Tuesday, 27.08.2019, Room G 55

Time	ID	TASK I: Precision Physics at Low Energy *Chair: Klaus Kirch, ETH Zürich*
14:00	301	**Analysis of the hyperfine splitting of the 5 → 4 transitions in muonic Re-185 and Re-187** *Stergiani Marina Vogiatzi, Paul Scherrer Institut & ETH Zürich, for the MUX collaboration* An ongoing experiment at PSI aims to determine the nuclear charge radius of ^{226}Ra - needed by an experiment aiming at measuring atomic parity violation in a radium ion - by means of muonic atom spectroscopy. An intermediate test was performed with a ^{185,187}Re target which is the last stable element whose nuclear charge radius has not been measured and shows similar nuclear structure effects as radium. In ^{185,187}Re there exists an intermediate domain of energy states in which the quadrupole splitting is proportional to the spectroscopic quadrupole moment. In this contribution, the analysis of the $5g$ $4f$ hyperfine transitions in muonic ^{185,187}Re for the extraction of its spectroscopic quadrupole moment is presented.
14:15	302	**Multi-pass optical cavity for the measurement of the hyperfine splitting in muonic hydrogen** *Miroslaw Marszalek [1], Aldo Antognini [1], Karsten Schuhmann [2], Manuel Zeyen [2], Laura Sinkunaite [1]* *[1] Paul Scherrer Institut, [2] ETH Zürich* The measurement of the hyperfine splitting (HFS) in muonic hydrogen at the ppm level by means of pulsed laser spectroscopy allows for extraction of the Zemach radius of the proton at the per mille level. This measurement, ongoing at the Paul Scherrer Institute, features a novel laser system to excite the HFS transition at 6.8 μm. To increase the transition probability, we will use a multipass optical cavity, which enhances the average light fluence on the muonic atoms. In this talk, we will present the principle of the experiment, the cavity requirements and the current state of the optical design. Work supported by SNF project 200021_165854 and ERC CoG. #725039.
14:30	303	**Design of the detection system for the measurement of the hyperfine splitting in muonic hydrogen** *Laura Sinkunaite [1], Aldo Antognini [1,2], Malte Hildebrandt [1], Klaus Kirch [1,2], Andreas Knecht [1], Franz Kottmann [2], Miroslaw Marszalek [1], Jonas Nuber [2], Elisa Rapisarda [1], Karsten Schuhmann [2], Ivo Schulthess [2], Anna Soter [1], David Taqqu [2], Manuel Zeyen [2], on behalf of the CREMA collaboration* *[1] Paul Scherrer Institute, [2] ETH Zürich* Muonic hydrogen is a bound-state of a negative muon and a proton. Since a muon is 207 times heavier than an electron, the energy levels of muonic hydrogen are very sensitive to the nuclear structure. By means of laser spectroscopy, we are aiming at the measurement of the ground-state hyperfine splitting to extract the two-photon exchange contribution and the Zemach radius of the proton. This experiment is being conducted at Paul Scherrer Institute and it requires designing a detector system capable of measuring the MeV-energy X-rays produced by the muonic atoms. In this talk we will introduce the simulations and the initial laboratory tests of the detection system. Work supported by SNF project 200021_165854 and ERC CoG. #725039.

14:45 | **304**

Thin-Disk Laser for the Measurement of the Hyperfine-Splitting in Muonic Hydrogen

Manuel Zeyen [1], Aldo Antognini [2], Miroslaw Marszalek [2], Karsten Schuhmann [1], Laura Sinkunaite [1], on behalf of the CREMA collaboration
[1] ETH Zürich, [2] Paul Scherrer Institute

The magnetic (Zemach) radius of the proton can be determined from the ground-state hyperfine splitting (HFS) of muonic hydrogen (bound state between muon and proton). At PSI, Switzerland, we aim to measure this HFS at the ppm level by means of laser spectroscopy.
Since a high laser fluence at an unusual wavelength (6.8 micrometer) is required to excite the HFS, a novel laser system will be developed. Its back bone is a thin-disk laser insensitive to thermal lens effects, delivering single-frequency pulses at 1030 nm with hundreds of mJ which will be converted to 6.8 micrometer via non-linear conversion stages. We will present results related to the thin-disk laser development.

Work supported by SNF project 200021_165854 and ERC CoG. #725039.

15:00 | **305**

Ramsey spectrometer for matter-antimatter experiments

Amit Nanda, Austrian Academy of Sciences

The ASACUSA collaboration, based at the AD of CERN aims to measure the ground state hyperfine structure of antihydrogen at a ppm level relative precision with a Rabi-type beam experiment [1]. For the same, a spectrometer line has been fully commissioned with studies on hydrogen, with a relative precision of 10^{-9} [2]. This precision can be pushed further by the Ramsey method. Using the existing stripline cavity, the decisive Ramsey fringes near the transition frequency can't be observed, thus demanding the finite element simulations and design of various options for new cavity and transmission lines, which shall be discussed.

[1] A. Mohri and Y. Yamazaki, Europhys. Lett. 63, 207–213 (2003).
[2] M. Diermaier et al., Nat. Commun. 8, 15749 (2017)

15:15 | **306**

Recent Measurements on Vacuum Muonium Production

Narongrit Ritjoho [1], Andreas Knecht [1], Anna Soter [3], Aldo Antognini [2], Klaus Kirch [1,2]
[1] ETH Zürich, [2] Paul Scherrer Institut, [3] Max-Planck-Gesellschaft

Recently, we have performed measurements on vacuum muonium formation at room and cryogenic temperatures at the the Paul Scherrer Institute. These measurements were conducted in the context of our efforts on the investigation of the gravitational interaction of antimatter and second-generation particles.
In our room temperature setup, the muon beam impinged on several targets such as zeolite powder, ablated aerogel and semiconductor carbon-nanotubes. The relative yield and velocity of the observed vacuum muonium are presented. At cryogenic temperature, the targets were dry and superfluid-helium coated aerogel. While vacuum muonium was not observed directly in this case, we did observe the formation of muonium by means of the spin rotation technique. This contribution will present and compare.

15:30 | **307**

Data Analysis for the PSI Neutron Electric Dipole Moment Experiment

Nicholas Ayres, ETH Zürich, on behalf of the PSI nEDM collaboration

The neutron's electric dipole moment is a probe sensitive to a broad range of CP violating physics beyond the standard model. However, a nonzero measurement remains elusive, despite successive measurements performed worldwide since 1951 improving in sensitivity by over 6 orders of magnitude. The most recent measurement took data from 2015 - 2016 at the ultracold neutron source at the Paul Scherrer Institute, and is set to publish in the coming months the first improvement since 2006 in the sensitivity of this measurement. I will present the experiment, the data analysis methodology and progress towards the publication of the new result.

The author gratefully acknowledges support from the SNF via grant no. 200020-172639.

15:45	**308**	**Next generation active magnetic shielding for n2EDM** *Solange Emmenegger, ETH Zürich* The n2EDM experiment hosted at the Paul Scherer Institute is seeking an improvement in the measurement of the neutron electric dipole moment (nEDM) by one order of magnitude. In order to achieve this goal, it is crucial to stabilize the magnetic fields inside the precession chamber, where neutrons are stored and Ramsey measurements are performed, down to 30 fT. This is especially challenging considering that the surrounding magnetic fields undergo substantial changes due to the activity of neighboring experiments. Therefore, an active magnetic shielding, which compensates the surrounding field and the occurring field changes via a feedback loop, is indispensable. We present how our compensation system design can meet the high performance goal despite various challenges, such as spatial constraints.
16:00	**309**	**Development of a caesium magnetometer array for the n2EDM experiment** *Georg Bison, Duarte Pais, Paul Scherrer Institut* The search for the neutron electric dipole moment d_n, carried on by the n2EDM experiment at PSI could provide a better insight on the baryon asymmetry of the universe and/or new physics. The experimental goal to reach an order of magnitude higher sensitivity than previous efforts, means its systematic effects need to be better controlled. The appearance of a false d_n ($d^{false}_{Hg \rightarrow n}$) due to the different motional magnetic fields seen by the neutrons and Hg atoms of the comagnetometer is one of such obstacles. This study aims at developing and building a Cs-Magnetometer array to measure the magnetic field in the experiment with high-enough precision and accuracy to control the associated systematic uncertainty with $d^{false}_{Hg \rightarrow n} \leq 4 \times 10^{-28}$ ecm. We are grateful for the financial support from the Swiss National Science Foundation, projects 163988 and 172626.
16:15	**310**	**Johnson-Nyquist Noise Studies for the n2EDM Experiment at PSI** *Pin-Jung Chiu, PSI & ETHZ* The n2EDM experiment being mounted at the Paul Scherrer Institute (PSI) will search for the neutron electric dipole moment (nEDM) with a baseline sensitivity of 1.1×10^{-27} e cm. With the increase in statistical sensitivity, an accordingly better control of systematic effects is required. This study investigates the impact of Johnson-Nyquist noise originating from thermal agitations of electrons in the electric conducting materials in the apparatus. The presentation covers the concepts and methods used to calculate the magnetic noise and shows preliminary results discussing the possible impacts on the measurement sensitivity. (This project is supported by SNF \#200021_169596.) nEDM project: *https://www.psi.ch/en/nedm*
16:30		***Coffee Break***
17:00	**311**	**Momentum Spectroscopy of Neutron Beta Decay Products with NoMoS** *Waleed Khalid [1], Raluca Jiglau [1], Daniel Moser [1], Torsten Soldner [2], Manfred Valentan [1], Johann Zmeskal [1], Gertrud Konrad [1]* *[1] Stefan Meyer Institute, ÖAW, [2] Institute Laue Langevin* Precision experiments in free neutron beta decay allow probing for physics beyond the Standard Model in a complementary manner to searches conducted at the LHC. NoMoS, the neutron decay products momentum spectrometer, aims to measure the momentum spectra of the charged decay products (electron and proton) in neutron beta decay with high precision. The spectrometer utilizes the concept of an **R** x **B** drift of a charged particle in a uniformly curved magnetic field to map its momentum to a drift distance. In this talk, a status update alongside the measurement and detection principles of the experiment will be presented.
17:15	**312**	**Kaonic Deuterium X-Ray Measurements with the SIDDHARTA-2 Apparatus at DAFNE** *Marlene Tüchler, Johann Zmeskal, Stefan Meyer Institute* The SIDDHARTA-2 experiment aims to observe the energy shift and width of the kaonic deuterium ground state induced by the strong interaction via X-ray spectroscopy.

		This measurement requires an improvement of the signal-to-noise ratio of at least a factor of ten compared to SIDDHARTA due to the very low kaonic deuterium X-ray yield. Therefore, three updates to the apparatus are implemented: a lightweight, cryogenic target cell, a large-area X-ray detection system consisting of Silicon Drift Detectors, and a dedicated veto system to suppress signal-correlated background. The characterisation of these updates will be discussed.
		TASK II: Dark Matter and Neutrino I *Chair: Paolo Crivelli, ETH Zürich*
17:30	**313**	**Beyond colliders: exploring the dark sector with beam dumps** *Elena Graverini, EPFL* Given the lack of smoking gun signatures that point to an energy scale to be explored, the landscape of post LHC Run2 motivates searching for new physics in a region that has not been well covered so far, i.e. physics involving new interactions much weaker than the electroweak scale. Beam dump facilities of high intensity electron and proton beams can probe an unexplored parameter space of couplings and masses for a wide range of SM extensions, empowering a diverse physics program that covers searches for DM, HS, Axions and Flavour physics. This talk will review the experimental perspectives for beam dump searches, with a focus on the CERN Beam Dump Facility and on SHiP, the first zero-background proton dump experiment.
18:00	**314**	**Dark sectors searches at high-intensity colliders** *Federico Leo Redi, EPFL* Cosmological and astrophysical observations point to the fact that the Standard Model (SM) of particle physics accounts for less than 5% of the total energy density of our Universe. What remains is defined as dark energy and dark matter (DM). More specifically, indirect gravitational interactions measurements indicate that DM is five times more abundant than ordinary baryonic matter. The existence of DM does not directly point to a specific mass scale for New Physics (NP), conversely a dark sector of particles not interacting through the known SM forces might exist. These new dark particles could communicate to the SM through so-called "portals". This talk will cover dark sectors future and present experimental searches with a specific focus on high-intensity colliders.
18:15	**315**	**Search for long-lived heavy neutrinos with the CMS Experiment** *Vinzenz Stampf, ETH Zürich, for the CMS collaboration* Heavy neutrinos are predicted by numerous Beyond the Standard Model theories that provide answers to long-standing questions, such as the smallness of neutrino masses, matter-antimatter asymmetry and the nature of dark matter. In this talk, a status report on a search for a long-lived heavy neutrino decaying to three leptons is presented. This analysis focuses on the final state with one displaced lepton pair and uses the resulting invariant mass to look for an excess between 1 and 10 GeV. Data-driven methods are developed to model misidentified and non-prompt lepton backgrounds in the signal region. A sample of 41.53 fb^{-1} of proton-proton collision data collected with the CMS detector in 2017 at $\sqrt{s}$ = 13 TeV is used.
18:30	**316**	**NA64 - Search for dark matter at CERN SPS** *Emilio Depero, Paolo Crivelli, Laura Molina Bueno, Balint Radics, ETH Zürich, for the NA64 collaboration* NA64 is a fixed target experiment at the CERN SPS aiming at a sensitive search for hidden sectors. The A′, called dark photon, could be generated in the reaction $e^-Z \rightarrow e^-ZA'$ of 100 GeV electrons dumped against an active target which is followed by the prompt invisible decay $A' \rightarrow \chi\chi$. The experimental signature of this process would be a clean event with an isolated electron and large missing energy in the detector. Results on the search for the visible $A' \rightarrow e^+e^-$ decays, as well as $X \rightarrow e^+e^-$ decay of a new 17 MeV X boson, which could explain a recently observed anomaly in the ^{8}Be transitions will be also discussed.
18:45		
19:30		***Public Lecture***

Time	ID	**TASK III: Detector** *Chair: Ilse Krätschmer, HEPHY Wien*
17:00	321	**Performance of the Belle II Silicon Vertex Detector** *Christoph Schwanda, Austrian Academy of Sciences, on behalf of the Belle II SVD collaboration* The Belle II experiment at the SuperKEKB collider of KEK (Japan) will accumulate 50 ab^{-1} of e^+e^- collision data at an unprecedented instantaneous luminosity of 8×10^{35} $cm^{-2}s^{-1}$, about 40 times larger than its predecessor. The Belle II vertex detector plays a crucial role in the rich Belle II physics program, especially for time-dependent measurements. It consists of two layers of DEPFET-based pixels and four layers of double sided silicon strip detectors (SVD). The vertex detector has been recently completed and installed in Belle II for the physics run started in spring 2019. In this presentation, we summarise the construction and installation of SVD and report first results from SVD commissioning and SVD performance in the first SuperKEKB collisions.
17:15	322	**SiPM detectors for the LHCb SciFi tracker upgrade** *Sebastian Schulte, EPFL, on behalf of the SciFi tracker collaboration* The LHCb experiment obtained outstanding results with the data collected during last two LHC data taking periods. An upgrade of the LHCb detector will be installed aiming for a full detector readout at 40 MHz for Run 3 and 4. To cope with the increased luminosity, the current downstream tracking system will be replaced by the the Scintillating Fibre tracker. The SciFi tracker uses 250 μm scintillating fibres densely packed and arranged in layers readout by Silicon Photo-Multipliers (SiPMs). Each single detector has to be characterised in terms of its electrical, geometrical and optical properties. A testing facility to characterise the 5500 multichannel arrays has been developed and employed during the production testing.
17:30	323	**Integration of the FELIX readout in the ATLAS ITk Pixel data transmission chain** *Meghranjana Chatterjee, University of Bern* At the end of the Run 2 of the LHC the current Inner Detector (ID) of the ATLAS experiment will need to be replaced. A new all-silicon Inner Tracker (ITk) is currently being designed and given the increase in the simultaneous p-p collisions, its data-taking system will have to use radiation hard high-speed data links at 10 Gbps, for a total bandwidth of ~ 60 Tbps. In this talk, the concept of the data transmission chain as well as its validation will be presented. The integration with the FELIX backend readout will be shown as well with results from a system where this readout is coupled to an existing set of silicon pixel readout chips.
17:45	324	**Characterisation of the opto-electrical data conversion system for the ATLAS detector upgrade** *Roman Müller, Uni Bern* For operation at the High Luminosity LHC, the ATLAS detector will be upgraded in 2024 - 2026. Its Inner Tracker will be able to handle pile-up conditions of μ = 200 which increases the digital data output significantly. A new optical to electrical conversion stage, the Optoboard system, needs to be designed in order to cope with this higher bandwidth requirement. In this talk I present the first prototype component development for the Optolink system with regards to powering and the cooling control. Results from measurement on full opto-system prototypes are also presented.

18:00	**325**	**Serial powering and high hit rate efficiency measurement for the Phase 2 Upgrade of the CMS Pixel Detector.** *Daniele Ruini, ETH Zürich* A serially powered pixel detector is the baseline choice for the High-Luminosity upgrade of the inner tracker of the CMS experiment. A serial power distribution scheme requires less cable mass, improves power efficiency and is less susceptible to voltage transients than parallel powering. A prototype pixel-readout-chip has been designed for serial powering in 65 nm-CMOS technology by the RD53 collaboration. Performance results from testing the prototype,called RD53A, are reported. The performance of RD53A operating in a chain consisting of four serially powered chips is compared with the performance under a conventional powering scheme. Additionally, the read-out efficiency of RD53A in a high hit rate environment is presented. The results indicate that serial powering is a robust and reliable power distribution scheme.
18:15	**326**	**zfit: scalable pythonic fitting** *Jonas Eschle, Albert Puig Navarro, Rafael Silva Coutinho, Universität Zürich* Statistical modelling is a key element for High-Energy Physics (HEP) analysis. Currently, most of this modelling is performed with the ROOT/RooFit toolkit which is written in C++ and poorly integrated with the scientific Python ecosystem. We present zfit, a new alternative to RooFit, written in pure Python. Built on top of TensorFlow (a modern, high level computing library for massive computations), zfit provides a high level interface for advanced model building and fitting. It is also designed to be extendable in a very simple way, allowing the usage of cutting-edge developments from the scientific Python ecosystem in a transparent way. This presentation introduces the main features of zfit and its extension to data analyses in the context of HEP experiments.
18:30	**327**	**ArgonCube: A Modular Approach for Liquid Argon Time Projection Chambers** *Roman Matthias Berner, University of Bern* The ArgonCube Collaboration developed a novel design for Liquid Argon Time Projection Chambers (LAr TPCs), segmenting the total detector volume into a number of electrically and optically isolated TPCs sharing a common cryostat. For the charge-readout, a pixelated anode plane is employed, providing unambiguous 3D event reconstruction. To minimize inactive and dense material a new technology is used for field-shaping, replacing the classical field-cage by a continuous resistive foil. Large dielectric planes inside the field-shaping structure allow for an efficient detection of prompt scintillation light. The technology proposed by ArgonCube will be applied to the near-detector of the Deep Underground Neutrino Experiment, DUNE, and being proposed also for one of the far-detectors.
18:45	**328**	**First dual-phase xenon TPC with SiPM readout and its ultra-low energy calibration with ^{37}Ar** *Kevin Thieme, University of Zürich* As part of the R&D towards the ultimate dark matter observatory DARWIN, we conduct tests with novel silicon photomultipliers (SiPM) for vacuum ultra violet (VUV) light being a promising alternative to traditionally used photomultiplier tubes. In particular, we are operating a small-scale dual phase (liquid/gas) xenon time projection chamber (TPC) instrumented with VUV-sensitive SiPMs from Hamamatsu for light and charge readout, being the first in the field. After a successful commissioning in Summer 2018, in this talk, we present the results from ^{83m}Kr calibration data to proof the principle of the detector design with the new photosensors. Moreover, we will show the analysis from a recently performed low-keV energy calibration with ^{37}Ar gas at the energy threshold of the detector.
19:00		
19:30		***Public Lecture***

Time	ID	TASK IV: High Energy Physics I *Chair: Günther Dissertori, ETH Zürich*
14:00	331	**First Observation of the Seeded Proton Bunch Self-Modulation in Plasma** *Marlene Turner, CERN* The Advanced Wakefield Experiment (AWAKE) recently demonstrated that a 400 GeV/c proton bunch can drive high amplitude plasma wakefields. To effectively excite wakefields, the drive bunch length should be on the order of the plasma electron wavelength (typically < 3mm). However, available proton bunches at CERN have an rms length of 6-12 cm. To be still able to excite high-amplitude wakefields, the experiment uses the plasma to modulate the bunch density, a process called the Seeded Self-Modulation. Transverse seed wakefields driven by the bunch in plasma act back on the bunch itself and periodically focus and defocus it, creating a microbunch train. This microbunch train can then resonantly excite a high amplitude plasma wakefield. Using the two-screen diagnostic in AWAKE, we measured the transverse proton bunch distribution downstream the plasma exit and proved that: 1) a 400 GeV/c proton bunch self-modulates in plasma; 2) the driven wakefield amplitudes grows from their initial seed level along the bunch and along the plasma. In this contribution, we discuss the physics behind the seeded self-modulation process and show the experimental results.
14:30	332	**Review of flavour anomalies** *Andrea Mauri, Universität Zürich* The concept of lepton universality is a cornerstone prediction of the Standard Model (SM). In the last few years, hints of lepton universality violation have been observed in both tree-level $b \to cl\nu$ and rare $b \to sll$ beauty decays. These results, combined with the tensions observed in angular and branching fraction measurements of rare semileptonic decays, point to a coherent pattern of anomalies that could represent the first observation of Physics beyond the SM. This presentation will review these anomalies, will give an outlook for the near future and will discuss the way these measurements can be used to characterise possible New Physics scenarios.
15:00	333	**Search for new physics in heavy baryon decays** *Martina Ferrillo, Universität Zürich* Semi-leptonic b-baryon decays provide a unique means to investigate Lepton Flavour Universality (LFU) at the LHCb experiment. Sensitivity to New Physics (NP) contributions could show up in the angular observables of the decay products. In this work, the decay amplitude of the process $\Lambda_b \to \Lambda_c l \nu$ as a function of the squared di-lepton invariant mass and lepton helicity angle is studied. The angular analysis thus is performed to assess the feasibility of NP searches within this decay channel.
15:15	334	**Search for the lepton-flavour-violating decay $B^+ \to K^+ \tau^\pm \mu^\mp$** *Lino Ferreira Lopes, EPFL* Using data from the LHCb experiment at CERN, a search for the lepton-flavour-violating decay $B^+ \to K^+ \tau^\pm \mu^\mp$ is being performed. This decay is forbidden in the standard model (SM) of particle physics because it violates the lepton-flavour conservation. However, it is known that the SM cannot account for dark matter, dark energy, the strong CP problem, the neutrino masses, etc. In particular, this decay is interesting since there is emerging evidence for lepton-flavour non- universality, which can be linked to lepton-flavour violation via the introduction of leptoquarks. In this talk, I will discuss selected aspects of an analysis designed to search for $B^+ \to K^+ \tau^\pm \mu^\mp$ decays using three-prong τ decays.

15:30 | **335**

Angular analysis of $B^0 \rightarrow K^{*0} \ell^+ \ell^-$ decays at LHCb

Zhenzi Wang Universität Zürich

The family of decays mediated by $b \rightarrow s\ell^+\ell^-$ transitions ($\ell = \mu$, e) provides a rich laboratory to search for effects of physics beyond the Standard Model. In recent years, LHCb has reported an anomalous behaviour in angular and branching fraction analyses of this decay, notably in one of the observables with reduced theoretical uncertainties, P_5'. However, the vector-like nature of this pattern could be also explained by non-perturbative QCD contributions from charm loops, that are able to either mimic or camouflage NP effects. In this talk I will discuss the main features of this channel and present the latest results from LHCb.

15:45 | **336**

CP violation in beauty and charm at LHCb

Julian Garcia Pardiñas, Universität Zürich

Precision measurements of CP violating observables in beauty and charm hadron decays are powerful probes to search for physics effects beyond the Standard Model. The LHCb experiment is specifically designed to study these heavy hadron decays and is currently playing a major role in the field. One of its latest achievements is the first observation of CP violation in the charm sector. This talk will review the recent results from LHCb, including the mentioned discovery and several key measurements of CP violating observables in beauty meson decays, obtained exploiting the data collected during the Run 2 of the LHC.

16:00 | **337**

Search for CP violation in angular distributions of $D^0 \rightarrow 4h$ decays at LHCb

Tara Nanut, EPFL, Maurizio Martinelli, CERN

A great step has been made recently in the field of CP violation in the charm sector, with the first observation of CP asymmetry by the LHCb collaboration (arXiv:1508.03054). A complementary approach to studying decay-rate asymmetries is investigating time-odd triple-product observables, which have the opposite dependence on the strong phase difference and thus complementary sensitivity to CP violation. We present an ongoing study using a novel triple-product asymmetry approach proposed by Durieux and Grossman (PRD92.076013) that uses angular-momentum dependent observables through natural spherical harmonics and angles between daughter particles. The study is performed on decays $D^0 \rightarrow K^+K^-\pi^+\pi^-$ and $D^0 \rightarrow \pi^+\pi^-\pi^+\pi^-$, with data collected by the LHCb experiment in Run2.

16:15 | **338**

Towards a measurement of the charm mixing parameter y_{CP} in $D^0 \rightarrow h^+h^-$ decays

Guillaume Max Pietrzyk, Pietro Marino, EPFL

CP Violation (CPV) in the two-body decays of charm mesons was recently observed by the LHCb collaboration through the ΔA_{CP} parameter. Current theoretical uncertainties cannot establish if this effect is due to physics beyond the Standard Model or not. Tests of CPV in the mixing or in the interference between mixing and decay might help clarify the picture. One way to probe these effects is to measure $y_{CP} \equiv \hat{\Gamma}(D^0 \rightarrow h^+h^-)/\hat{\Gamma}(D^0 \rightarrow K^-\pi^+)$ where h is a pion or a kaon. The main challenge is the determination of the detection efficiencies of the daughter particles to correct the reconstructed decay times of the D^0 mesons. This presentation will focus on an innovative data-driven approach to tackle this issue.

16:30 | ***Coffee Break***

TASK V: High Energy Physics II

Chair: Rainer Wallny, ETH Zürich

17:00 | **341**

Model-independent measurement of charm-mixing parameters in $D^0 \rightarrow K^0_S\pi^+\pi^-$

Surapat Ek-In [1], Tara Nanut [1], Maurizio Martinelli [2], Olivier Schneider [1]
[1] EPFL, [2] CERN

We present a measurement of charm-mixing parameters in $D^0 \rightarrow K^0_S\pi^+\pi^-$ decays with a model-independent method on data collected by the LHCb collaboration in 2011 - 2012 [arXiv:1903.03074], and the prospects for an improved analysis using the 2016 - 2018 data. The analysis measures the dimensionless parameter x related to the mass difference between the mass eigenstates of the D^0 meson, whose current world-average value is still zero within uncertainty. D^0 candidates

		are reconstructed from $D^{*-} \to D^0\pi^-$ and $B^- \to D^0\mu^- X$ decays. The statistical uncertainty on x in the new analysis is expected to reach (10^{-4}) when combining both samples. We present sensitivity studies using the 2016 - 2018 data and discuss approaches to improve the precision beyond the increased statistics.
17:15	**342**	**Measurement of CP violation with the ATLAS experiment** *Emmerich Kneringer, University of Innsbruck* Direct and indirect CP violation is observed in particle decays. The latter usually includes oscillations between a neutral meson and its antiparticle. ATLAS measures this type of CP violation in the decay $B_s \to J/\psi + \phi$, with $J/\psi \to \mu^+\mu^-$ and $\phi \to K^+K^-$, mainly because it is sensitive to higher order effects and therefore to deviations from known physics. Here the quantity of interest is the so-called weak mixing phase ϕ_s. Latest results will be presented and compared to similar analyses from other LHC experiments as well as with the expectation from the Standard Model.
17:30	**343**	**Amplitude analysis of $B^0 \to (\pi^+\pi^-)(K^+\pi^-)$ decays** *Maria Vieites Diaz, EPFL* The amplitudes describing the decays of neutral b-hadrons to charmless (quasi)-two-body final states receive contributions from b→u tree and b→d,s penguin topologies. This rich landscape of interfering amplitudes allows interesting CP-violation measurements to be performed. In the case of B decays to two vector particles, a full amplitude analysis also provides insight in the so-called polarisation puzzle. In this work, a set of CP-violating observables is measured using B^0 meson decays reconstructed from the $(^{+-})(K^{+-})$ quasi-two-body final state. The CP-averaged polarisation fractions and phase differences among the contributing amplitudes are also reported. The analysis uses 3 fb^{-1} of data collected during LHCb Run I and consists of the first full amplitude study of this decay mode.
17:45	**344**	**Towards a measurement of the differential decay rate of the decay $B^+ \to \rho^0\mu^+\nu_\mu$ at LHCb** *Veronica Sølund Kirsebom, EPFL* A long standing tension between measurements of the CKM matrix element V_{ub} in inclusive and exclusive decays can be eased by introducing a small right-handed weak current. By measuring the differential decay rate of the semileptonic decay $B^+ \to \rho^0\mu^+\nu_\mu$, using data from the LHCb experiment, a bound on a possible right-handed weak current can be set. This talk will focus on the first steps of the analysis where a new signal-reconstruction approach has been studied. The development and performance of a multivariate algorithm used to separate signal and background will also be presented, and finally, the status and future steps of the analysis will be discussed.
18:00	**345**	**Observation of Hbb in CMS** *Krunal Bipin Gedia, Alessandro Calandri, ETH Zürich* In 2012, the ATLAS and CMS Collaborations announced the discovery of a new state with a mass around 125 GeV, compatible with the Standard Model Higgs boson. A measurement of the Higgs-beauty quark coupling through the Higgs boson production associated with a Z or W boson in the lepton + beauty final state is presented. The analysis is based on 41.3/fb data from p-p collisions at 13 TeV collected by CMS in 2017. When combining with the analyses on the 7, 8 and 13 TeV energies, a 125.09 GeV Higgs boson is measured (4.8 sigma significance). The combination of this measurement with other CMS analyses of a Higgs boson decaying to beauty quarks observed a significance of 5.6 sigma.

18:15	**346**	**Measurement of ttH(bb) in proton-proton collision data at 13 TeV** *Korbinian Schweiger, Universität Zürich* Measuring the top quark Yukawa coupling is an important test of the standard model (SM) of particle physics and the production of a Higgs boson in association with top quarks (ttH) is the only channel that allows a direct measurement of this SM parameter. This talk will focus on the measurement of ttH where the Higgs boson decays to bottom quarks. The data were collected by the CMS experiment in 2017 at a center-of-mass energy of 13 TeV at the LHC. Because of the small cross section and challenging final state, sophisticated methods for signal/background rejection as well as signal extraction are required.
18:30	**347**	**Search for top squark pair production in events with Z bosons** *Meinrad Schefer, LHEP, Universität Bern* A search for direct top squark pair production is presented using Run 2 ATLAS data in final states containing at least three leptons and missing transverse momentum. Naturalness considerations suggest the third generation squark masses should be around the TeV scale and hence could be produced at LHC. Models are considered where a pair of the heavier top squark mass eigenstates is produced, which decay into the lighter top squark and a Z boson. The light top squark subsequently decays into a top quark and the lightest neutralino. The leptonic decay of the Z bosons is exploited in addition to the missing transverse momentum from the neutralinos in order to discriminate against background Standard Model events.
18:45	**348**	**Low-mass dielectron measurements in pp, p-Pb and Pb-Pb collisions with ALICE at LHC** *Elisa Meninno, Stefan Meyer Institute for Subatomic Physics, Vienna, on behalf of the ALICE collaboration* The measurement of low-mass e^+e^- pairs is a powerful tool to study the properties of the Quark-Gluon Plasma (QGP) created in ultra-relativistic heavy-ion collisions. Since such pairs do not interact strongly and are emitted during all stages of the collisions, they allow us to investigate the full time evolution and dynamics of the medium created. Measurements in pp and p-Pb collisions are the necessary reference for heavy-ion studies. In this contribution, I will present low-mass dielectron measurements with the ALICE detector at LHC, in pp, p-Pb and Pb-Pb collisions at different energies. The results will be compared with the expected dielectron yields from known hadronic sources and with theoretical predictions.
19:00		***Postersession with Apéro***
20:30		

Time	ID	**TASK VI: Dark Matter and Neutrino II** *Chair: Tatsuya Nakada, EPFL*
14:00	**351**	**Active Magnetic Shielding and Axion-Dark-Matter Search** *Michał Rawlik, Paul Scherrer Institut, WBBA 221, Forschungsstrasse 111, 5232 Villigen PSI* Despite the tremendous success of the Standard Model of particle physics, there remain several fundamental aspects of the Universe that are still not understood. One such is the violation of the symmetry of simultaneous charge exchange and parity inversion (CP), which allowed the early Universe to become more abundant in matter than in antimatter. For some 65 years the electric dipole moment of the neutron (nEDM) has been giving an increasing insight into this problem. An nEDM measurement at the Paul Scherrer Institute in Switzerland has finished taking data with enough statistics to go beyond the present limit standing at 3×10^{-26} ecm (90% C.L.) [1]. In my talk I will explain how we measured the nEDM using the Ramsey interferometry of neutrons. Operating at neV energies, we employed an exciting combination of the gravitational, strong and electromagnetic interactions to guide, store and manipulate the spins of polarised ultracold neutrons. The measurement required magnetic field stabilities on a picotesla level, reaching of which was only possible thanks to an active magnetic field compensation system. I will speak about how it works and, in particular, how we design ten-metre-large colis for that system [2]. Finally, I will show how we could use our measurement for an entirely different purpose: a search for an ultra-low-mass axion dark matter [3]. [1] C. Abel et al. https://arxiv.org/abs/1811.04012 (2018) [2] M. Rawlik et al. Am. J. Phys. 86, 602 (2018) [3] C. Abel et al. Phys. Rev. X 7, 041034 (2017)
14:30	**352**	**Xenon1T results** *Giovanni Volta, University of Zürich* The XENON project aims to directly detect Dark Matter, employing a dual-phase TPC (Time Projection Chamber) with a xenon target. Located at the Gran Sasso National Laboratory (LNGS), the XENON project began in 2006 with the prototype XENON10, followed by XENON100 in 2008. The third phase, XENON1T, has already achieved the highest sensitivity to the elastic scattering of nucleons and WIMPs (weakly interactive massive particles). Most recently, following an exposure of 1.0 tonne × years, XENON1T has set the strongest limits on WIMP-nucleon spin-independent elastic scattering cross section for WIMP masses above 6 GeV, with a minimum of 4.1×10^{-47} cm^2 at 30 GeV/c^2 and 90 % confidence level. In addition to this benchmark WIMP search, the results of complementary physics channels will be reported.
14:45	~~**353**~~	*cancelled*
15:00	**354**	**Search for Dark Absorption in XENON1T** *Michelle Galloway, Universität Zürich, for the XENON collaboration* The XENON1T dark matter experiment, located at the Laboratori Nazionali del Gran Sasso, currently holds the world-leading limit for direct detection of Weakly Interacting Massive Particles. Due to unprecedented low backgrounds, it also has discovery potential to dark matter in the form of dark photons and axion-like particles via absorption by bound electrons. Here I will present the latest results in the search for dark absorption from a 220-day science run of XENON1T.

15:15	**355**	**Analysis of high-energy events in XENON1T** *Chiara Capelli, University of Zürich, on behalf of the XENON collaboration* The XENON1T experiment searches for Weakly Interacting Massive Particle (WIMP) dark matter candidate with a dual-phase xenon time projection chamber. Following the main result on spin-independent WIMP-nucleon scattering, the effort of the XENON collaboration is directed towards exploring other detection channels. For this purpose the signal reconstruction and data analysis need to be extended up to the MeV energy range, two order of magnitude higher than the standard WIMP analysis. This would allow in particular to perform the analysis on the ^{136}Xe neutrinoless double beta decay, fundamental to prove the Majorana nature and solve the hierarchy problem of the neutrinos. The current achievements and ongoing work aimed to explore the high energies detection channels will be presented.
15:30	**356**	**Axion-Dark-Matter Search using Cold Neutrons** *Ivo Schulthess, University of Bern* The current best estimate for the universe's matter content consists of 84% dark matter, and the search for its composition remains of great interest. One possible candidate is a so far undetected ultra-low-mass axion. Various astronomical observations, and only one laboratory experiment, using ultra-cold neutrons, currently constrain the axion mass and its interaction strength in the allowed phase space. In this talk, the idea of a new complementary laboratory search for an axion-induced oscillating neutron electric dipole moment using a cold neutron beam Ramsey setup will be presented.
15:45	**357**	**The SST-1M telescope** *Cyril Martin Alispach, Université de Genève* The SST-1M project, a 4 m-diameter Davies Cotton telescope with 9 degrees FoV and a 1296 pixels SiPM camera, is designed to meet the requirements of the next generation of ground based gamma- ray observatory CTA in the energy range above 3 TeV. In this work, a special emphasis will be given to the commissioning results of the SST-1M telescope. The latest performance validation tests such as charge resolution, trigger efficiency together with Monte-Carlo comparison will be given. Preliminary results on the observation of gamma ray emitters will be presented.
16:00	**358**	**Neutrino point-source searches for multi-messenger astronomy with IceCube** *Anastasia Maria Barbano, Tessa Lauren Carver, Teresa Montaruli, Francesco Lucarelli,* *Université de Genève, on behalf of the IceCube collaboration* Since 2012 the IceCube detection of a diffuse population flux of astrophysical neutrinos confirmed the existence of population of sources emitting neutrinos above the 100 TeV energy scale, the nature of which remains still unknown. The sources of this diffuse neutrino high-energy excess need investigations with point-like source searches (time integrated and time dependent) and a strong multi-messenger program in synergy with other gamma-ray and other energy-band photon experiments, gravitational waves and cosmic-ray experiments. Recent results on high-energy emission from the blazar TXS 056+056 and latest results of point-source searches with 10 years of IceCube data, including observed neutrino emission excess from the active galaxy NGC 1068, will be presented.
16:30		***Coffee Break***

Time	ID	**TASK VII: DARK MATTER AND NEUTRINO III** *Chair: Christoph Schwanda, HEPHY Wien*
17:00	**361**	**qBOUNCE: first results of the Ramsey-type GRS experiment** *Joachim Bosina [1], Katharina Durstberger-Rennhofer [1], Tobias Rechberger [1], Martin Thalhammer [1], Rene Sedmik, Tobias Jenke [1], Andrei Ivanov [1], Hanno Marius Filter [1], Gunther Cronenberg [1], Hartmut Abele [1], Mario Pitschmann [1], Peter Geltenbort [2], Jakob Micko [2]* *[1] TU Wien, [2] Institut Laue-Langevin* This talk focus on the control and understanding of a gravitationally interacting elementary quantum system using the techniques of gravitational resonance spectroscopy (GRS) and ultracold neutrons (UCN). It offers a new way of looking at gravitation at short distances based on quantum interference. In the past years, the qBOUNCE collaboration designed and built a new Ramsey-type experiment at the Institute Laue-Langevin (Grenoble). In 2018, we were able to measure gravitational state transition with the complete assembled experiment for the first time. In June 2019, another 200 days of measurements will start. We will present the status of the data analysis and a novel search strategy using GRS to differentiate between Einstein's cosmology constant and dark energy theories.
17:15	**362**	**Studying the Extreme Behaviour of 1ES 2344+51.4** *Axel Arbet-Engels [1], Marina Manganaro [2], Daniela Dorner [3], Vandad Fallah Ramazani [4], Adrian Biland [1], Jose Acosta Pulido [5], Talvikki Hovatta [4], Valeri Larionov [6], Claudia M. Raiteri [7]* *[1] ETH Zürich, [2] University of Rijeka, Department of Physics, [3] Universität Würzburg, [4] Tuorla Observatory, University of Turku, [5] Instituto de Astrofísica de Canarias, [6] Astronomical Institute of St. Petersburg State University, [7] Osservatorio Astrofisico di Torino* MAGIC and FACT investigate the very-high-energy (E > 100 GeV) gamma rays emitted by blazars, whose relativistic jets points towards the observer. Past observations have revealed that the blazar 1ES2344+51.4 can show strong flux variability and the spectral energy distribution shifts towards unusual high energies during flares. We report a flaring episode of 1ES2344+51.4 during August 2016, where the VHE flux measured by MAGIC and FACT is comparable to the historical maximum, while the spectrum is the hardest for this object above 100 GeV. Combining multi-wavelength observations, we obtain an unprecedented characterisation of the inverse Compton peak.
17:30	**363**	**Latest results on cross-section measurement at T2K near detector** *Stephanie Bron, Université de Genève* A precise characterization of neutrino oscillation parameters is very important to search for physics beyond the standard model. T2K, located in Japan, is one of the leading long-baseline neutrino oscillation experiments. It measures a muon (anti-)neutrino flux, with energy peaked at ~0.6 GeV, produced at the J-PARC facility 295 kilometers east of the SuperK far detector. One of the most important limiting factors to precise oscillation measurements are the systematic uncertainties on the neutrino-nucleus interactions. A near detector, ND280, located at 280 meters, is used to constrain the flux of the beam and gain better understanding of the nuclear effects which are poorly understood. We will present the latest techniques and results from cross-section measurements at the near detector.
17:45	**364**	**Sensitivity study for proton decay via $p \to K^+ + \bar{\nu}$ in the Deep Underground Neutrino Experiment** *Christoph Alt, ETH Zürich* Supersymmetry and Grand Unified Theories predict several nucleon decay modes with lifetimes between 10^{28} and 10^{39} years. The Deep Underground Neutrino Experiment (DUNE) will be able to test many of the predicted decay modes for lifetimes up to 10^{35} years. DUNE's far detector will comprise four 10-kiloton Liquid Argon Time Projection Chambers (LAr TPCs) installed 1475 meters underground. Its design combines high precision calorimetry with an exposure of several 100 kiloton-years in a low-background environment, which makes it especially suitable for proton decay searches via $p \to K^+ + \bar{\nu}$. I will present a sensitivity study for this channel in DUNE, using a fully simulated and reconstructed signal and atmospheric neutrino background sample in a 10-kiloton dual phase LAr TPC.

18:00	**365**	**The search for neutrinoless double beta decay in ^{76}Ge** *Roman Hiller, University of Zürich, for the GERDA collaboration* The discovery of neutrinoless double beta decay would establish neutrinos as Majorana fermions and imply a violation of lepton number conservation. The leading experiment based on ^{76}Ge is GERDA, which operates a 36 kg array of germanium detectors, enriched in ^{76}Ge directly immersed in liquid argon. The argon acts a a coolant and active shield against background radiation due to its scintillating capabilities. GERDA was the first experiment in the field to reach a half-life sensitivity of 10^{26} yr, and it will take data until the end of 2019. Its successor is LEGEND-200, which will operate about 200 kg of enriched ^{76}Ge-detectors in liquid argon at LNGS. We will present the latest results of GERDA and plans for LEGEND-200 and beyond.
18:15	**366**	**DARWIN: a next-generation multi-ton xenon observatory** *Patricia Sanchez-Lucas, University of Zürich, on behalf of the DARWIN collaboration* The DARWIN experiment is a next-generation dual-phase time projection chamber which will operate 50 tonnes of natural xenon and whose primary goal will be to explore the entire experimentally accessible parameter space for WIMPs. Besides its unprecedented sensitivity to WIMPs, such a large detector, with its low-energy threshold and ultra low background level, will also be sensitive to other rare interactions like the neutrinoless double beta decay of ^{136}Xe. In addition, DARWIN will be able to measure low energy solar neutrinos, observe the coherent neutrino-nucleus interaction and detect galactic supernovae. We discuss here the concept of DARWIN and the sensitivity for the different physics channels.
18:30	**367**	**Prospects for neutrino-less double beta decay detection with the DARWIN experiment** *Yanina Biondi, University of Zürich* DARk matter WImp search with liquid xenoN (DARWIN) will be a direct dark matter detection experiment using a multi-ton time projection chamber at its core. While DARWIN is designed to explore the entire experimentally accessible parameter space for WIMPs, the detector will also be sensitive to other rare interactions. One ambitious goal is the search for the neutrinoless double beta decay of ^{136}Xe which has an abundance of 8.9% on natural xenon. We present the sensitivity estimation of DARWIN to this rare nuclear decay process, based on detailed Monte Carlo simulations of the backgrounds from detector materials, intrinsic sources to the xenon, as well as solar neutrinos.
18:45	**368**	**Overview of MicroBooNE** *Thomas Josua Mettler, Yifan Chen, Universität Bern* MicroBooNE is the first of three liquid argon time projection chambers (LArTPCs) of the Short-Baseline Neutrino Program at Fermilab. Located on the Booster Neutrino Beamline, MicroBooNE has been collecting data since October 2015 to determine the source of the low-energy electromagnetic event excess previously reported by MiniBooNE and LSND. In addition, MicroBooNE is studying neutrino interactions on liquid argon, measuring low-energy neutrino cross sections, and developing technological advancements for future LArTPC experiments such as DUNE. This talk will give an overview of the MicroBooNE experiment, as well as discussing the principal physics goals of MicroBooNE and highlighting recent physics results.
19:00		***END; Transfer to Dinner***
19:30		***Conference Dinner***

ID	TASK Poster
371	**Muonic Atom Spectroscopy: Preparations Regarding a Measurement of the Charge Radius of Radium** *Alexander Albert Skawran, Paul Scherrer Institut & ETH Zürich, for the MUX collaboration* Atomic parity violation experiments are one attempt to look for physics beyond the standard model. An experiment to measure the atomic parity violation electric dipole contribution to the energy transition 7S1/2 and 6D3/2 in singly ionised Radium-226 is currently ongoing. The extraction of the atomic parity violating signature for the measurement requires precise calculations based on quantities like the indeterminate radius of Radium-226. Muonic atom spectroscopy at PSI enables a precise nuclear charge radius determination. Previous muonic atom spectroscopy experiments at PSI were designed for targets containing at least several grams. Current safety regulations permit only an amount of a few μg of Radium-226. In this contribution, newly developed techniques and preparations for low amount targets will be presented.
372	**Ultracold neutron production and extraction from the solid deuterium converter of the PSI UCN source** *Ingo Rienäcker, Paul Scherrer Institut & ETH Zürich* Ultracold neutrons (UCN) with energies below 300 neV are storable for hundreds of seconds due to total reflection on the effective optical wall potential of the containment. They are used in experiments that benefit greatly from long measurement times, like the search for a permanent electric dipole moment of the neutron. The PSI UCN source makes use of solid deuterium as superthermal moderator to produce UCN. Increasing UCN extraction from the moderator poses a big challenge. We study the impact of structural features in the deuterium on UCN extraction by dedicated energy-dependent measurements and detailed simulations. This will provide important insights helping to further increase the UCN output of the PSI UCN source. The author of this work acknowledges the support of the SNF grant 200021_178951.
373	**Measuring the Beryllium Isotopic Composition in Cosmic Rays with the Alpha Magnetic Spectrometer on the International Space Station** *Jiahui Wei, Université de Genève* The Beryllium isotopic composition in cosmic rays provides essential information for the study of the propagation of cosmic rays in the Galaxy. The Alpha Magnetic Spectrometer (AMS) installed on the International Space Station (ISS) since May 2011 provides the opportunity to measure this composition in the energy range from ~0.2 GeV/n to ~10 GeV/n with unprecedented precision. For events selected with a specific nuclear charge, the particle mass is obtained combining the velocity measured by the Time of Flight (ToF) or by the Ring Imaging Cherenkov (RICH) detectors with the rigidity measured by the silicon tracker. A method to extract the relative isotopic abundances from the mass distribution will be presented.
374	**Cosmic-ray Magnesium flux measured with the Alpha Magnetic Spectrometer on the International Space Station** *Zhen Liu, Université de Genève* Magnesium nuclei in cosmic rays are primary particles thought to be mainly produced and accelerated in astrophysical sources. Knowledge of the precise behavior of the Magnesium spectrum is important in understanding the origin, acceleration, and propagation of cosmic rays. I will present the precision measurement of the Magnesium flux in the rigidity range from 3 GV to 3 TV based on data collected by AMS-02 during the first 7 years of operation on the International Space Station.
375	**Cosmic-ray Silicon Flux measured with the Alpha Magnetic Spectrometer on the International Space Station** *Yao Chen, Université de Genève* Understanding the precise rigidity dependence of the Silicon flux sheds light on the origin, acceleration and propagation of cosmic rays. I will present the precision measurement of the Silicon flux based on data collected by the Alpha Magnetic Spectrometer (AMS-02) during its first 7 years of operation on the International Space Station.

376	**Diffusion of muonic atoms in the muX gas cell** *Jonas Nuber, ETHZ & PSI, for the MUX collaboration* Muonic atom spectroscopy allows for a precise investigation of nuclear properties. At PSI we want to extract the nuclear charge radius of Radium-226 from its muonic x-ray spectrum. To measure the spectrum using only few μg of Radium-226 we have developed an apparatus in which the muons are stopped in a H_2/D_2 gas mixture and then diffuse towards a disk containing the Radium-226 nuclei. Monte Carlo simulations of the diffusion are used to optimise the cell so that a large fraction of muons reach the target disk. This poster illustrates the simulated physics and the interplay of simulation and measurement.
377	**A 2.6 m tall DARWIN Demonstrator** *Frédéric Girard, University of Zürich* The DARWIN Time Projection Chamber will be the most sensitive dark matter detector. The increased size of the detector over its precursors will raise new challenges. The DARWIN demonstrator, designed and to be built at the University of Zürich, will mainly be used to investigate the drift of electrons in liquid xenon over a distance of 2.6 m, along with all the technological advances needed to achieve this goal. Amongst others, the design of a high voltage electric feedthrough in liquid phase and the determination of the requirements in xenon purity will be addressed.
378	**Identification of ^{137}Xe like a background for 0vbb searches with DARWIN** *Patricia Sanchez-Lucas, University of Zürich, on behalf of the DARWIN collaboration* DARWIN is a proposed next-generation xenon observatory that will be sensitive, among other rare interactions, to the neutrinoless double beta decay of ^{136}Xe. Future experiments looking for this process will become more and more sensitive while the intrinsic radioactivity of the detector materials will be reduced thanks to the screening campaigns. This brings the risk that backgrounds previously considered negligible become important contributions. In this context, the cosmogenic production of ^{137}Xe by the neutron capture of ^{136}Xe can be relevant if our detector is not sitting at the enough depth. Simulations of muon-induced neutrons with Geant4 allow us to evaluate the production rate of ^{137}Xe and its importance for these searches with DARWIN.
379	**Beam EDM detector characterization** *Marc Solar, Universität Bern* For the neutron Beam EDM experiment at the University of Bern, a dedicated neutron detector has been supplied by the company CDT. The detector has been amply characterized in various aspects by taking data at the beamlines BOA and SANS-1at the Paul Scherrer Institute in September and December 2018. The results of these measurements in terms of efficiency, homogeneity, as well as wavelength and voltage dependency will be presented. Additionally, the implications of the obtained detector characteristics on the experiment are discussed.
380	**Experimental strategy to test Lepton Flavour Universality in $b \rightarrow sl^+l^-$ decays at LHCb** *Sara Celani, EPFL* Lepton Flavour Universality (LFU) is one of the fundamental properties of the Standard Model: photon, W and Z bosons are predicted to be equally coupled to the three lepton generations. Hints for possible deviations from LFU have been found by the LHCb collaboration in $b \rightarrow s\,l\,l$ and $b \rightarrow c\,l\,\nu$ decays, sparking great interest.This poster explains the strategy adopted to study $b \rightarrow s\,l\,l$ decays, concentrating on the experimental challenge of estimating the efficiencies. This is a key ingredient to evaluate the ratio between $B \rightarrow X\,l\,l$ branching fractions (where X indicate a generic system containing a strange meson and l = e, μ), a clean experimental observable sensitive to presence of LFU-breaking new particles.

381	**Qualification of the Radiation-Hard Electron Monitor (RADEM) for ESA JUICE mission** *Patryk Socha [1], Wojtek Hajdas [1], Radosław Marcinkowski [1], Jo Ann Egger [1], Salome Gruchola [1], Patrícia Gonçalves [2], Marco Pinto [2], Arlindo Marques [3], Costa Pinto [2], Tiago Sousa [3], Rui Matos [3], Ivo Lourenço [3]* *[1] Paul Scherrer Institut, [2] LIP, [3] EFACEC* RADEM is a radiation monitor developed for ESA JUICE mission to icy moon of Jupiter: Ganymede, Callisto and Europa. Instrument contains of set of detectors optimized to measure electrons, protons, heavy ions and angular distributions of incoming radiation. Assembling and qualification of Si-diode sensors for RADEM as well as test campaign of its Engineering Model were carried out at PSI. Various measurements successfully confirmed quality of the sensors in accordance to mission requirements. EM instrument was exposed to different radiation types at PSI exposure facilities. Detectors were tested with electrons and protons at different energies and fluxes. Detailed Monte Carlo simulations and modelling runs were started to verify instrument responses and provide calibration factors for spectra unfolding algorithms.
382	**Real-time detection of Supernova Neutrinos in XENONnT** *Ricardo Peres, University of Zürich, for the XENON collaboration* The XENONnT experiment, projected to begin operation by early 2020 at the Laboratori Nazionali del Gran Sasso (LNGS), is a double-phase Time Projection Chamber with a 6 tonne liquid xenon target. Primarily developed to detect Weakly Interactive Massive Particles (WIMPs) that scatter of xenon nuclei, it will also be sensitive to neutrinos coming from a supernova burst beyond the edge of the Milky Way. Given its low background rate and neutrino flavour blindness of coherent elastic neutrino scatterings (CEvNS), XENONnT will be able detect supernova (SN) neutrino bursts in real-time. We describe the framework to run an active SN trigger using XENONnT's open-source processor (Strax), based on the continual counting of proportional scintillation signals (S2) induced by such SN neutrinos.
383	**XENONnT: The next stage in the search for dark matter with liquid xenon** *Adam Brown, University of Zürich, for the XENON collaboration* XENONnT, the next stage in the XENON collaboration's search for dark matter, ist is an evolution of the very successful XENON1T experiment, which has set the strongest limits on various channels of WIMP-nucleus interactions and observed double-electron capture in ^{124}Xe for the first time. A larger detector will mean a much-increased exposure and better self-shielding, giving sensitivity to smaller dark matter interaction cross-sections. Innovations in xenon handling will allow a sub- stantial background reduction, with in particular the ^{222}Rn background being roughly ten times lower. Furthermore, a new neutron veto can tag at least 80% of singly-scattered neutrons, which until now formed an almost irreducible background. XENONnT is currently under construction with commissioning planned to start at the end of 2019.
384	**Lamb Shift of (Anti)hydrogen** *Devesh Nandal [1], Gianluca Janka [1], Naofumi Kuroda [2], Ryoma Nishi [2], Eberhard Widmann [3], Martin Simon [3], Amit Nanda [3], Paolo Crivelli [1]* *[1] ETH Zürich, [2] University of Tokyo, [3] Austrian Academy of Sciences* Antihydrogen studies aim to shed light on the observed baryon/antibaryon asymmetry in the Universe by comparing the properties of matter and antimatter with very high precision. In the context of the GBAR experiment located at CERN, our aim is to perform a measurement of the antihydrogen Lamb shift with an uncertainty of 100 ppm, which allows extracting the antiproton charge radius at a level of 10%. Due to the two years shutdown of the accelerator complex at CERN, no experiments with antihydrogen can be performed until 2021. In the meantime, the setup is being tested and optimized by using the same detection method with a hydrogen beam at ETH Zurich. The experimental setup and the current status will be presented.

385	**The SHiP-Charm Experiment** *Dario De Simone, Annarita Buonaura, Universität Zürich* The SHiP experiment is a beam dump experiment proposed at the CERN SPS aiming at the observation of long lived particles very weakly coupled with matter and at the study of tau-neutrino properties. Hidden particles are mostly produced in the decay of charmed hadrons and tau neutrinos are produced by D_s decays, therefore measuring charm production cross-sections from 400 GeV protons is critical for the SHiP experiment. This poster will report on the dedicated experiment proposed to measure different characteristics of charmed hadronic production in a SHiP-like target and on the ongoing analysis of the optimization run which was conducted in July 2018.
386	**Detection System for NoMoS** *Waleed Khalid [1], Raluca Jiglau [1], Daniel Moser [1], Torsten Soldner [2], Manfred Valentan [1], Johann Zmeskal [1], Gertrud Konrad [1]* *[1] Stefan Meyer Institute, Austrian Academy of Sciences, [2] Institute Laue Langevin* NoMoS, the neutron decay products momentum spectrometer, investigates the beta decay of the free neutron. It uses the R×B drift effect in a uniformly curved magnetic field and a spatially resolving detector to separate and measure the charged decay particles according to their momentum. The protons from the decay are low energetic and need to be made detectable, therefore require post-acceleration by a high voltage electrode that surrounds the detector. The poster shows the preliminary detection system and systematic effects introduced by the high voltage applied to the detector and the electrode.