University of Bern, Sidlerstrasse 5, 3012 Bern, Switzerland* The ATLAS experiment at the Large Hadron Collider (LHC) at CERN is a detector designed to explore a very large spectrum of physics issues. The detector has been designed to explore a wide range of new phenomena, e.g. Higgs boson discovery, SUSY and dark matter searches. For this reason the ATLAS electromagnetic calorimeter needs to be able to detect electrons and photons in a large range of energy (from 5 GeV to 7 TeV) with a linearity better than 0.5%. In order to meet this request test beam and hardware calibrations are not enough. These methods are not sensitive to the material in front of the calorimeter, to the high voltage ßuctuation and to the local liquid argon temperature and purity variation. The ATLAS strategy to reach the desired precision is to implement an in-situ intercalibration. The standard intercalibration method uses $Z^0 \rightarrow e^-e^+$ decays, but a comparison between the momentum measurement p from the tracker and the energy E from the calorimeter for isolated electrons can also be used, in particular before there are enough $Z^0 \rightarrow e^-e^+$ events. Here we report on the study of position and shape of the E/p distribution from electrons from heavy ßavours with very early data.
16:00		***Coffee Break***

Time	ID	NUCLEAR AND PARTICLE PHYSICS XI: COLLIDER VI (ATLAS II) & PANDA & THEORY *Chair: L. Widhalm, HEPHY Wien*
16:30	**34**	***Winner of the ÖPG "V.-F. Hess" Award***
16:45	**401**	**Event generator comparison for SUSY discovery potential at the LHC** *Cyril Topfel, LHEP - University of Bern, Sidlerstr. 5, 3012 Bern, Switzerland* The Large Hadron Collider (LHC) will start its operation this fall, opening the path to new physics at an initial centre-of-mass energy of 10 TeV. Supersymmetry is a theory which proposes new heavy particles, the bosonic superpartners of the standard model fermions and fermionic superpartners of the standard model bosons. The search for such new particles is a major goal of the LHC. SUSY theories, however, have large parameter spaces, making it difficult to prepare for specific scenarios. While a generic minimal supersymmetric standard model consists of 105 free parameters, constrained model still have 5 free parameters. We must therefore scan these parameter spaces and generate Monte Carlo simulations for many choices thereof. This is done using a generator program, which in the case of ATLAS is Herwig(Isawig) for SUSY studies. In this talk, a comparison of particle-spectra stemming from supersymmetric events generated using Herwig(Isawig) and Pythia will be presented. It will be shown that the cross-sections need not be the same a priori for different generators, and its impact on the SUSY discovery potential with ATLAS will be highlighted.
17:00	**402**	**Expected Measurements with First Data from the ATLAS Detector** *Emmerich Kneringer, Institute of Astro- and Particle Physics, University of Innsbruck, Technikerstraße 25, 6020 Innsbruck, Austria* When LHC starts this year to collide protons at a centre of mass energy of 10 TeV the ATLAS detector is expected to continuously take data for almost one year. Detailed plans have been set up within the various physics groups of the ATLAS collaboration in order to get interesting physics results out of an expected data sample of 200 pb^{-1} of integrated luminosity. This talk focuses on the physics of B-hadrons and it presents the physics analyses that have been developed in this sector and that will be applied to first collision data.
17:15	**403**	**The ATLAS trigger and data acquisition system** *Claudia Borer, LHEP, University of Bern, Sidlerstrasse 5, 3012 Bern, Switzerland* The ATLAS experiment is one of the four big experiments at the CERN Large Hadron Collider. Protons will collide at a centre of mass energy of 14TeV and at the collision rate of 40MHz, starting in fall 2009. Collisions capable of unveiling new physics beyond the Standard Model are rare and only the 200 most promising events per second will be retained for offline analysis. This reduction of event rate is achieved online via the three stage Trigger and Data Acquisition (TDAQ) system. Each trigger level refines the decisions of the previous level and applies additional selection criteria.

		Here I will discuss the overall design and requirements of the ATLAS TDAQ architecture, with focus on the data-logger system at the end of the data acquisition chain, where events are written into data files and are sent on for first pass reconstruction.
17:30	**404**	**Performance of Electron Triggers based on the Transition Radiation Tracker in the ATLAS Experiment.** *Moritz Backes, Phillip Urquijo* *University of Geneva, 24, Quai Ernest-Ansermet, 1211 Geneve 4, Switzerland* The Large Hadron Collider (LHC) is expected to deliver an interaction rate of ~1 GHz in proton-proton collisions. To select the rare physics processes of interest while reducing the overall rate to ~100 Hz for data storage a three-level trigger system has been designed for the ATLAS experiment. An important signature for many physics analyses envisaged at the LHC are events with electrons in the final state. The electron trigger selection in ATLAS is based on energy deposition clusters in the electromagnetic calorimeter in association with particle tracks from the inner detector. These tracks are generally reconstructed from all components of the inner detector - the pixel detector, the semiconductor tracker (SCT) and the transition radiation tracker (TRT). Electron triggers that use exclusively TRT tracks provide a useful backup to this configuration and can be used to study the performance of the pixel detector and SCT tracking algorithms. This presentation will focus on the performance of TRT-based electron triggers and the determination of suitable selection criteria to keep the event rates within the allocated bandwidth.
17:45	**405**	**Plans for Triggers and Physics with Photons in First ATLAS Data** *Andrew Hamilton, Université de Genève, Quai Ernest-Ansermet 24, 1211 Genève, Switzerland, on behalf of the ATLAS Collaboration* This talk will outline the plans for triggering on and producing initial physics studies with photon final states in the first ATLAS data. It will show results of performance studies using cosmic rays, summarize the trigger commissioning strategy, and provide examples of physics studies planned for first data using photon.
18:00	**406**	**A cluster-jet target for PANDA and the PANDA vacuum system** *Alexander Gruber [1], Johann Marton [1], Eberhard Widmann [1], Johann Zmeskal [1], Herbert Orth [2], Jost Lühning [2]* *[1] Stefan-Meyer-Institut für subatomare Physik, Boltzmanngasse 3, 1090 Wien, Austria* *[2] GSI Helmholtzzentrum für Schwerionenforschung GmbH, Plankstraße 1, 64291 Darmstadt, Germany* The universal detector PANDA will be constructed at the future high-energy antiproton storage ring HESR at FAIR (Facility for Antiproton and Ion Research, GSI/Darmstadt). It will use antiproton beams (1.5 to 15 GeV/c) for hadron physics in the charmonium region. The Stefan Meyer Institut (SMI) contributes to major parts of the PANDA detector like the cluster-jet target and the vacuum system. In order to reach the desired target density, an optimisation of the cluster-jet target is essential. Together with

		the target group at GSI, we are carrying out R&D for increasing the jet-density. SMI also has a major role in the design of the vacuum system of the PANDA detector. Furthermore a study on the feasibility of using NEG-coated (non-evaporative-getter) tubes as beam pipes near the high density internal target has been carried out at SMI. The measurements and results will be presented.
18:15	**407**	**Baryon studies in a covariant Faddeev approach** *Martin Schwinzerl, Reinhard Alkofer, Gernot Eichmann, Andreas Krassnigg, Diana Nicmorus* *Institut für Physik, Karl-Franzens Universität Graz, Universitätsplatz 5, 8010 Graz, Austria* Established results for the quark propagator in Landau gauge QCD, together with a detailed comparison to lattice data, are used to formulate a Poincaré covariant Faddeev approach to the nucleon. The resultant three-quark amplitudes describe the quark core of the nucleon. The nucleon's mass and its electromagnetic form factors are calculated as functions of the current quark mass. The corresponding results together with charge radii and magnetic moments are discussed in connection with the contributions from various ingredients in a consistent calculation of nucleon properties, as well as the role of the pion cloud in such an approach. G. Eichmann et al.: Annals Phys. 323 (2008) 2505. D. Nicmorus et al.: arXiv:0812.1665 [hep-ph].
18:30 **mo-ves to time-slot of 344**	**408**	**How do we obtain things from strings?** *Christoph Mayrhofer, Nils-Ole Walliser, Andrés Collinucci, Maximilian Kreuzer,* *Institut für Theoretische Physik, TU Wien, Wiedner Hauptstrasse 8-10/136, 1040 Vienna, Austria* I give a brief introduction to superstring theory and show some simple compactifications of this ten dimensional theory down to four dimensional Minkowski space-time. We will see how chiral fermionic matter and its gauge interaction arise from the geometry of the hidden dimensions. At the end I will try to make contact with my current research and present models that exhibit minimal supersymmetric standard model like content.
18:45		***END***
19:30	**21**	***Public Lecture***

Time	ID	NUCLEAR AND PARTICLE PHYSICS XII: LOW AND MEDIUM ENERGY IV (OPERA) *Chair: H. Abele, TU Wien*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	391	***➔ go to room B***
14:30	411	**CNGS, CERN Neutrinos to Gran Sasso: Direkte Messung von Neutrino Oszillation** *Edda Gschwendtner, CERN, 1211 Geneva 23, Switzerland* Das CNGS Experiment, Cern Neutrinos to Gran Sasso, studiert die direkte Oszillation von Myon-Neutrinos zu Tauon-Neutrinos. Ein intensiver Myon-Neutrino Strahl (10^{17} Neutrinos/Tag) wird am CERN produziert und 730 km weiter zu komplexen Detektoren (OPERA und ICARUS) im Gran-Sasso National Laboratory, LNGS, Italien, gelenkt. Im Mittel werden 2-3 Tauon-Neutrinos/Jahr in den Detektoren erwartet. CNGS ist das erste 'long-baseline' Neutrino Experiment, das die Oszillationsparameter durch die Beobachtung von Tau-Neutrinos misst. CNGS wurde 2006 in Betrieb genommen und seit 2008 wird ein Neutrinostrahl kontinuierlich produziert. In diesem Vortrag wird eine Übersicht über CNGS gegeben. Höhepunkte der Strahlperformance, sowie erste interessante Resultate des OPERA Detektors werden gezeigt.
14:45	412	**The OPERA experiment: Current status** *Guillaume Lutter, University of Bern - Laboratory for High Energy Physics, Sidlerstrasse 5, 3012 Bern, Switzerland* The neutrino flavour oscillations hypothesis has been confirmed by several experiments, all are based on the observation of the disappearance of a given neutrino flavour. The long baseline neutrino experiment OPERA (Oscillation Project with Emulsion tRacking Apparatus) aims to give the first direct proof of the tau neutrino appearance in a pure muon neutrino beam (CERN Neutrinos to Gran Sasso beam). The neutrino interactions in the detector are recorded by Emulsion Cloud Chambers (ECC), stacks of 57 nuclear emulsions interleaved with 1 mm thick lead plates. In 2008 the OPERA experiment has started full data taking in the CNGS beam and around 1700 interactions in the detector have been recorded. After a description of the experiment and the data taking procedure, a review of the current status and preliminary results from 2008 run will be presented.

15:00	**413**	**OPERA: track reconstruction with electronic detector.** *Claudia Lazzaro, André Rubbia, Andreas Badertscher, Thomas Strauss* *Institute for Particle Physics ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* The electronic detectors in OPERA are composed of scintillator planes, which interleave the target walls consisting of nuclear emulsion/lead bricks, and the magnetic spectrometers downstream of each target sector module, which are equipped with drift tubes. The electronic detector data analysis is the first step in the OPERA's analysis, and it is used to reconstruct charged particle tracks and to find the muon's track. After the track reconstruction a Kalman filter is applied to find the origin of the track in the target and to estimate the momentum at this position; these results are used in the brick finding procedure to selected the brick in which the neutrino interaction occurred. An estimation of the muon momentum is especially important for the OPERA experiment, since it permits to reconstruct the spectrum of nm, to monitor the CNGS flux, and to give an estimation of the neutrino events expected in the detector. The Kalman procedure is briefly described and the momentum resolution and the track position estimation obtained from MC generated quasi-elastic and charge current interactions are given. The result of the Kalman filter applied to real data is also presented.
15:15	**414**	**Neutrino Induced Charm Events in the OPERA Experiment** *Thomas Strauss* *Institute for Particle Physics, ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* The goal of the OPERA experiment is to search for ν_τ appearance in the (almost) pure ν_μ beam from CERN to the Gran Sasso underground lab by detecting the decay of the τ lepton from a ν_τ CC interaction in the nuclear emulsion/lead target of the OPERA detector. In about 5% of the ν_μ CC neutrino events charmed particles are produced. Due to their short lifetime, which is in the range of the τ lifetime, these events are the key for understanding the detector. Using the neutrino charm production cross sections measured with the CHORUS experiment, the efficiency to find and reconstruct the decay of short-lived particles with OPERA can be investigated. This talk will present the MC studies of the Opera Charm Working Group together with the first observed charm candidate events from the 2007 and 2008 runs and the projected goals for the current run.

15:30	**415** c a n c e l l e d	**~~Hadro-production measurements with the NA61/SHINE experiment at the CERN SPS~~** *~~Claudia Strabel, André Rubbia, Alberto Marchionni~~* *~~ETH Zürich, IPP, Schafmattstr.20, 8093 Zürich, Switzerland~~* ~~In this talk the first results on hadron production in p+C interactions at 31 GeV/c from NA61/SHINE at the CERN SPS will be presented. These interactions are studied in order to predict the neutrino beam at J-PARC, Japan, used by the T2K experiment.~~ ~~The NA61/SHINE detector is a large acceptance hadron spectrometer which allows for precise momentum measurements and particle identification. The ongoing measurements for the characterization of the T2K neutrino beam will be discussed. A focus will be put on the determination of the inelastic cross-section for p+C interactions and measurements of the double-differential inclusive cross section for pion production.~~
15:45	**416**	**GERDA, searching for the neutrinoless double beta decay in ^{76}Ge** *Roberto Santorelli* *University of Zürich, Winterthurerstrasse 190, 8057 Zürich, Switzerland* The GERDA (GERmanium Detector Array) experiment is designed to search for the neutrino-less double beta decay of ^{76}Ge, which could establish the nature of the neutrino (Dirac or Majorana) and provide information on the absolute neutrino mass. The experiment is currently under construction in the Gran Sasso National Laboratory, the commissioning phase is expected to start in fall 2009. In GERDA phase-I, about 18 kg of enriched-^{76}Ge detectors, previously operated by the Heidelberg-Moscow and IGEX experiments, will be immersed directly in pure liquid Ar, which will act as the cooling medium and as shield against external backgrounds. In phase-II about 20 kg of new enriched detectors will be added. The aim is to collect an exposure of about 100 kg · y with a background of 10^{-3} counts/(kg · y · keV) at the Q-value of 2039 keV. The status and science prospects of the project will be presented.
16:00		***Coffee Break***
		Astro- and Particle Physics II: *Chair: NN*
16:30	**34**	***➔ go to room B***
16:45	**461 - 463**	***see session "Astrophysics"; ➔ go to room F***
17:30		***END***
19:30	**21**	***Public Lecture***

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Neutron polarimetric test of Leggett's contextual model of quantum mechanics

Claus Schmitzer, Hannes Bartosik, Jürgen Klepp, Stephan Sponar, Gerald Badurek, Yuji Hasegawa
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The Einstein-Podolsky-Rosen (EPR) argument attempted to dispute quantum theory. With the Bell inequality it was possible to set up an experimental test of the EPR argument. Here, we describe the rebuilding of the measurement station at the tangential beam exit of the TRIGA reactor of the Atominstitut in Vienna. A new polarimeter setup was constructed and adjusted to generate Bell states by entangling a neutron's energy and spin. After accomplishing visibilities of up to 98.7%, it was possible to test a Leggett-type inequality, which challenges a "contextual" hidden variable theory. Such a contextual model would have been capable of reproducing former Bell inequality violations. Measurement results of this Leggett inequality and a generalised Clauser-Horne-Shimony-Holt (CHSH) inequality show violations of this hidden variable model. Hence noncontextual and contextual hidden variable theories can be excluded simultaneously and quantum mechanical predictions are confirmed.

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A neutron interferometric measurement of a phase shift induced by Laue transmission

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Dynamical diffraction theory is the basis for an understanding of the reflected and transmitted intensities of a neutron beam incident on a perfect crystal blade. Here we study a different aspect: the neutron phase shift due to Laue transmission. We discuss the theoretical concept and experimental challenges of a possible setup to measure this phase shift with a perfect crystal neutron interferometer. Furthermore an approach for a numerical calculation of the whole interferometric setup is discussed. Finally first quantitative measurements in the vicinity of the Bragg condition are presented and compared with numerical calculations.
The study of this phase shift might result in precise measurements of the neutron-electron scattering length and the Debye-Waller factor.
The work is funded by the FWF, project No. P18460-N16.

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presented as talk on 2.9.

Physics Research Opportunities at MedAustron

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MedAustron is a planned centre for hadron therapy and diagnosis in Austria. The centre is grouped around a synchrotron which should deliver beams of protons up to 800 MeV/c and carbon ions up to 400 MeV/c per nucleon with intensities of 10^{10} protons/s and $4 \cdot 10^8$ ions/s,

	respectively. Although the accelerator is primarily dedicated to clinical application, its use for non-clinical research is foreseen for nights, weekends and holidays. In a recent white book study we clearly indicated the potential of the facility for basic and applied research in physics and technology. Especially, the wide range of intermediate energies delivered by the foreseen accelerator is of interest. It allows the setup of a proton scattering facility for basic research as well as the use of the beam to perform tests of detectors for nuclear and particle physics. The facility offers also opportunities to implement selected applications, e.g. in materials research and in dosimetry. In this contribution we present the outcome of our study and discuss the most appealing applications and possibilities for non-clinical research at such a synchrotron of a hadron therapy centre. One of the major aspects of this infrastructure is its importance for education and training of young researchers in Austria.
474	**Nucleons interacting with excited nuclear matter** *Helmut Leeb, Johannes Haidvogl, Denise Neudecker* *Atominstitut, TU Wien, Wiedner Hauptstr. 8-10, 1040 Wien, Austria* In microscopic approaches of precompound reactions the dependence of the optical potential on the excitation is still an open question, which might heal some deficiencies of present day calculations. For the interesting energy regime the nuclear matter approach is well suited, which is based on the g-matrix obtained from Bethe-Goldstone equation. In order to account for the excitation of nuclear matter a simple model of excitation has been developed and a correspondingly refined Pauli-operator has been formulated. The dependence of the g-matrix on the excitation as well as on the incident energy is studied. In addition, the impact of excitation on optical potentials and cross sections is discussed.
475	**Study of nuclear reactions relevant for the astrophysical s-process with n_TOF at CERN** *Claudia Lederer [1], Erwin Jericha [2], Helmut Leeb [2], Anton Wallner [1], Christina Weiß [2]* *[1] Isotopenforschung und Kernphysik, Fakultät für Physik, Universität Wien, Währingerstrasse 17, 1090 Wien, Austria* *[2] Fakultät für Physik, TU Wien, Atominstitut der Österreichischen Universitäten, Stadionallee 2, 1020 Wien, Austria* Neutron capture reactions are the main mechanisms for the production of elements heavier than Fe in stellar nucleosynthesis. Recently found disagreements between observed and predicted abundances demonstrate, that our knowledge on nucleosynthesis is still limited and particularly asks for precise capture cross-sections. The neutron time-of-flight facility n_TOF at CERN provides an excellent set-up to measure neutron capture cross-sections because of its high instantaneous neutron flux and low background. In addition, the 200 m flight path available, guarantees a high energy resolution. In view of these features, the n_TOF facility is predestined for precise measurements of interest for s-process nucleosynthesis. Within the n_TOF collaboration, we will measure neutron capture cross sections of Fe and Ni isotopes at n_TOF. These data will be compared with recent results from independent activation measurements using Accelerator Mass Spectrometry. After installation of a new spallation target a new measurement campaign was started in 2009. The present status of neutron-capture reactions will be highlighted. Supported by Fonds zur Förderung der wissenschaftlichen Forschung, project number P20434.

476	**Nuclear reactions induced by ^{6}Li and ^{7}Li-ions on ^{27}Al** *Johann Kühtreiber, Harry Friedmann, Oliver Forstner, Peter Hille, Andreas Pavlik, Alfred Priller, Patrick Törnström, Anton Wallner* *Fakultät für Physik, Universität Wien, Währinger Str. 17, 1090 Wien, Austria* Aluminium target foils (2 µm thick) were irradiated by ^{6}Li- and ^{7}Li-ions at the Vienna Environmental Research Accelerator (VERA-facility) to investigate nuclear reactions near the coulomb barrier. The nuclei ^{6}Li and ^{7}Li can be modelled as weak bound systems of d+α and t+α, respectively. Therefore, it is of scientific interest to test if the nuclear reactions caused by Li are rather compound reactions or can better be explained by a break-up reaction mechanism. Prompt gamma-ray emission as well as gamma-ray emission from the decay of radioactive reaction products were measured in order to determine production rates of residual nuclei. A comparison with data from the literature on the reaction ^{18}O+^{16}O which leads to the identical compound nucleus ^{34}S, reveals a predominant non-compound reaction mechanism.
477	**Experimental test of quantum contextuality in neutron interferometry: advanced version of demonstrating a Koch-Specker-like phenomenon** *Hannes Bartosik [1], Claus Schmitzer [1], Jürgen Klepp [1], Stephan Sponar [1], Adan Cabello [2], Helmut Rauch [1], Yuji Hasegawa [1]* *[1] Atominstitut, TU-Wien, Stadionallee 2, 1020 Wien, Austria* *[2] Departamento de Fısica Aplicada II, Universidad de Sevilla,, 41012 Sevilla, Spain* As known from the Einstein Podolsky Rosen (EPR) paradox, an entangled quantum system exhibits correlations, which cannot be explained by classical theories. While entanglement between identical particles is utilized in most experiments, we are performing measurements on single neutron systems entangled in degrees of freedom for demonstrating quantum contextuality. Here, we describe an advanced version of an experimental test of a Kochen-Specker phenomenon based on an inequality derived from the Peres-Mermin proof, using spin-path (mometum) entanglement in neutron interferometry. Following the strategy proposed in A. Cabello et al., Phys. Rev. Lett. 100, 130404 (2008), a Bell-like state was generated and three expectation values were determined. The observed violation 2.291 ± 0.0086 > 1 clearly shows that quantum mechanical predictions cannot be reproduced by non-contextual hidden variables theories.
478	**Definition und Messung der Teilchenmasse von der klassischen Mechanik zum Standardmodell** *Harald Markum, Atominstitut, TU-Wien, Wiedner Hauptstrasse 8-10, 1040 Wien, Austria* In der klassischen Newton'schen Mechanik besteht die Hamiltonfunktion aus einer Summe von kinetischer und potentieller Energie, in welcher die Masse eines Körpers als Parameter auftritt. Im Rahmen der Gravitation unterscheidet man die schwere Masse bei der Anziehung von Körpern im Gegensatz zur trägen Masse im leeren Raum; experimentell lässt sich kein Unterschied feststellen. In der speziellen Relativitätstheorie tritt die Energie-Impulsbeziehung auf, worin sich die Masse geschwindigkeitsabhängig ergibt; die Ruhemasse ist jedoch der gleiche Parameter der klassischen Mechanik. In der Quantenmechanik bleibt die Masse als Parameter im Hamiltonoperator; Anregungszustände im Wasserstoffatom sind proportional zur Ruhemasse. In der Quantenfeldtheorie wird die Masse zu einem (divergierenden) Parameter, der durch Renormierung an den experimentellen Wert angepasst werden muss.

	Im Standardmodell der Teilchenphysik hängen die Massen vom Vakuumerwartungswert des Higgs-Feldes ab. Die Fermionen werden überdies noch von einer Yukawakopplung bestimmt, die einen offenen Parameter darstellt. Ein Überblick über die verschiedenen Definitionen und Messungen soll gegeben werden.
479	**An optimized ion-optical setup for AMS of ^{10}Be with a degrader foil** *Martin Martschini, Oliver Forstner, Robin Golser, Walter Kutschera, Leonard Michlmayr, Alfred Priller, Peter Steier, Anton Wallner* *VERA-Laboratory, Fakultät für Physik-Isotopenforschung, Universität Wien, Währinger Straße 17, 1090 Wien, Austria* The challenge in accelerator mass spectrometry (AMS) of ^{10}Be ($t_{1/2}$=1.4 Ma) is the suppression of the stable isobar ^{10}B. One method established in recent years at VERA (Vienna Environmental Research Accelerator), is the use of a thin degrader foil to introduce an energy difference between ^{10}Be and ^{10}B, followed by an additional energy-sensitive bending element and a split-anode ionization chamber. While this setup has considerably reduced our background (^{10}Be/^{9}Be < 10^{-15}), it initially suffered from a poor transmission after the degrader foil. In order to optimize our setup, we have measured the phase space of a ^{9}Be^{2+}-beam and determined the transverse emittance and energy distribution of the beam. These results were used in ion-optical simulations of our high energy beamline. They allowed to identify the beamline elements responsible for transmission losses and helped to plan modifications of our quadrupole doublet and the switcher magnet chamber. Thereby, the transmission increased by a factor of 3. Hence, the degrader foil method clearly outperforms other established methods for samples with ^{10}Be/^{9}Be ratios lower than 10^{-13}.
480	**Supernova and Nucleosynthesis** *Anton Wallner [1], Klaus Knie [2], Thomas Faestermann [2], Gunther Korschinek [2], Michael Paul [3], Robin Golser [1], Walter Kutschera [1], Alfred Priller [1], Peter Steier [1]* *[1] Fakultät für Physik, Univ. Wien, Währinger Strasse 17, 1090 Wien, Austria* *[2] Physik Department, TU München, James-Franck Strasse 2, 85748 Garching, Germany* *[3] Racah Institute of Physics, Hebrew University, 91904 Jerusalem, Israel* The search for supernova-produced, long-lived radionuclides on Earth, will give an improved insight into explosive nucleosynthesis scenarios. We explored the detection of very small traces of the long-lived radionuclides ^{244}Pu ($t_{1/2}$ = 81 Ma) and ^{247}Cm (15.6 Ma) at the Vienna Environmental Research Accelerator (VERA) laboratory. Such a finding would be of great interest in nuclear astrophysics complementing the recent detection of possibly supernova-produced 60Fe. Nuclear astrophysics aims at describing nuclear processes relevant to nucleosynthesis. At VERA we are pursuing a program to study such cross sections. An overview on recent activities of the AMS technique in nuclear astrophysics will be given, including measurements relevant for Big-Bang and stellar nucleosynthesis and the search for SN-produced radionuclides on Earth.

481	**The nucleon phase of binary fission** *Christian Ythier, Genevieve Mouze, Sabet Hachem* *Faculté des Sciences, 28 avenue de Valrose, 06108 Nice cedex 2, France* The main step of the fission process is a sharing-out of nucleons, within a "nucleon-phase", between the valence shells of the primordial cluster of the internally-dissociated fissioning system and the valence shells of the "A =126 nucleon core" of the nascent heavy fragment. The formation of an "A = 82 nucleon core" in the nascent light fragment explains the asymmetric fission mode of the light actinide nuclei. The nucleon partition in the nucleon phase can be understood in the framework of chemical thermodynamics. The formation of an "A = 126 nucleon core" in the nascent light fragment of heavier fissioning systems explains the symmetric fission mode of ^{258}Fm and that of heavier nuclei. But the new phenomenon of "barrier-free" fission, discovered in ^{258}Fm (s.f.), plays in this system and all symmetrically fissioning superheavy nuclei a very important role.
482	**On the existence of subatomic extra-dimensions** *Christian Ythier, Faculté des Sciences, 28 avenue de Valrose, 06108 Nice cedex 2, France* The concepts of mass and charge are intimately linked. Any charge is associated with a mass. But any rest-mass is associated with a rest- frequency ν_0. Thus a well –defined frequency ν_0 is a characteristic property of any charged particle at rest; and its rest mass can be written $(\hbar/c^2)\ \omega_0$, where ω_0 is an angular frequency. In 2005 we noted that no motion in space does not exclude motion in extra-dimensions, in particular in time, and that the conservation of charge, in a hydrogen atom, could be represented by a closed loop in a three-dimensional time orthogonal to the 3D-space. Today we replace the colour of the quarks by the 3D- time coordinates and show that the chiral flow of charge is responsible for inertia.
483	**Joining the Worldwide LHC Computing Grid** *Gregor Mair [1], Peter Öttl [1], Wolfgang Jais [1], Wolfgang Kausch [1], Katharina Nimeth [1],* *Dietmar Kuhn [1], Gabriel Esterhammer [1], Reinhard Bischof [2]* *[1] Astro- & Teilchenphysik Innsbruck, Technikerstraße 25/8, 6020 Innsbruck, Austria* *[2] ZID Innsbruck, Technikerstraße 23 , 6020 Innsbruck, Austria* The World Wide Computing Grid (WLCG) provides an hierarchical Grid computing environment for the LHC experiments. Within the WLCG different Grid sites with different middlewares are in use. Most European sites use Enabling Grids for E-sciencE (EGEE) middleware and services for their Grid sites. In this poster we show how WLCG and EGEE are connected to enable Grid resources for research computing. This interaction is illustrated on the basis of the HEPHY-UIBK computing Grid and work studies performed in Innsbruck.
484	**Towards renormalizable models for gauge fields in non-commutative space** *Daniel Blaschke, Arnold Rofner, Rene Sedmik* *TU Wien, Institut f. Theoretische Physik, Wiedner Hauptstr. 8-10, 1040 Vienna, Austria* When trying to construct a quantum field theory on non-commutative space-time, e.g. by employing the so-called Groenewold-Moyal star product, one inevitably runs into the infamous UV/IR mixing problem: New kinds of non-local infrared divergences prevent the model from being renormalizable. In fact, so far only some modified scalar field theories on Euclidean non-commutative spaces have been found to be renormalizable by successfully circumventing problems due to UV/IR mixing. Here we present a promising candidate for a renormalizable non-commutative gauge theory.

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Full Salpeter Equations with Confining Interactions: Stability of Bound States

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The most popular three-dimensional reduction of the Bethe–Salpeter formalism for the description of bound states within relativistic quantum field theory is the Salpeter equation, obtained as instantaneous limit of the Bethe–Salpeter equation under the additional assumption of free propagation of the bound-state constituents. Unfortunately, depending on the assumed Lorentz structure of the Bethe–Salpeter kernel the solutions of the Salpeter equation with confining interactions may exhibit instabilities, probably related to the Klein paradox. As illustrated by the example of harmonic-oscillator potentials, for confining interaction kernels of various Lorentz structures the stability of the Salpeter solutions can be established by analytic arguments, supporting thus the findings of several numerical studies. Moreover, this analysis provides insight into the reasons why, for Lorentz natures other than the above, instabilities arise, at least in certain regions of the parameter space.