Tuesday, 01.09.2015, Room EI 7

Time	ID	TASK-FAKT I: High Energy Frontier I *Chair: Gertrud Konrad, TU Wien & SMI Wien*
13:30	301	**Studying QCD matter with the ALICE detector** *Michael Weber, Stefan-Meyer Institut für subatomare Physik, Boltzmanngasse 3, AT-1090 Wien* According to QCD, strongly interacting matter at sufficient high energy density exists in a state of deconfined quarks and gluons, the so-called Quark Gluon Plasma (QGP). The ALICE detector at the LHC features the unique possibility to study QCD matter at high temperatures and small net-baryon densities. A complete set of observables measured in pp, p-Pb and Pb-Pb collisions allows to explore properties of the QGP, to study initial-state effects of heavy-ion collisions and to study particle production in the QCD vacuum. A selection of ALICE results from LHC Run-1 will be presented.
14:00	302	**Search for extra dimensions in the high mass diphoton spectrum at 13 TeV** *Milena Quittnat, Institute for Particle Physics, ETH Zürich, c/o CERN, CH-1211 Geneva 23* With the restart of the LHC, the CMS experiment will record events with a center of mass energy of 13 TeV. The new mass range is especially interesting for the study of high mass diphoton events, where deviations from the standard model might appear during the LHC Run 2. The decay of a graviton into two high energetic photons as predicted by the RS (Randall Sundrum) and ADD (Arkani-Hamed, Dimopoulos, Dvali) model, would yield in a resonant or non-resonant enhancement, respectively. The reconstruction of high energy photons with the CMS detector as well as the data driven methods for these searches will be presented.
14:15	303	**CMS performance of Jets and Missing energy in 13 TeV data** *Robert Schoefbeck, HEPHY, Nikolsdorfergasse 18, AT-1050 Austria* The precise determination of the jet energy scale and the missing transverse momentum is crucial for many searches for processes beyond the Standard Model. The collision rate at CMS during Run-II at 13 TeV of the LHC will moreover increase beyond conditions previously overcome. I will present CMS strategies to meet these challenges and show first results on the performance on jets and missing energy which are crucial tools for probing the new energy regime.
14:30	304	**Optical receivers for the ATLAS Pixels Layers 1 and 2 upgrade** *Geoffrey Mullier, Federico Meloni* *Laboratory for High Energy Physics, Universität Bern, Sidlerstrasse 5, CH-3012 Bern* To cope with the elevated data rates in the new high luminosity environment provided by the LHC, the pixel detector of the ATLAS experiment requires an upgrade of its readout chain. A sensitive component of the optical links in-between the on and off detector electronics is the off detector electronics optical receiver (Rx). In this context we present the design, testing and productions of new Rx plugins, based on an ASIC chip designed to perform during the whole operation of the Layer 1 / Layer 2 during Run II.
14:45	305	**Results and prospects for the measurement of Higgs boson decays to pairs of tau leptons with the CMS experiment** *Johannes Brandstetter, Martin Flechl, HEPHY Vienna, Nikolsdorfer Gasse 18, AT-1050 Vienna* In 2012 the Higgs boson was discovered by the ATLAS and CMS experiment at CERN. The observation was mainly based on the ZZ, $\gamma\gamma$ and WW channels, while decays to fermions have not yet been confirmed at the same significance level. For the latter measurement the $H \rightarrow \tau\tau$ channel is one of the most promising ones. Our aim during LHC Run 2 period is to measure the $H \rightarrow \tau\tau$ decay at the CMS detector with a significance larger than 5 standard deviations. The current status of $H \rightarrow \tau\tau$ results at CMS is summarized, followed by prospects for the analysis for LHC Run 2.

15;00	**306**	**ATLAS searches for new physics in final states with 2 leptons in 13 TeV pp collisions** *Maria Elena Stramaglia, AEC/LHEP - University of Bern, Sidlerstrasse 5, CH-3012 Bern* A search for new physics with the ATLAS detector, looking for final states with two leptons and missing energy will be presented. The expected sensitivity to Supersymmetric and EFT models will be evaluated with a cut and count approach targeting 10 fb^{-1} of pp collision data at $\sqrt{s}$ = 13 TeV. The targeted final state provides optimal sensitivity to top squark pair production decaying to a bottom quark and a chargino which decays into a neutralino, lightest supersymmetric particle.
15:15	**307**	**Exotic and non-exotic quarkonium properties within the Dyson-Schwinger-Bethe-Salpeter equation approach** *Thomas Hilger, Institute of Physics, University of Graz, Mozartgasse 5, AT-8010 Graz* Results of a sophisticated approach to a comprehensive meson phenomenology within the rainbow-ladder truncated Dyson-Schwinger-Bethe-Salpeter equation framework are presented and discussed. In particular, the exotic and non-exotic light and heavy quarkonium mass spectrum in the spin-0 and spin-1 channel, as well as for tensor mesons is evaluated. Leptonic decay constants are analysed and open up a new perspective on the identification of experimentally observed states.
15:30		***Coffee Break***
		TASK-FAKT II: High Energy Frontier II *Chair: Michael Weber, SMI Wien*
16:00	**311**	**CMS Phase I Upgrade - A "Test Bench" for Pixel Modules.** *Dehua Zhu, Institute for Particle Physics, ETH Zürich, Otto-Stern-Weg 5, CH-8093 Zürich* With upgrades of the Large Hadron Collider (LHC), the luminosity will more than double. In parallel, the Compact Muon Solenoid (CMS) experiment needs to be upgraded as well, including the pixel detector, its innermost component. This talk summarizes aspects of the Phase I Pixel Upgrade and focuses on how new digital modules are electronically tested under controllable environments before being implemented into the CMS.
16:15	**312**	**Simplifed Models interpretation of LHC results with SModelS** *Federico Ambrogi, HEPHY, Institut für Hochenergiephysik, Nikolsdorfer Gasse 18, AT-1050 Vienna* The numerous beyond the Standard Model (BSM) searches done at the LHC Run1 have been typically interpreted in the framework of Simplified Model Spectra (SMS) results. We present the updated version 1.1 of SModelS, a tool designed to automatically interpret SMS results in the context of realistic BSM models. Among the new features, we updated the database which is now extended to include efficiency maps that can be used for a more accurate interpretation of the SMS results and to highlight interesting signatures of BSM physics. Moreover we added an intuitive and user friendly browser to access the database of experimental results.
16:30	**313**	**An overview of meson phenomenology beyond spectroscopy from the DSBSE approach** *Andreas Krassnigg, Inst. f. Physik, Univ. Graz, Universitätsplatz 5, AT-8010 Graz* Based on a comprehensive set of data from a Dyson-Schwinger-Bethe-Salpeter-equation approach obtained in rainbow-ladder truncation we investigate the influence of the effective strong interaction in both heavy and light quarkonium systems on observables beyond mere spectroscopy. We start with leptonic decay constants and continue to electromagnetic properties, such as form factors, charge radii, and give an outlook on more general transition amplitudes.

16:45	**314**	**Recent measurements of quarkonium production with the CMS experiment** *Ilse Krätschmer, Institute of High Energy Physics Vienna, Nikolsdorfer Gasse 18, AT-1050 Vienna* Studies of quarkonium production are important to improve our understanding of hadron formation within the context of quantum chromodynamics. Thanks to a dedicated dimuon trigger strategy, the CMS experiment could collect large samples of pp collisions at 7 and 8 TeV, including quarkonium states decaying in the dimuon channel. This allowed the CMS collaboration to perform a series of measurements in quarkonium production physics, including double-differential cross sections, cross section ratios and polarizations, as a function of rapidity, transverse momentum and charged particle multiplicity. This talk presents CMS results on quarkonium production in pp collisions with emphasis on the most recent measurements.
17:00	**315**	**Novel methods and expected run 2 performance of ATLAS track reconstruction in dense environments** *Roland Jansky, Inst. für Astro- und Teilchenphysik, Univ. Innsbruck & CERN, CH-1211 Genève 23* Detailed understanding and optimal track reconstruction performance in the core of high pT objects is paramount for a number of techniques (e.g. jet energy and mass calibration, jet flavour tagging, hadronic tau identification). Dense environments are characterized by charged particle separations on the order of the granularity of ATLAS's inner detector. With the insertion of an additional innermost tracking layer and an increase in the centre-of-mass energy, these environments will become even more relevant in Run-2, e.g. in searches for heavy resonances. Novel developments to the ATLAS track reconstruction software targeting these topologies and the expected improved performance are presented.
17:15	**316**	**Search for stop pair production in SUSY models with highly compressed mass spectra with the CMS experiment at the LHC** *Navid Rad, HEPHY, Nikolsdorfer Gasse 18, AT-1050 Wien* Supersymmetry (SUSY) is one of the most promising candidates for beyond the standard model (SM) searches as it explains many of the current problems with SM. In particular SUSY models in which a light top squark has a mass close to the lightest supersymmetric particle (LSP) are very well motivated by naturalness and dark matter constraints. In this talk a search for such a compressed SUSY scenario with a mass gap smaller than the W mass in events with one or two leptons will be presented. The results for the 8 TeV data of the CMS-detector and the plans for the 13 TeV data are included.
17:30	**~~317~~**	***moved to 346***
17:45	**318**	**Development of HV-CMOS Pixel Sensors for the Phase-2 ATLAS upgrades** *Marco Rimoldi, Laboratory for High Energy Physics, Universität Bern, Sidlerstrasse 5, CH-3012 Bern* For the Phase 2 upgrades of the ATLAS detector at the LHC a new inner detector called ITK (Inner Tracker) will replace the current tracker system. The ITK is scheduled to be installed in 2022 to cope with the expected higher peak luminosity of $5 \cdot 10^{34}$ $cm^{-2}s^{-1}$. The High-Voltage CMOS technology for silicon pixels allows implementation of a low-cost radiation-tolerant detector with excellent time resolution. We present the characteristics of this technology and results from test beam data acquired in 2015 with a ~150 GeV pion beam at the SPS at CERN.
18:00		***Postersession and Aperitif***
19:45		***Public Lecture***

<table>
<tr><th>Time</th><th>ID</th><th>TASK-FAKT III: INTERACTIONS AND FUNDAMENTAL SYMMETRIES AT LOW ENERGIES I
Chair: Klaus Kirch, ETH Zürich & PSI Villigen</th></tr>
<tr><td>13:30</td><td>321</td><td>Towards a novel high-brightness muon beamline

Andreas Eggenberger [1], Aldo Antognini [1], Ivana Belosevic [1], Kim Siang Khaw [1], Klaus Kirch [1], Florian Piegsa [1], David Taqqu [1], Gunther Wichmann [1], Yu Bao [2], Malte Hildebrandt [2], Andreas Knecht [2], Angela Papa [2], Claude Petitjean [2], Stefan Ritt [2], Kamil Sedlak [2], Alexey Stoykov [2], Daniel M. Kaplan [3], Thomas J. Phillips [3]
[1] Institute for Particle Physics, ETH Zürich, Otto-Stern Weg 5, CH-8093 Zürich
[2] Paul Scherrer Institute, CH-5232 Villigen PSI
[3] Illinois Institute of Technology, 10 W. 32nd Street, 60616 Chicago, USA

We are developing a device delivering a novel muon beam with significantly increased brilliance for next generation low-energy particle physics experiments with both μ^+ and muonium ($Mu=\mu^+e^-$). This device will decrease the phase space of a standard μ^+ beam by a factor of 10^{10} with an efficiency of 10^{-3}. The concept involves stopping MeV μ^+ in a cryogenic target with a gas density gradient, and compressing the stopped distribution by means of strong electric and magnetic fields in several successive stages. Finally, the beam will be extracted into vacuum, re-accelerated and sent to experiments. Preliminary results from our experiments at PSI will be presented.
This work is supported by SNF grant 200020_146902.</td></tr>
<tr><td>13:45</td><td>322</td><td>The Compact Muon Beam Line for the Mu3e Experiment

Felix Berg, Paul Scherrer Institut, CH-5232 Villigen PSI

The Mu3e experiment is aiming for a sensitivity of 10^{-16} for the lepton flavour violating decay channel $\mu^+ \rightarrow e^+e^+e^-$, requiring beam rates of the order 10^8 - 10^9 μ^+/s. Following a staged approach Mu3e will be located in the PiE5 area at PSI for the first phase of commissioning and data taking. Since this area is shared with the MEG Experiment, a compact muon beam line layout was designed and implemented, based on a split triplet solution. Extensive simulations based on various tools have been carried out. Furthermore results of the beam tests of Dec. 2014 / May 2015 will be presented.</td></tr>
<tr><td>14:00</td><td>323</td><td>Realization of a Quantum Bouncing Ball Gravity Spectrometer

Tobias Rechberger [1], Martin Thalhammer [2], Tobias Jenke [1], Hartmut Abele [1]
[1] Atominstitut, TU Wien, Stadionallee 2, AT-1020 Wien
[2] Institut Laue-Langevin, 71 Avenue des Martyrs, FR-38000 Grenoble

We present the neutron as a measuring tool and as an object for gravity research. We show that Gravity-Resonance-Spectroscopy, a new method developed for that purpose, allows to test Newton's inverse square law and to search for dark matter and dark energy candidates. We use a method based on spectroscopy, as frequency measurements have shown spectacular sensitivity in the past. Implementing a Ramsey-like setup, it is also possible to probe neutron's electric neutrality. Experimental data on transition frequencies of the quantum gravitational bound states of ultra cold neutrons, measured with a sensitivity of about (10^{-14} – 10^{-21}) eV, are the key to solve cosmological puzzles in terrestrial table top experiments.</td></tr>
<tr><td>14:15</td><td>324</td><td>Vacuum energy and the cosmological constant

Steven Bass, Stefan Meyer Institute, ÖAW, Boltzmanngasse 3, AT-1090 Vienna

The accelerating expansion of the Universe points to a small positive value for the cosmological constant or vacuum energy density. We discuss recent ideas that the cosmological constant plus LHC results might hint at critical phenomena near the Planck scale.</td></tr>
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14:30	325	**High sensitivity Cs magnetometers in experiment searching for a neutron electric dipole moment** *Malgorzata Kasprzak and the nEDM collaboration, Department of Physics and Astronomy, University of Leuven, Celestijnenlaan 200d, BE-3001 Heverlee* Experiments searching for a neutron electric dipole moment (nEDM) depend upon precise information about a magnetic field. In the nEDM experiment at the Paul Scherrer Institute in Switzerland, a magnetic field of 1 μT is measured by a laser driven array of sixteen Cs magnetometers with 10^{-7} relative sensitivity. The magnetic field value at the Cs sensor positions is determined from an optically detected Larmor frequency of the polarized Cs atoms. Those values are used to model the spatial distribution of the magnetic field and its gradients. In this contribution the details of the magnetic field measurements will be shown.
14:45	326	**Search for a violation of the Pauli Exclusion Principle with electrons** *Andreas Pichler, Stefan Meyer Institute for subatomic physics, Boltzmanngasse 3, AT-1090 Vienna, on behalf of the VIP 2 collaboration* The Pauli Exclusion Principle (PEP) is the foundation for our understanding of physics where systems of fermions are concerned. Therefore, it is important to make precision tests of the PEP. In a pioneering experiment, Ramberg and Snow supplied an electric current to a Cu target, and searched for PEP violating atomic transitions of the “fresh" electrons from the current. The non-existence of the anomalous X-rays from such transitions then set the upper limit for a PEP violation. Following this method, the VIP (VIolation of Pauli Exclusion Principle) experiment improved the sensitivity. The experiment and the results will be presented. The preparation of the follow-up experiment VIP-2 will also be shown.
15;00	327	**PERKEO III - Systematic effects related to the electromagnetic setup** *Michael Klopf [1], Hartmut Abele [1], Jens Klenke [2], Gertrud Konrad [1], Peter Lennert [3], Wilfried Mach [1], Bastian Märkisch [4], Daniel Moser [1], Lukas Raffelt [3], Christoph Roick [3], Heiko Saul [1], Ulrich Schmidt [3], Torsten Soldner [5]* *[1] Atominstitut ,TU Wien, Stadionallee 2, AT-1020 Wien* *[2] FRM II, TU München, Lichtenbergstr. 1, DE-85748 Garching b. München* *[3] Physikalisches Institut, Universität Heidelberg, Im Neuenheimer Feld 226, DE-69120 Heidelberg* *[4] TU München, James-Franck-Str. 1, DE-85748 Garching b. München* *[5] Institut Laue-Langevin, 71, avenue des Martyrs, FR-38000 Grenoble* The semi-leptonic decay of the neutron is well described within the Standard Model (SM). Measurements of observables in neutron decay allow testing the SM. Furthermore,models comprising Physics Beyond the SM can be tested. Measurements with the PERKEO III experiment at the Institut-Laue Langevin aim to measure the proton asymmetry with improved accuracy. For this, I have built and implemented crucial components of the electromagnetic setup. In this talk I will present my contributions to the experiment, focusing on systematic effects. Those are related to high voltage electrodes and traps due to the electromagnetic setup of the experiment.
15:15	328	**A neutron resonator for β-decay experiments with polarized neutrons** *Wilfried Mach, Michael Bacak, Stefan Baumgartner, Joachim Bosina, Andreas Hawlik, Erwin Jericha, Hartmut Abele, Gerald Badurek* *Atominstitut, TU Wien, Stadionallee 2, AT-1020 Vienna* The neutron resonator MONOPOL is a novel type of neutron chopper and velocity selector working entirely by controlling a magnetic field configuration to manipulate the neutron spin. The convincing advantage to standard neutron beam manipulation tools is the easy variability of beam parameters and the fact that MONOPOL works entirely without moving parts. Therefore it will be a very useful tool for beam preparation of neutron instruments like PERC. In 2014 MONOPOL was tested with very cold neutrons. Next year MONOPOL will be tested at the brand new thermal white neutron beam which is currently under construction at the Atominstitut.

15:30	**329**	**Sound modes and instabilities in coupled superfluids** *Alexander Haber, Andreas Schmitt* *Institute for Theoretical Physics, TU Wien, Wiedner Hauptstr. 8-10/E136, AT-1040 Vienna* A mixture of two coupled superfluids can occur in several physical systems, ranging from nuclear matter in compact stars down to cold atomic gases or superfluid ^{3}He–^{4}He in the laboratory. As a simple model, a theory of two coupled and entrained scalar fields which obey a U(1) × U(1) symmetry can be used. This model shows very interesting behavior already at vanishing temperatures, like the existence of various instabilities. I will discuss the sound modes of the system from which these instabilities, e.g. the two stream instability that might be responsible for various physical effects in compact stars, can be analyzed.
15:45		
16:00		***Coffee Break***
		TASK-FAKT IV: B-Physics *Chair: Christoph Schwanda, HEPHY Wien*
16:30	**331**	**NoMoS: Beyond the Standard Model Physics in Neutron Decay** *Gertrud Konrad, Stefan-Meyer-Institut, ÖAW, Boltzmanngasse 3, AT-1090 Wien & TU Wien* The newly established New Frontiers Group 'NoMoS: Beyond the Standard Model Physics in Neutron Decay' of the Austrian Academy of Sciences aims to search for traces of new physics in neutron beta decay with novel experimental techniques. Precision measurements in neutron decay allow searching for physics beyond the Standard Model. An accuracy of 10^{-4} in the observables corresponds to energy scales of 1 – 100 TeV for new particles and interactions. To achieve this accuracy, a new technique is developed: R×B spectroscopy. For measurements at ultimate statistics, the R×B spectrometer will be combined with PERC, a new facility at FRM-II in Garching/Germany.
17:00	**332**	**Measurement of the decay $\overline{B} \to D \ell^- \overline{\nu}_\ell$ in fully reconstructed events and determination of the CKM matrix element $\vert V_{cb} \vert$** *Robin Glattauer, Institut für Hochenergiephysik, Wien, Nikolsdorfer Gasse 18, AT-1050 Wien* The weak transition of quarks into each other is determined by the CKM matrix. In order to measure the entry V_{cb}, which governs decays of bottom quarks to charm quarks, we study the decay $\overline{B} \to D \ell^- \overline{\nu}_\ell$ (l = e, μ). We analyse 770 million $B\overline{B}$ meson pairs produced at the Y(4S) resonance at the Belle experiment. Full reconstruction of the non-signal *B* meson grants access to the missing mass and a clear signal - background separation. Through a fit of the decay rate over different kinematic regions we determine $\vert V_{cb} \vert$.
17:15	**333**	**Full reconstruction of hadronic B_s^0 decays at Belle** *Alexander Leopold, Felicitas Breibeck, Robin Glattauer, Christoph Schwanda* *HEPHY, Austrian Academy of Science, Nikolsdorfergasse 18, AT-1050 Vienna* In this talk we introduce the hadronic B_s^0 tag which is currently being developed for the $\Upsilon(5S) \to B_s^{(*)} \overline{B}_s^{(*)}$ data set collected with the Belle experiment in Tsukuba, Japan. This software reconstructs O(1000) hadronic decay modes of B_s^0 mesons, so that the decay products of one B_s^0 meson can be fully removed from the Y(5S) event. This results in a very clean environment for observing the decay of the other B_s^0 meson in the event, which allows for studying B_s^0 modes with missing energy, e.g. $B_s \to D_s \ell \nu$ or $B_s \to \tau^+ \tau^-$ that could not be reconstructed otherwise. This work is supported by the Austrian Science Fund under Grant No. P26794-N20.

17:30 | **334**

Beam test data analysis and resolution studies for the Belle II Silicon Vertex Detector

Benedikt Würkner, Thomas Bergauer, HEPHY, ÖAW, Nikolsdorfer Gasse 18, AT-1050 Wien

The new Vertex Detector for the Belle II experiment at KEK (Japan) is currently under construction. It consists of two layers of DEPFET pixel detectors, which are surrounded by four layers of double sided silicon detectors (DSSDs). To test the resolution of the DSSDs, beam tests at CERN's SPS accelerator have been performed, where the sensors have been read out by prototype readout electronics. The detector assemblies were placed inside the EUDET Telescope to get high-resolution reference tracks. The data was analyzed with the EUTelescope framework. Multiple challenges were faced and resolved while analyzing strip detectors with an analysis framework designed for pixel detectors.

17:45 | **335**

Measurements of CP violation in flavour oscillations of neutral B mesons

Mirco Dorigo, Ecole Polytechnique Federale de Lausanne, BSP- Cubotron, CH-1015 Lausanne

Measurements of the violation of the CP symmetry in flavour oscillations of neutral B mesons can reveal signs of physics beyond the standard model at scale not directly accessible with current colliders. We present the measurement of the CP-violating phases β_s and β, corresponding to the phases of the B_s^0 and B^0 oscillation amplitudes, respectively, obtained throughout the analysis of the time evolution of the decays $B_s^0 \to J\psi KK$ and $B^0 \to J\psi KS$. Using data collected by the LHCb experiment in proton-proton collisions at centre-of-mass-energies of 7 and 8 TeV, we obtain among the most precise results available to date.

18:00 | **336**

Determination of the πΣ scattering lengths from the $\Lambda_c \to \Sigma\pi\pi$ decay using Belle data

Manfred Berger [1], Ken Suzuki [1], Christoph Schwanda [2], Felicitas Breibeck [2], Robin Glattauer [2]
[1] Stefan-Meyer-Institut, ÖAW, Boltzmanngasse 3, AT-1090 Wien
[2] HEPHY, ÖAW, Nikolsdorfer Gasse 18, AT-1050 Wien

The Λ(1405) resonance can be described as an anti-kaon-nucleon meson-baryon quasi bound state strongly coupled to Σπ. The anti-kaon-nucleon reaction around the threshold is reasonably well constrained. However, the σπ amplitude is still afflicted with large uncertainty. In this light a method analogue to Cabibbo's extraction of the pion scattering length from a cusp occurring at threshold in the ππ spectrum from kaon decays has been proposed for the weak $\Lambda_c \to \Sigma\pi\pi$ decay. In this report we give preliminary results for our efforts to extract these scattering lengths using data from the Belle experiment.

18:15 | **337**

Measurement of the photon polarisation in $B_s^0 \to \phi\gamma$ at the LHCb experiment

Zhirui Xu, EPFL-SB-IPEP-LPHE, BSP - Cubotron, CH-1015 Lausanne

In the Standard Model, photons emitted in the b → sγ transition are predominantly left-handed, while the emission of right-handed photons is not suppressed in various new physics models. Therefore, a measurement of the photon polarisation in decay modes produced by the b → sγ transitions is a promising way to search for physics beyond the Standard Model. The time-dependent CP asymmetry in the $B_s^0 \to \phi\gamma$ decays gives access to the polarisation of the photon. In this talk, a recent measurement of the photon polarisation in the $B_s^0 \to \phi\gamma$ decay made by the LHCb experiment with data collected in 2011 and 2012 will be presented.

18:30 | **338**

Study of the rare B_s^0 and B^0 decays into the $\pi^+\pi^-\mu^+\mu^-$ final state

Ilya Komarov, EPFL-SB-IPEP-LPHE, BSP - Cubotron, CH-1015 Lausanne

A search for two rare B meson decays, $B_s^0 \to \pi^+\pi^-\mu^+\mu^-$ and $B^0 \to \pi^+\pi^-\mu^+\mu^-$, is conducted with data collected between 2011 and 2012 by the LHCb experiment in proton-proton collisions at centre-of-mass energies of 7 and 8 TeV, corresponding to an integrated luminosity of 3.0 fb^{-1}. Decay candidates with pion pairs that have invariant mass in the range 0.5–1.3 GeV/c^2 and with muon pairs that do not originate from resonances are considered. The first observation of the decay $B_s^0 \to \pi^+\pi^-\mu^+\mu^-$ and the first evidence of the decay $B^0 \to \pi^+\pi^-\mu^+\mu^-$ are obtained together with the measurement of their branching fractions. These measurements provide first constraints to the different theoretical models describing these decays.

18:45	**339**	**Characterisation of the Hamamatsu MPPC multichannel array for LHCb SciFi Tracker** *Axel Kuonen, EPFL, BSP 611, Rte de la Sorge, CH-1015 Lausanne* In the context of the LHCb upgrade, the current Inner Tracker (silicon strip) and Outer Tracker (straw tubes) will be replaced with a single technology of scintillating fibre tracker. The SiPM photodetectors used for the read-out need to provide high photon detection efficiency, low optical cross-talk, dense packaging and withstand a high neutron fluence. A customised detector based on the latest technology from Hamamatsu (september 2014), packaged in a 128 channel linear array is the base of the latest measurements. This talk will focus on the results of these detectors, outlook to the next generation devices and focuse on the effect of neutron radiation.
19:00	**340**	**The Belle II Silicon Vertex Detector Readout Chain: Electronics, Power supplies and Cooling System.** *Richard Thalmeier [1], Thomas Bergauer [1], Florian Buchsteiner [1], Markus Friedl [1], Christian Irmler [1], Katsuro Nakamura [2], Siegfried Schmid [1], Hao Yin [1]* *[1] HEPHY Vienna, Nikolsdorfer Gasse 18, AT-1050 Wien* *[2] KEK Japan, 1-1 Oho, Ibaraki, JP-3050801 Tsukuba* The Belle II Experiment at the KEK in Tsukuba, Japan, will explore the CP violation and search for new physics beyond the standard model by measuring the tracks of the collision products of electrons and positrons. The Silicon Vertex Detector has 172 double-sided strip sensors in four layers around the collision point. 1748 CO_2-cooled radiation-hard APV25 chips read out 128 detector strips each and send data out of the radiation zone. The SVD data rate of about 100 Tbytes/sec is processed and reduced: Trigger System, Signal Extraction, Strip Reordering, Pedestal Subtraction, Common Mode Correction, Zero Suppression and Hit-Time-Finding.
19:15		***Transfer to Dinner***
20:00		***Conference Dinner***

Thursday, 03.09.2015, Room EI 7

Time	ID	**TASK-FAKT V: Detector R & D** *Chair: Paul Bühler, SMI Wien*
14:00	**341**	**Calibration of POLAR with polarized X-ray beams at ESRF** *Hualin Xiao, Paul Scherrer Institute, CH-5232 Villigen PSI* Gamma ray burst are short and intense flashes of gamma-rays produced at cosmological distances. POLAR is a compact space-borne detector dedicated for precise measurements of the polarization in the prompt emission of Gamma-ray bursts (GRB). POLAR is developed by an international collaboration of China, Switzerland and Poland. In May 2015, we have performed a systematic calibration of POLAR at several energies (140 keV, 110 keV and 60 keV) and with 100% polarized X-ray beams at beam line ID11 at ESRF. We present some experimental details and data analysis results of the beam test data.
14:15	**342**	**The Radiation Hard Electron Monitor (RADEM) for the ESA JUICE mission** *Alankrita Isha Mrigakshi [1], Wojtek Hajdas [1], Laurent Desorgher [1], Patricia Goncalves [2], Costa Pinto [3], Arlindo Marques [3], Dirk Meier [4]* *[1] Paul Scherrer Institute, CH-5232 Villigen PSI* *[2] Lab. de Instrumacao e Fisica Exp. de Particulas (LIP), Av. Elias Garcia, 14 - 1, PT-1000-149 Lisbon* *[3] Efacec - Engenharia e Sistemas, Rua Eng Frederico Ulrich, PT-4471-907 Moreira da Maia* *[4] Integrated Detector Electronics AS (IDEAS), Gjerdrums Vei 19, NO-0484 Oslo* The RADEM instrument will fly onboard the JUICE spacecraft to characterize the highly dynamic radiation environment of the Jovian system. Its major objective is to measure the energy spectra of energetic electrons and protons up to 40 MeV and 250 MeV respectively. Further goals include the

detection of heavy ions and the determination of the corresponding LET spectra and dose rates. Considering the technical constraints (1 kg, 1 L, 2.2 W) and risks associated with the extreme radiation conditions at Jupiter, extensive Geant4 Monte Carlo simulations are being performed to optimize the performance and design of RADEM. We present here its development status.

14:30 **343**

A radio frequency quadrupole cooler for intense negative ion beams

Tobias Moreau, Johannes Lachner, Martin Martschini, Johanna Pitters, Alfred Priller, Peter Steier, Robin Golser
Faculty of Physics, University of Vienna, Währinger Straße 17, AT-1090 Vienna

The Ion Laser InterAction Setup ILIAS at the VERA-facility in Vienna is dedicated to explore laser photodetachment of negative ions in a gas-filled radio frequency quadrupole cooler. The aim of this project is a novel technique for element-selective negative ion beam purification in accelerator mass spectrometry (AMS). For this purpose, the ion cooler has to be suited to handle atomic and molecular negative ion beams of several μA. We will describe the current state of the setup, which is operational for a year now, and discuss recent experimental results.

14:45 **344**

Performance Studies of a W-CeF_3 Sampling Calorimeter

Myriam Schönenberger [1], Robert Becker [1], Lorenzo Bianchini [1], Günther Dissertori [1], Lubomir Djambazov [1], Mauro Donegà [1], Michael Dröge [1], Christian Haller [1], Urs Horisberger [1], Werner Lustermann [1], Andrea Marini [1], Francesca Nessi-Tedaldi [1], Francesco Pandolfi [1], Marco Peruzzi [1], Ulf Röser [1], Milena Quittnat [1], Francesca Cavallari [2], Ioan Dafinei [2], Marcella Diemoz [2], Clara Jorda Lope [2], Francesco Micheli [2], Giulia D'Imperio [2], Daniele Del Re [2], Simone Gelli [2], Paolo Meridiani [2], Massimo Nuccetelli [2], Giovanni Organtini [2], Riccardo Paramatti [2], Fabio Pellegrino [2], Shahram Rahatlou [2], Livia Soffi [2], Francesco Santanastasio [2], Chiara Ilari Rovelli [2], Luca Brianza [3], Pietro Govoni [3], Arabella Martelli [3], Tommaso Tabarelli de Fatis [3], Nadia Pastrone [4], Valeria Monti [4], Vieri Candelise [5], Giuseppe Della Ricca [5], Federico Vazzoler [5]
[1] Institute for Particle Physics (IPP), ETH Zürich, Otto-Stern-Weg 5, CH-8093 Zürich
[2] Universita e INFN, Roma I, P.le Aldo Moro, 2, IT-00185 Rome
[3] Universita & INFN, Milano-Bicocca, Piazza della Scienza 3, IT-20126 Milano
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[5] Universita e INFN, Trieste, Via Valerio, 2, IT-34127 Trieste

The performance of a sampling calorimeter consisting of tungsten and CeF_3 crystals read out with wavelength shifting fibers was evaluated in two electron beam tests and compared to a GEANT4 simulation. At the Beam Test Facility in Frascati, Italy, electrons of up to 491 MeV delivered a first proof of principle on the performance of the W-CeF_3 prototype. At the SPS-H4 beam line at CERN electrons with an energy of up to 150 GeV were available, allowing for an in depth study of the energy resolution and the response as a function of the impact point.

15:00 **345**

Development of a cryogenic x-ray detector and an application for kaon mass measurement

Ken Suzuki, Kevin Phelan, Johann Zmeskal
Stefan-Meyer-Institut, ÖAW, Boltzmanngasse 3, AT-1090 Wien

The ASPE!CT project aims at developing a cost-competitive, orientation-free, sub-millikelvin, single-stage ADR, based on a GM cryocooler. The project aims to develop an x-ray detector operating at ~300 mK. The resolution should be an order of magnitude better than conventional semiconductor sensors. Despite the fundamental importance for hadron and particle physics, current PDG value of the kaon mass is unsatisfactorily precise due to the large split in the world data (60 keV, ~3 sigma). With the system we will measure kaonic atom x-rays to more precisely determine the kaon mass: to within a few keV.

15:15	**346**	**Measurement of charged particle densities with the ATLAS detector at the LHC** *Wolfgang Lukas* *Universität Innsbruck, Institut für Astro- und Teilchenphysik, Technikerstr. 25/8, AT-6020 Innsbruck* We present measurements of charged particle densities in proton-proton collisions at center-of-mass energy $\sqrt{s}$ = 8 TeV, which were recorded with the ATLAS detector at the LHC in 2012 using a single-arm minimum bias trigger. The data are corrected to well-defined phase-space regions with minimal model dependence. A detailed comparison of corrected data and various Monte Carlo generator predictions is given, including Pythia8 and EPOS tunes. These latest precision results from LHC Run 1 are compared with the first Run 2 results of charged particle density measurements, using 13 TeV proton-proton collision data recorded with ATLAS in June 2015.
15:30	**347**	**ArgonCube - a stepping stone towards future modular large scale liquid argon time projection chamber** *Damian Göldi, University of Bern, Sidlerstr. 5, CH-3012 Bern* The Liquid Argon Time Projection Chamber is a prime candidate detector for future neutrino oscillation physics experiments, underground neutrino observatories and proton decay searches. These future detectors will have an active mass of up to two orders of magnitude larger than what was operated to date. A new R&D program, the ArgonCube, will be presented that aims at developing a novel LAr TPC based on a scalable, fully-modular design. The R&D also aims at the exploitation of new signal readout methods. This talk will focus on specific R&D topics, the advantages of this design and the implementation plans for building and testing prototypes of increasing size over the next years.
15:45		
16:30		***Coffee Break***
		TASK-FAKT VI: Dark Matter *Chair: Jochen Schieck, HEPHY & TU Wien*
17:00	**351**	**Measurement of quarkonium polarization to probe QCD at the LHC: From puzzles to understanding** *Valentin Knünz, HEPHY Wien* The Large Hadron Collider at CERN provides excellent conditions for studies of hadron formation through measurements of quarkonium production. Until quite recently, experimental and phenomenological efforts have not resulted in a satisfactory overall picture of quarkonium production cross sections and quarkonium polarizations, challenging QCD-inspired models. The CMS detector is ideally suited to study quarkonium production in the experimentally very clean dimuon decay channel, allowing precision measurements of the polarizations of the S-wave bottomonium and charmonium states. Surprisingly, no significant polarizations are found in any of the studied quarkonium states, in none of the studied reference frames, nor in a frame-independent analysis. From an experimental point of view, these results, together with recent results from other experiments, clarify the confusing picture originating from previous measurements, which were plagued by experimental ambiguities and inconsistencies. The currently most favored approach to model and understand quarkonium production is non-relativistic QCD (NRQCD), which allows color-octet pre-resonant quark-antiquark states to contribute to quarkonium bound state formation. A large sample of LHC measurements in the field of quarkonium production is interpreted with an original phenomenological approach within the theoretical framework of NRQCD. This phenomenological analysis leads to a coherent picture of quarkonium production cross sections and polarizations within a simple model. These findings provide new insight in the dynamics of heavy quarkonium production at the LHC, an important step towards a satisfactory understanding of hadron formation within the standard model.

17:30 | **352**

Search for Dark Matter annihilations in the Sun using the completed IceCube neutrino telescope.

Mohamed Rameez, Teresa Montaruli
Universite de Genève, DPNC, 24, Quai Ernest Ansermet, CH-1211 Genève

If Dark Matter consists of Weakly Interacting Massive Particles (WIMPs), these might be gravitationally captured in the Sun where they can pair-annihilate into standard model particles. Terrestrial neutrino detectors such as IceCube can observe this as an enhanced neutrino flux in the direction of the Sun. We will present results from an analysis of data from IceCube-DeepCore in the 86 string configuration. Sensitivity has improved with respect to previous searches due to better analysis methods and reconstructions in addition to improved veto techniques using the outer layers of the cubic kilometre array which have been used to reduce the atmospheric muon background and extend sensitivity to the Austral Summer.

17:45 | **353**

Exploring sneutrino dark matter

Suchita Kulkarni [1], Sabine Kraml [2], Chiara Arina [3], Maria Eugenia Cabrera Catalan [4], Ursula Laa [2], Joseph Silk [3]
[1] High Energy Physics Institute, Nikolsdorfer Gasse 18, AT-1050 Vienna
[2] LPSC, Universite Grenoble-Alpes, CNRS/IN2P3, 53 Avenue des Martyrs, FR-38026 Grenoble
[3] Institute of Astroparticle Physics, 98bis Boulevard Arago, FR-75014 Paris
[4] University Sao Paulo, BR-05508 Sao Paulo

Mixed left and right handed supersymmetric sneutrino dark matter is a viable dark matter candidate. In this talk, I explore the reach of LHC run 1 results for this scenario. I will further illustrate the complimentary between direct - indirect dark matter detection experiments and LHC explaining possible ways to constrain this scenario.

18:00 | **354**

Dark Axions Dark Energy

Josef Pradler, Institute of High Energy Physics (HEPHY), Nikolsdorfergasse 18, AT-1050 Vienna

The potential late-time cosmological role of axions in string-inspired scenarios will be highlighted. The latter suggest the existence of a plethora of axion-like fields with masses spread over a huge number of decades. Here we show that these ideas lend themselves to a model of quintessence with no super-Planckian field excursions. The scenario addresses the “why now” problem—i.e., why has accelerated expansion begun only recently—by suggesting that the onset of dark-energy domination occurs randomly with a slowly decreasing probability per unit logarithmic interval in cosmic time. We will then map the fundamental parameters of the scenario onto the parameter space of dark-energy density, equation-of-state parameter, and expansion rate and use current cosmological data to constrain the model.

18:15 | **355**

Looking for dark matter with XENON1T

Lukas Bütikofer, Lab. for High Energy Physics, University of Bern, Sidlerstrasse 5, CH-3012 Bern

Indirect observations tell us that ~27% of our Universe is made out of dark matter. Many experiments try to reveal the unknown by directly detecting WIMP dark matter (weakly interacting massive particles). Among them is XENON1T, the first ton-scale liquid xenon time projection chamber, which is currently under construction at LNGS, Italy. This talk will introduce the experiment and address the challenges of detector readout and data storage. For this purpose, a novel readout scheme has been developed, which allows reaching a high data throughput, a very low detector threshold, and to reject non-interesting events already during data taking.

~~18:30~~ | **356** | *cancelled*

18:30 | **357**

Current status of the CRESST-II experiment

Holger Kluck, Cenk Türkoğlu, Atominstitut, TU Wien, Stadionallee 2, AT-1020 Wien

CRESST-II is a cryogenic experiment directly searching for dark matter using scintillating $CaWO_4$ crystals. A possible dark matter candidate is a weakly interacting massive particle (WIMP). In this work we report the status of CRESST-II phase 2 which operates an upgraded detector setup with improved radio purity and enhanced background rejection. We will present the current limit for the

		spin-independent WIMP-nucleon cross section down to WIMP masses of ~ 1 GeV/c^2, one of the best limits in this low mass region. In addition, we will give an outlook on the potential of further improved detectors for the next CRESST phase.
18:45	358	**Simulation of electron and gamma backgrounds in CRESST-II** *Cenk Türkoğlu, Holger Kluck, Atominstitut, TU Wien, Stadionallee 2, AT-1020 Wien* CRESST-II aims for the detection of weakly interacting massive particles (WIMPs) scattering off the nuclei in the target $CaWO_4$ crystals. CRESST-II phase 2 searches for WIMPs as light as ~ 1 GeV/c^2 which requires a detailed understanding of the background down to ~ 1 keV. A possible background in this energy range is radioactivity from the decay chains of U/Th: beta-particles and gamma-rays from intrinsic contaminations of the $CaWO_4$ crystals and gamma emission from the module housing. We will present the expected background spectrum based on Monte Carlo simulations with the program package Geant4. The agreement with experimental observations will be discussed.
19:00	359	**Gas Emanation System for the GERDA experiment** *Michael Miloradovic, Physik Institut, Universität Zürich, Winterthurerstrasse 190, CH-8057 Zürich, for the GERDA Collaboration.* The GERDA experiment is based on a germanium detector array directly submerged in a liquid argon cryostat searching for the neutrinoless double beta decay of ^{76}Ge at the Laboratori Nazionali del Gran Sasso. To ensure the purity of the liquid argon against gas emissions of the experiment components, an emanation chamber was built at the University of Zurich for outgassing rate and composition analysis. Component materials such as Polytetrafluorethylen (PTFE) and Tetraphenyl-butadiene (TPB) coated Tetratex were studied in Zurich with up to 10^{-13} mbar · l/s rate sensitivity. Argon, xenon and other gas samples were measured to 1 ppm sensitivity.
19:15	360	**PMT calibration system of the XENON1T experiment** *Payam Pakarha, Physik Institute, University of Zürich, Winterthurerstrasse 190, CH-8057 Zürich* The XENON1T detector is currently being constructed to search for galactic WIMPs via scattering off xenon nuclei, and aims to reach much better sensitivity than the current limits. Various types of calibrations are needed to characterize the detector response. In particular, the gains of the 248 photomultiplier tubes (PMTs), used for the signal readout, are required to be calibrated and monitored regularly during the lifetime of the detector. The hardware design of the PMT calibration system of XENON1T detector will be presented together with an overview of the analysis software which is under development.
19:30		
19:45		***Public Lecture***

Friday, 04.09.2015, Room EI 7

Time	ID	**TASK-FAKT VII: Interactions and Fundamental Symmetries at low energies II** *Chair: Helmut Neufeld, Uni Wien*
11:45	361	**η-Photoproduction off Quasi-Free Protons and Neutrons Bound in Light Nuclei** *Lilian Witthauer, Departement Physik, Uni Basel, CH-4056 Basel* At low energies, only phenomenological quark models and lattice QCD can be used to predict the excitation spectrum of the nucleon. Investigations of the nucleon excitation spectrum in the last years have shown a discrepancy between experiment and model descriptions. In η-photoproduction this mismatch is apparent, since former experiments have shown an unusual narrow structure in the cross section on the neutron, which is not visible on the proton. Model descriptions have not yet lead to conclusive results. In this talk, we present results on unpolarised and helicity dependent cross sections and the double polarisation observable E. The results are very promising and will help to constrain the origin and quantum numbers of this unknown structure.

12:00 | **362**

Neutron Imaging Investigations at Pakistan Atomic Research Reactor I (PARR I)

Fareeha Hameed [1], Alina Khan [2], Sajjad Rehman [2], Usman Khurshid [3], Jamshed Zaidi [3]
[1] Elettra Synchrotron, S.S. 14, km 163,5 in Area Science Park 34149 Basovizza, IT-34149 Trieste
[2] Forman Christian College, Ferozepur Road, PK-54600 Lahore
[3] Pakistan Institute of Nuclear Science and Technology, Post Office Nilore, PK-45650 Islamabad

At PARR-I (Pakistan Research Reactor-I), neutron radiography (NR) can be performed using the film method. The NR images have been analyzed by different methods. Images have been taken using different converters and methods. A comparison of these images will lead to optimized results. In this paper the above mentioned techniques have been successfully applied for the qualitative and quantitative analysis of building material, clay bricks, and original archaeological samples from Lahore Fort. This study can help in the up gradation of the facility as well as in further studies on other types of materials and samples.

12:30 | **363**

Snapshots of a Quantum Bouncing Ball realized with the qBounce gravity spectrometer

Martin Thalhammer [1], Hartmut Abele [1], Tobias Jenke [1], Tobias Rechberger [1], Peter Geltenbort [2]
[1] Atominstitut, Technische Universität Wien, Stadionallee 2, AT-1020 Wien
[2] Institut Laue Langevin, 71 Avenue des Martyrs, FR-38000 Grenoble

One class of gravity experiments within the qBounce project focuses on the realization of a Quantum Bouncing Ball, i.e. a measurement of the time evolution of a neutron bouncing above a horizontal plane. In 2014, the spatial probability distribution of this Schrödinger wave packet has been measured for different observation times with a spatial resolution of about 1.5 µm. We illustrate the role of interference weaving the quantum carpet of several quantum states. After a first quantum reflection, several snapshots show the fall of the wave packet.

12:45 | **364**

A High Intensity Muon Beamline Study at the Paul Scherrer Institut

Zachary Hodge, Paul Scherrer Institut, 5232 Villigen PSI

Next generation charged lepton-flavor violation experiments require muon rates higher than those currently achievable by the world's most intense sources. The Paul Scherrer Institut is supporting a new High Intensity Muon Beam Line study known as the HiMB project, in an effort to increase by more than an order of magnitude the rate of surface muons delivered to these experiments by focusing on novel concepts for muon production and beam transport. This contribution will present the current status of the HiMB project as well as efforts regarding target geometries and materials to enhance the surface muon production yield.

13:00 | **365**

Prototype Studies for the Mu3e Scintillating Fiber Hodoscope

Giada Rutar, Paul Scherrer Institut and ETH Zürich, CH-5232 Villigen PSI,
on behalf of the Mu3e Collaboration

The Mu3e experiment searches for the charged lepton flavor violating decay $\mu^+ \rightarrow e^+e^-e^+$. The tracking system to extract the particle vertices and momentum information is based on novel silicon devices (HVMAPS) and is complemented by a hodoscope made of scintillating fibers coupled to silicon photomultipliers, allowing track reconstruction at very high rates. Concerning the hodoscope, the main challenge consists in detecting minimum ionizing particles with as little material as possible to reduce multiple scattering while still maintaining a good timing resolution below 1 ns at detection efficiencies close to 100%. In this talk, results obtained with a three-layer prototype made of 250 micron squared multi-clad fibers will be presented.

13:15	366	**First Measurements of the MicroBooNE Experiment** *Christoph Rudolf von Rohr, University of Bern, Sidlerstrasse 5, CH-3012 Bern* MicroBooNE is a short-baseline neutrino experiment designed to investigate electron (anti-)neutrino excesses observed by LSND and MiniBooNE. It is located near the surface in the Fermilab Booster Neutrino Beam and starts operation in July 2015. The Experiment employs a 170 t Liquid Argon Time Projection Chamber, which combines high track resolution and accurate calorimetry properties to allow distinguishing gamma-like, and electron-like events with high precision. A UV-laser system will be used to perform essential calibrations of the detector. In this talk we will show studies of the cosmogenic backgrounds for the oscillation analyses and first performance measurements from the calibration system.
13:30	367	**Progress towards measuring the ground state hyperfine splitting of antihydrogen** *Clemens Sauerzopf, Stefan-Meyer-Institut, ÖAW, Boltzmanngasse 3, AT-1090 Wien* The matter - anti matter asymmetry observed in the universe today still lacks a quantitative explanation. One possibility that could contribute to the observed state could be a violation of the combined Charge-, Partiy- and Timesymmetries (CPT). To test if the CPT symmetry is broken the ASACUSA collaboration (Atomic Spectroscopy And Collisions Using Slow Antiprotons) at the CERN AD (Antiproton Decelerator) tries to produce a low temperature beam of antihydrogen - the most simple atomic system built only of anti particles. Fist preliminary results of the detector performance und progress of the experiment for 2014 and 2015 will be discussed.
13:45	368	**Accelerator Mass Spectrometry of Cesium Isotopes** *Magdalena Kasberger, Johannes Lachner, Martin Martschini, Alfred Priller, Peter Steier, Robin Golser* *Universität Wien, Fakultät für Physik, Währingerstraße 17, AT-1090 Wien* Measuring ratios and concentrations of radioisotopes is a very successful method in environmental research. Decay counting of ^{137}Cs ($T_{1/2}$ = 30.17 a) has proven to be a very useful method and is well established. The full potential of Cs isotopes could be reached by also measuring ^{135}Cs ($T_{1/2}$ = 2.3 Ma), but requires another method than decay counting. Accelerator mass spectrometry of both isotopes is a promising solution and would allow not only tracing but also identifying sources. We present a comprehensive study on accelerator mass spectrometry of cesium at VERA. Results on negative ion formation of cesium molecules in the negative ion source and on the transmission through the accelerator will be discussed.
14:00		***END***
		END OF CONFERENCE

ID	TASK-FAKT POSTER
381	**The Upgrade of CMS tracker experiment at HL-LHC** *Johannes Großmann , HEPHY, TU Wien, Nikolsdorfer Gasse 18, AT-1050 Wien, on behalf of the CMS - tracker collaboration* The LHC at CERN is planning to increase its luminosity to 5 x 10^{34} $cm^{-2}s$ after 2020 (HL-LHC). This implies for the CMS experiment, that the number of pp-interactions per bunch crossing will increase to 100 – 200. Particle tracks are measured with high precision in the tracker, which is based on silicon sensor technology. The current tracker will be replaced due to sensor degradation, insufficient granularity, and the requirement to include the tracker in the L1-trigger decision. A new tracker with reduced material budget and binary readout will be constructed. Prototypes for the silicon pixel-strip modules of the inner layer of the tracker have been built and electrically characterized.

382	**Vertex detector R&D for CLIC** *Niloufar Alipour Tehrani, ETH Zürich, c/o CERN, 1211 Genève 23* A vertex-detector based on the hybrid pixel-detector technology is under development for the proposed multi-TeV linear e^+e^- Compact Linear Collider (CLIC). High precision requirements on the performance of the vertex detector limit the material budget to only 0.2% X0 per layer. Sensors and readout ASICs will each have to be thinned down to 50 μm. Assemblies using planar pixel sensors (50 - 500 μm) hybridised to Timepix ASICs are characterised at DESY using the EUDET beam telescope. The test-beam setup is simulated using a GEANT4-based simulation framework tuned with TCAD silicon device simulations. Recent results on the test-beam analysis and simulation of the data will be presented.
383	**Developing Silicon Strip Detectors for HEP experiments with a large-scale commercial foundry** *Thomas Bergauer [1], Axel König [1], Marko Dragicevic [1], Johannes Hacker [2], Ulf Bartl [2]* *[1] HEPHY Vienna, Nikolsdorfer Gasse 18, AT-1050 Wien* *[2] Infineon Technologies Austria AG, Siemensstraße 2, AT-9500 Villach* Silicon-based sensors are well established as tracking devices in modern particle detectors, like the CMS Experiment at CERN's Large Hadron Collider. However, the required quantities often exceed the capabilities of academic institutions and commercial vendors are necessary for the production. Therefore, HEPHY Vienna is developing a production process for planar silicon strip sensors together with the semiconductor manufacturer Infineon. Four runs on 6 inch wafers were manufactured and characterized up to now. Along with results from electrical characterization, results gained from beam tests at the SPS at CERN will be presented.
384	**The Barrel Scintillator Tile Hodoscope for PANDA** *Dominik Steinschaden, Stefan Meyer Institute for Subatomic Physics, Boltzmanngasse 3, AT-1090 Vienna* The PANDA experiment, currently under construction at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt, Germany, addresses fundamental questions in hadron and nuclear physics via interactions of antiprotons with nucleus / nuclei. The barrel-shaped scintillator tile hodoscope will be one of the key components to determine the time origin of the tracks and provides particle identification for slow particles below 700 MeV/c. To achieve a time resolution < 100 ps plastic scintillator tiles with minimum material budget read out by Silicon Photomultiplier (SiPM) have been selected. In this presentation, an overview of the current development status with a particular focus on Monte Carlo based simulation studies will be
385	**Development of a high-brightness low-energy muon beamline** *Ivana Belosevic [1], Aldo Antognini [1], Andreas Eggenberger [1], Kim Siang Khaw [1], Klaus Kirch [1], Florian Piegsa [1], David Taqqu [1], Gunther Wichmann [1], Yu Bao [2], Malte Hildebrandt [2], Andreas Knecht [2], Angela Papa [2], Claude Petitjean [2], Stefan Ritt [2], Kamil Sedlak [2], Alexey Stoykov [2], Daniel M. Kaplan [3], Thomas J. Phillips [3]* *[1] Institute for Particle Physics, ETH Zürich, Otto-Stern Weg 5, CH-8093 Zürich* *[2] Paul Scherrer Institute, CH-5232 Villigen PSI* *[3] Illinois Institute of Technology, 3300 S Federal St, 60616 Chicago USA* A novel μ^+ beamline that would reduce the phase space of the input beam by a factor of 10^{10} with 10^{-3} efficiency was proposed in [PRL97, 194801(2006)]. The beamline consists of three stages: transverse compression, longitudinal compression and extraction into the vacuum. Compression is achieved by stopping μ^+ in helium gas at cryogenic temperatures and applying electric and magnetic fields and a gas density gradient. Construction of such a beamline is challenging because of the requirement for high electric fields and cryogenic temperatures. Longitudinal compression stage was successfully tested in 2011 and 2014. The current development progress will be presented. This work is supported by SNF grants 200020_146902 and 200020_159754.
386	*cancelled*

387	**Characterisation of scintillating fibre tracker in neutron radiation environment** *Olivier Girard, Laboratoire de physique des hautes énergies, EPFL, Rte de la Sorge, CH-1015 Lausanne* The focus of our research is on the development of Scintillating Fibre (SciFi) Tracker in the context of two experiments. The LHC Beam Gas Vertexing (BGV) detector, a monitoring device providing real-time beam size measurements to improve the luminosity calibration for other LHC experiments and the LHCb SciFi Tracker upgrade, replacing Inner and Outer Tracker with a total area of 350 m^2 in LS1. The presentation will explain the experimental setup used for characterisation and quality control of the SciFi modules and focus on their operation in neutron radiation environment. The setup allows to operate at -40°C detectors irradiated at a neutron fluence of $12 \cdot 10^{11}$ 1 MeV N_{eq}/cm^2.
388	**Development of a cryogenic x-ray detector and an application for kaon mass measurement.** *Kevin Phelan, Ken Suzuki, Johann Zmeskal* *Stefan Meyer Institute for Subatomic Physics, Boltzmanngasse 3, AT-1090 Vienna* The ASPE!CT project aims to develop a commercially viable, cryogen-free, single-stage, adiabatic demagnetisation refrigerator for use at ~500 mK. The project will greatly advance current technology making it useable for a wide range of cryogenics sensors. Later we will push the temperature range to 30 mK, introducing continuous, high-power, low-temperature cooling. We will improve measurements of the kaon mass, which is essential for strangeness hadron physics. Current data contain two non-conclusive measurements (~3 sigma, 60 eV). We will test various cryogenic detectors designs to achieving the necessary resolution at ~10 keV x-ray energies created in kaonic atoms.
389	**Mu3e: Experimental Search for the Lepton Flavour Violating Decay $\mu^+ \rightarrow e^+ e^- e^+$** *Simon Corrodi, Institute for Particle Physics, ETH Zürich, Otto-Stern-Weg 5, CH-8093 Zürich* Effects of "new physics" beyond the Standard Model of elementary particle physics can be searched for in direct production at high energies, e.g. at the LHC but also through their influence as virtual particles on rare processes. Mu3e is a dedicated experiment for the rare lepton flavour violating decay $\mu^+ \rightarrow e^+ e^- e^+$. Its ultimate goal is to find or exclude this process if it occurs more than once in 10^{16} muon decays. This poster shows the experimental concept, with the focus on the timing-detector made of scintillating fibers coupled to Silicon photomultipliers and there readout.
390	**Carrier free $^{10}Be/^{9}Be$ measurement with AMS** *Marco Ploner, Johannes Lachner, Peter Steier, Robin Golser* *Fakultät für Physik, Universität Wien, Währingerstraße 17, AT-1090 Wien* Measuring $^{10}Be/^{9}Be$ ratios is a powerful tool to date marine deposits up to ages of 10 Myr if it succeeds to determine minute amounts of the long-lived ^{10}Be and the stable ^{9}Be. The conventional approach determines this ratio by separately measuring ^{10}Be and ^{9}Be concentrations with two different methods. With the new carrier free method only a single Accelerator Mass Spectrometry measurement is necessary. This poses challenges to the preparation of samples and to very sensitive measurements of both ^{10}Be and ^{9}Be. We present the establishment of this method at the VERA laboratory and show results from iron-manganese nodules and crusts and the potential of these experiments in an astrophysical context.
391	**Status of the ILIAS negative ion cooler project** *Tobias Moreau, Johannes Lachner, Martin Martschini, Johanna Pitters, Alfred Priller, Peter Steier, Robin Golser* *Faculty of Physics, University of Vienna, Währinger Straße 17, AT-1090 Vienna* The Ion Laser InterAction Setup ILIAS at the VERA-facility in Vienna is dedicated to explore laser photodetachment of negative ions in a gas-filled RFQ ion cooler. The aim of this project is a novel technique for element-selective negative ion beam purification in accelerator mass spectrometry (AMS). For this purpose, the ion cooler has to be suited to decelerate and cool intense atomic and molecular negative ion beams with keV energies. Following several years of development work, we have recently demonstrated a selective depletion of unwanted ion species by 5 orders of magnitude.

392	**Cryogenic developments and studies for a novel low-energy muon beam line.** *Gunther Wichmann [1], Aldo Antognini [1], Ivana Belosevic [1], Andreas Eggenberger [1], Kim Siang Khaw [1], Klaus Kirch [1], Florian Piegsa [1], Karsten Schuhmann [1], David Taqqu [1], Yu Bao [2], Malte Hildebrandt [2], Andreas Knecht [2], Angela Papa [2], Claude Petitjean [2], Stefan Ritt [2], Kamil Sedlak [2], Alexey Stoykov [2], Daniel M. Kaplan [3], Thomas J. Phillips [3]* *[1] Institute for Particle Physics, ETHZ, Otto-Stern-Weg 5, CH-8093 Zürich* *[2] Paul Scherrer Institut, CH-5232 Villigen PSI* *[3] Illinois Institute of Technology, 3300 South Federal Street, Chicago, IL 60616-3793, USA* A novel tertiary muon beam line has been proposed in [PRL 97, 194801 (2006)]. The method uses positive muons stopped in ^{4}He gas at low temperature. A density gradient enables compressing the stopped muons transversely with electric and magnetic fields. Afterwards the muons are further compressed longitudinally. A 1 m long horizontal cryostat provides a constant cooling power of 1 W at 7 K in a 5 T field. A large gas gradient was demonstrated by means of neutron radiography using ^{3}He. This work is supported by the grants SNF 200020_159754 and ETH-35 14-1.
393	*cancelled*
394	**Investigation of systematic effects of PERKEO III** *Daniel Moser [1], Michael Klopf [1], Gertrud Konrad [1], Hartmut Abele [1], Christoph Roick [2], Lukas Raffelt [2], Ulrich Schmidt [2], Torsten Soldner [3], Heiko Saul [4], Bastian Märkisch [4] , Jens Klenke [4], Wilfried Mach [1], Peter Lennert [2]* *[1] Atominstitut, Technische Universität Wien, Stadionallee 2, AT-1020 Vienna* *[2] Physikalisches Institut, Universität Heidelberg, Im Neuenheimer Feld 226, DE-69120 Heidelberg* *[3] Institute Laue-Langevin, 71 avenue des Martyrs, FR-38042 Grenoble* *[4] FRM II, Technische Universität München, Lichtenbergstr.1, DE-85748 Garching* Free neutron beta decay is well described by the Standard Model of particle physics. The PERKEO III experiment is inter alia dedicated to measure the proton asymmetry C in polarized neutron decay. This poster deals with systematic effects, such as the magnetic mirror effect, charged particle retardation, as well as neutron beam and instrument background, which have to be considered in the evaluation of C. For the correction of the magnetic mirror effect, e.g., the magnetic field of PERKEO III has been mapped. Other systematic effects have been tackled via the simulation of electromagnetic fields and charged particle trajectories.
395	**Active stabilization of a magnetic field for the nEDM experiment** *Michał Rawlik, Department of Physics, ETH Zürich, Otto-Stern-Weg 5, CH-8093 Zürich* Measurements of the electric dipole moment of the neutron provide stringent limits on various standard model extensions. The main challenge in these measurements is reaching a magnetic field stability on the picotesla level. The stability may be greatly improved by putting the apparatus in the middle of a coil system that actively counteracts magnetic disturbances. At ETH a small-scale model of the compensation system, as well as a device capable of mapping a magnetic field, is developed. The principle of operation of both will be presented, together with preliminary results. The work is supported by SNF grant #149211.
396	**Numerical Simulations for the measurement of the Groundstate Hyperfine Splitting of Antihydrogen** *Bernadette Kolbinger, Stefan Meyer Institute, ÖAW, Boltzmanngasse 3, AT-1090 Vienna* The ASACUSA collaboration at the Antiproton Decelerator of CERN aims to measure the groundstate hyperfine structure of antihydrogen using a Rabi-like experimental setup. The symmetry of CPT will be tested by this experiment. In order to predict results and properties of this measurement, simulations of the setup are being done using the particle physics toolkit Geant4 which we modified to support atomic transitions in a microwave field, atomic deexcitation processes and antiproton annihilation at our energy regime. In this poster, structure and results of our simulation program will be discussed.