

**PREN 2023 (Proton Radius  
European Network - STRONG  
2020) &  $\mu$ ASTI (Muonic Atom  
Spectroscopy Theory  
Initiative)**

**Report of Contributions**

Contribution ID: 2

Type: Talk

## Measurement of the proton charge radius during the ULQ2 experiment

Since 2010, the proton charge radius has been measured using electron scattering, atomic and muonic hydrogen spectroscopy and the results of these measurements tend to fit with a 0.84-fm or 0.88-fm radius. The cause of the discrepancy is not fully understood but some inconsistent results are pointed out: different radii are determined from the same transition of the hydrogen atom (1S-3S) [1,2] and the electric form factor data obtained by the PRad and Mainz experiments using electron scattering are incompatible [3,4].

At ELPH, the ULQ2 (Ultra-Low  $Q^2$ ) experiment aims at determining the proton charge radius using low-energy electron scattering ( $E_e = 10\text{--}60$  MeV) covering the  $Q^2$  range from 0.0003 (GeV/c)<sup>2</sup> to 0.008 (GeV/c)<sup>2</sup> as the proton charge radius is obtained from the slope of the proton electric form factor when the momentum transfer ( $Q^2$ ) tends to 0. We are currently conducting the least model-dependent measurement of the proton charge radius with electron scattering as we are carrying out the absolute measurement of the electronproton scattering cross-section using a plastic (CH<sub>2</sub>) target and the Rosenbluth separation in the extremely low  $Q^2$  region. The equipment of the brand-new ULQ2 beam line has already been commissioned and the efficiency of the detectors have already been measured. The physics runs started last April and will be carried out for 28 days to determine the proton radius with 1% accuracy.

- [1] A. Grinin et al., Science 370 (2020) 1061.
- [2] H. Fleurbaey et al., Phys. Rev. Lett. 120 (2018) 183001.
- [3] J. C. Bernauer et al., Phys. Rev. C 90 (2014) 015206.
- [4] W. Xiong et al., Nature 575 (2019) 147.

**Primary author:** LEGRIS, Clement (ELPH, Tohoku University (Japan))

**Presenter:** LEGRIS, Clement (ELPH, Tohoku University (Japan))

Contribution ID: 3

Type: **Talk**

## A novel approach for determining spatial moments of the proton charge density

The internal structure of the nucleon is a field of intensive study. This structure can be experimentally probed through electron elastic scattering off a proton target. This allows the extraction of the proton electric and the magnetic form factors which characterize the charge and the magnetization densities. The spatial moments of the proton charge density are extracted using the electric form factor (EFF) data. Up to now, methods rely on the evaluation of the EFF derivative in the limit of zero four-momentum transfer  $Q^2$  enabling access only to positive even orders of spatial moments. A novel approach based on integral forms of the Fourier transform of the density function allows the determination of spatial moments of densities to any real valued order. Within this approach, we compute spatial moments of different orders from a reanalysis of EFF data obtained with Rosenbluth separation and from low  $Q^2$  experiments covering a range of  $Q^2$  from  $2 \times 10^{-4}$  up to  $8.8 \text{ GeV}^2$ . We pay specific attention to the evaluation of systematic uncertainties. In this context, the evaluation of the proton charge radius corresponding to the second order moment of the proton charge density will be discussed.

**Primary author:** ATOUI, Mariam (IJCLab)

**Presenter:** ATOUI, Mariam (IJCLab)

Contribution ID: 4

Type: **Talk**

## **Polarizability contribution to the hyperfine splitting in muonic deuterium from effective field theory**

Muonic atom spectroscopy provides a precision probe of electroweak physics and possible sources of Beyond the Standard Model physics such as dark matter and the violation of lepton flavor universality. However, uncertainties from nuclear theory are the main bottleneck in calculations of the energy levels for muonic atoms. Therefore, it is necessary to reduce these uncertainties in order to correctly interpret possible new physics. In particular, the theoretical prediction of the nuclear polarizability that enters the two-photon exchange contribution to the energy levels must be improved. In recent years, a significant amount of progress has been made in regards to the two-photon exchange contribution to the Lamb shift in light muonic atoms using effective field theory techniques. Here, we use similar tools to investigate the polarizability contribution to the hyperfine splitting of muonic deuterium. We detail the generic formalism used to extract the hyperfine splitting and employ forces and currents derived in chiral effective field theory.

**Primary author:** RICHARDSON, Thomas

**Presenter:** RICHARDSON, Thomas

Contribution ID: 5

 Type: **Poster**

## Precision Measurements with Simple Molecular Hydrogen Ions at ALPHATRAP

Molecular hydrogen ions offer a unique opportunity for testing fundamental physics at high precision. As simple three-body systems, the energy levels and properties of  $\text{H}_2^+$ , and its isotopologue  $\text{HD}^+$ , are exactly calculable and precision spectroscopy enables measurement of fundamental constants such as the proton-to-electron mass ratio [1], including possible temporal or spatial variation [2]. In contrast to atomic hydrogen, molecular hydrogen ions have many narrow, laser-accessible transitions and can be trapped and cooled ion traps. This offers not only exciting prospects for metrology[3], but presents a viable method for creating and performing precision measurements on the antimatter counterpart [4]. We have recently demonstrated long-term trapping and quantum control a single  $\text{HD}^+$  molecule in the rovibrational ground state at the ALPHATRAP Penning-trap apparatus [5] culminating in a measurement of the ground state hyperfine structure. This measurement allows us to extract the shielded  $g$ -factors of the proton, deuteron, and electron along with the  $E_{4}$  and  $E_{5}$  coefficients of the hyperfine Hamiltonian and demonstrates molecular state detection via the continuous Stern-Gerlach effect which we will use in upcoming measurements of rovibrational transitions in  $\text{HD}^+$  and  $\text{H}_2^+$ .

[1] I. V. Kortunov, *et al.*, Nature Physics vol **17**, 569-573 (2021)

[2] M. S. Safronova, *et al.*, Rev. Mod. Phys. **90**, 025008 (2018)

[3] S. Schiller, D. Bakalov, Appl. Phys. B **114**, 213-230 (2014)

[5] S. Sturm *et al.*, Eur. Phys. J. Spec. Top. **227**, 1425-1491 (2019)

**Primary author:** BOHMAN, Matthew (Max Planck Institute for Nuclear Physics)

**Co-authors:** HEISSE, Fabian (Max Planck Institute for Nuclear Physics); KOENIG, Charlotte (Max Planck Institute for Nuclear Physics); KORTUNOV, Ivan (University of Duesseldorf); MORGNER, Jonathan (Max Planck Institute for Nuclear Physics); SAILER, Tim (Max Planck Institute for Nuclear Physics); TU, Bingsheng (Max Planck Institute for Nuclear Physics); VOGT, Victor (University of Dues-seldorf); BLAUM, Klaus (Max Planck Institute for Nuclear Physics); SCHILLER, Stephan (University of Dues-seldorf); STURM, Sven (Max Planck Institute for Nuclear Physics)

**Presenter:** BOHMAN, Matthew (Max Planck Institute for Nuclear Physics)

Contribution ID: 6

Type: **Talk**

## Measurement of Compton scattering at MAMI and extraction of nucleon polarizabilities

Polarizabilities are fundamental properties related to the internal dynamics of the nucleon. They play a crucial role not only in our understanding of the nucleon, but also in other areas such as precision atomic physics. The experimental program performed by the A2 Collaboration at the MAMI accelerator facility in Mainz aims for an accurate extraction of the nucleon polarizabilities using Compton scattering on nucleons. Recently, the A2 Collaboration at MAMI measured the unpolarized cross-section and the beam asymmetry  $\Sigma_3$  for Compton scattering below pion photoproduction threshold with unprecedented precision. This measurement allowed accurate extraction of the proton scalar polarizabilities based only on this new data set. Moreover, for the extraction of the spin polarizabilities, the beam asymmetry  $\Sigma_3$  and the beam-target asymmetries  $\Sigma_{2x}$  and  $\Sigma_{2z}$  were measured at energies above pion production threshold, where the sensitivity to the spin polarizabilities increases. Presently, the A2 Collaboration plans a high-precision measurement of the neutron polarizabilities using Compton scattering on light nuclei with novel experimental technique, exploiting an active target in combination with the Crystal Ball/TAPS setup. In this talk, the current results and the plans for the upcoming measurements with the A2 setup at MAMI will be presented.

**Primary author:** SOKHOYAN, Vahe

**Presenter:** SOKHOYAN, Vahe

Contribution ID: 7

Type: **Talk**

## Tests of mu-e universality

Lepton universality (LU) typically refers to the lepton coupling, which is considered to be the same for all charged leptons, if the interaction is electroweak according to the Standard Model.

Lepton universality tests are hence a compelling probe for New Physics.

I will review the current status of mu-e universality and recent testing efforts, with some emphasis on TREK/E36 at J-PARC and MUSE at PSI.

**Primary author:** Dr KOHL, Michael (Hampton University)

**Presenter:** Dr KOHL, Michael (Hampton University)

Contribution ID: 8

Type: **Talk**

## The MUSE experiment

The MUon proton Scattering Experiment (MUSE) at the PiM1 beam line of the Paul Scherrer Institute was created a decade ago in response to the Proton Radius Puzzle, the difference observed between muonic hydrogen measurements of the proton charge radius and the existing electronic measurements. To date, MUSE has commissioned its experimental systems to the level needed for the measurements and performed a careful studies of the electron and muon beam properties in the PiM1 channel. MUSE already obtained scattering data sets at 3 different beam momenta:  $\pm 115$  MeV/c,  $\pm 160$  MeV/c and  $\pm 210$  MeV/c in 2021 and 2022. Now MUSE is simultaneously measuring the elastic scattering of electrons and muons from a liquid hydrogen target to increase the statistics of those data sets. Both beam polarities are being measured over the course of the experiment. By comparing the four scattering cross sections, the experiment will provide unique muon proton scattering data with a precision sufficient to address the proton radius puzzle and will directly measure two-photon exchange (TPE) effects for both muons and electrons.

The MUSE experiment is supported by the US Department of Energy, NSF, PSI, and the US-Israel Binational Science Foundation.

**Primary author:** Dr ROSTOMYAN, Tigran (Paul Scherrer Institut)

**Presenter:** Dr ROSTOMYAN, Tigran (Paul Scherrer Institut)



Contribution ID: 9

Type: **Talk**

## **Toward XUV frequency comb spectroscopy of the 1 S–2 S transition in He+**

*Monday, 26 June 2023 11:00 (30 minutes)*

**Primary author:** MORENO, Jorge (Max-Planck-Institut für Quantenoptik)

**Presenter:** MORENO, Jorge (Max-Planck-Institut für Quantenoptik)

**Session Classification:** He+ and D Session

Contribution ID: **10**

Type: **not specified**

## **Welcome and introduction to PREN & $\mu$ ASTI**

*Monday, 26 June 2023 10:00 (30 minutes)*

**Presenters:** HAGELSTEIN, Franziska; POHL, Randolph (University of Mainz)

**Session Classification:** Welcome

Contribution ID: **11**

Type: **Talk**

## **Introduction to $\mu$ ASTI and summary of the workshop**

**Presenter:** PASCALUTSA, Vladimir (JGU Mainz)

**Session Classification:**  $\mu$ ASTI session

Contribution ID: 12

Type: **Talk**

## **First observation of the 1S-2S transition of singly-ionized helium in an atomic beam**

*Monday, 26 June 2023 11:30 (30 minutes)*

**Primary author:** EIKEMA, Kjeld (Vrije Universiteit Amsterdam)

**Presenter:** EIKEMA, Kjeld (Vrije Universiteit Amsterdam)

**Session Classification:** He+ and D Session

Contribution ID: 13

Type: **Talk**

## **1S-3S cw Spectroscopy on deuterium atoms**

*Monday, 26 June 2023 12:00 (30 minutes)*

**Primary author:** YZOMBARD, Pauline (Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS, College de France)

**Presenter:** YZOMBARD, Pauline (Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS, College de France)

**Session Classification:** He+ and D Session

Contribution ID: 14

Type: **not specified**

## **Motional ground-state cooling of H<sub>2</sub><sup>+</sup>**

*Monday, 26 June 2023 17:30 (30 minutes)*

**Primary author:** KIENZLER, Daniel (ETH Zurich)

**Presenter:** KIENZLER, Daniel (ETH Zurich)

**Session Classification:** HD+ and H<sub>2</sub><sup>+</sup>

Contribution ID: 15

Type: **not specified**

## **Precision spectroscopy of molecular hydrogen ions: recent progress**

*Monday, 26 June 2023 16:30 (30 minutes)*

**Primary author:** Prof. SCHILLER, Stephan (Heinrich-Heine-Universität Düsseldorf)

**Presenter:** Prof. SCHILLER, Stephan (Heinrich-Heine-Universität Düsseldorf)

**Session Classification:** HD+ and H2+

Contribution ID: **16**

Type: **Talk**

## **The muX experiment at PSI**

*Tuesday, 27 June 2023 09:00 (30 minutes)*

**Primary author:** KNECHT, Andreas (Paul Scherrer Institut)

**Presenter:** KNECHT, Andreas (Paul Scherrer Institut)

**Session Classification:** MuX and  $\mu$ Li



Contribution ID: 17

Type: **Talk**

## **Precision X-ray spectroscopy of light muonic atoms with metallic magnetic calorimeters**

*Tuesday, 27 June 2023 09:30 (30 minutes)*

**Primary author:** WAUTERS, Frederik

**Presenter:** WAUTERS, Frederik

**Session Classification:** MuX and  $\mu\text{Li}$

Contribution ID: **18**

Type: **Talk**

## **Nuclear structure corrections in light muonic atoms**

*Tuesday, 27 June 2023 12:00 (30 minutes)*

**Primary author:** LIMULI, Simone

**Presenter:** LIMULI, Simone

**Session Classification:** TPE in  $\mu\text{H}$  and  $\mu\text{D}$

Contribution ID: **19**

Type: **Talk**

## **Nucleon structure in light muonic atoms: muonic hydrogen**

*Tuesday, 27 June 2023 11:00 (30 minutes)*

**Primary author:** LENSKY, Vadim (JGU Mainz)

**Presenter:** LENSKY, Vadim (JGU Mainz)

**Session Classification:** TPE in  $\mu\text{H}$  and  $\mu\text{D}$

Contribution ID: 20

Type: **Talk**

## **Lattice QCD Calculation of the Two-Photon Exchange Contribution to the Muonic-Hydrogen Lamb Shift (REMOTE)**

*Tuesday, 27 June 2023 11:30 (30 minutes)*

**Primary author:** FU, Yang (Peking University)

**Presenter:** FU, Yang (Peking University)

**Session Classification:** TPE in  $\mu\text{H}$  and  $\mu\text{D}$

Contribution ID: 21

Type: **Talk**

## **Polarizability contribution to the hyperfine splitting in muonic deuterium from effective field theory**

*Tuesday, 27 June 2023 10:00 (30 minutes)*

**Primary author:** RICHARDSON, Thomas

**Presenter:** RICHARDSON, Thomas

**Session Classification:** MuX and  $\mu\text{Li}$

Contribution ID: **22**

Type: **Talk**

**TBD**

*Tuesday, 27 June 2023 14:30 (30 minutes)*

**Primary author:** CARLSON, Carl (William & Mary)

**Presenter:** CARLSON, Carl (William & Mary)

**Session Classification:** Spin Structure Functions

Contribution ID: **23**

Type: **Talk**

## **GDH Programme at JLab**

*Tuesday, 27 June 2023 15:00 (30 minutes)*

**Primary author:** SIRCA, Simon (U of Ljubljana)

**Presenter:** SIRCA, Simon (U of Ljubljana)

**Session Classification:** Spin Structure Functions

Contribution ID: 24

Type: **Talk**

## **Proton spin structure functions and polarizability contribution to Hyperfine Splitting in (muonic) hydrogen (REMOTE)**

*Tuesday, 27 June 2023 15:30 (30 minutes)*

**Primary author:** RUTH, David (University of New Hampshire)

**Presenter:** RUTH, David (University of New Hampshire)

**Session Classification:** Spin Structure Functions



Contribution ID: 25

Type: **Talk**

# Electromagnetic form factors of light nuclei in chiral EFT

*Tuesday, 27 June 2023 16:30 (30 minutes)*

**Primary author:** EPELBAUM, Evgeny (Ruhr University Bochum)

**Presenter:** EPELBAUM, Evgeny (Ruhr University Bochum)

**Session Classification:** Few-Nucleon Systems, Disp. FFs

Contribution ID: 26

Type: **Talk**

## **Calculation of Dynamical Response Functions Using a Bound-State Method (REMOTE)**

*Tuesday, 27 June 2023 17:00 (30 minutes)*

**Primary author:** WALET, Niels (University of Manchester)

**Presenter:** WALET, Niels (University of Manchester)

**Session Classification:** Few-Nucleon Systems, Disp. FFs

Contribution ID: 27

Type: **Talk**

# **Precision calculation of the recoil-finite-size correction for the hyperfine splitting in muonic and electronic hydrogen**

*Tuesday, 27 June 2023 17:30 (30 minutes)*

**Primary author:** LIN, Yong-Hui (University of Bonn, HISKP)

**Presenter:** LIN, Yong-Hui (University of Bonn, HISKP)

**Session Classification:** Few-Nucleon Systems, Disp. FFs

Contribution ID: 28

Type: **Talk**

## **Searches for New Physics along the sensitivity frontier: a few examples**

*Wednesday, 28 June 2023 09:00 (30 minutes)*

**Primary author:** BUDKER, Dmitry

**Presenter:** BUDKER, Dmitry

**Session Classification:** New Physics I

Contribution ID: 29

Type: **Talk**

## **Self-consistent extraction of spectroscopic bounds on light new physics**

*Wednesday, 28 June 2023 17:30 (30 minutes)*

**Primary author:** SOREQ, Yotam (Technion)

**Presenter:** SOREQ, Yotam (Technion)

**Session Classification:** New Physics II

Contribution ID: **30**

Type: **not specified**

## **QED @ NNLO with McMule**

*Wednesday, 28 June 2023 11:00 (30 minutes)*

**Primary author:** SIGNER, Adrian (PSI / UZH)

**Presenter:** SIGNER, Adrian (PSI / UZH)

**Session Classification:** MUSE & Rad. Corr.

Contribution ID: **31**

Type: **Talk**

## **Future and past TPE experiments**

*Wednesday, 28 June 2023 11:30 (30 minutes)*

**Primary author:** BERNAUER, Jan (Stony Brook University / RIKEN BNL Research Center)

**Presenter:** BERNAUER, Jan (Stony Brook University / RIKEN BNL Research Center)

**Session Classification:** MUSE & Rad. Corr.

Contribution ID: **32**

Type: **Talk**

## **The MUSE experiment**

*Wednesday, 28 June 2023 12:00 (30 minutes)*

**Primary author:** ROSTOMYAN, Tigran (Paul Scherrer Institut)

**Presenter:** ROSTOMYAN, Tigran (Paul Scherrer Institut)

**Session Classification:** MUSE & Rad. Corr.



Contribution ID: 33

Type: **Talk**

## **Proton Radius within the Program of AMBER at CERN**

*Wednesday, 28 June 2023 14:30 (30 minutes)*

**Primary author:** FRIEDRICH, Jan (TU Munich)

**Presenter:** FRIEDRICH, Jan (TU Munich)

**Session Classification:** LFV,  $\mu$  scatt., fits

Contribution ID: **34**

Type: **Talk**

## Tests of mu-e universality

*Wednesday, 28 June 2023 15:00 (30 minutes)*

**Primary author:** KOHL, Michael (Hampton University)

**Presenter:** KOHL, Michael (Hampton University)

**Session Classification:** LFV,  $\mu$  scatt., fits

Contribution ID: 35

Type: **Talk**

## **A novel approach for determining spatial moments of the proton charge density**

*Friday, 30 June 2023 10:00 (30 minutes)*

**Primary author:** ATOUI, Mariam (IJCLab)

**Presenter:** ATOUI, Mariam (IJCLab)

**Session Classification:** Proton FF

Contribution ID: **36**

Type: **Talk**

## **Muon loops in ordinary atoms (REMOTE)**

*Wednesday, 28 June 2023 16:30 (30 minutes)*

**Primary author:** POSPELOV, Maxim (University of Minnesota)

**Presenter:** POSPELOV, Maxim (University of Minnesota)

**Session Classification:** New Physics II

Contribution ID: 37

Type: **Talk**

## **Exploring fundamental interactions and constants with trapped ions**

*Wednesday, 28 June 2023 17:00 (30 minutes)*

**Primary author:** STURM, Sven (MPIK)

**Presenter:** STURM, Sven (MPIK)

**Session Classification:** New Physics II

Contribution ID: **38**

Type: **Talk**

## King plot nonlinearities in $\text{Ca}^+$

*Wednesday, 28 June 2023 09:30 (30 minutes)*

**Primary author:** VIATKINA, Anna (PTB, Braunschweig; TU Braunschweig)

**Presenter:** VIATKINA, Anna (PTB, Braunschweig; TU Braunschweig)

**Session Classification:** New Physics I

Contribution ID: **39**

Type: **Talk**

**TBD**

*Thursday, 29 June 2023 09:00 (30 minutes)*

**Primary author:** PACHUCKI, Krzysztof (University of Warsaw)

**Presenter:** PACHUCKI, Krzysztof (University of Warsaw)

**Session Classification:** QED

Contribution ID: 40

Type: **Talk**

## **Hyperfine structure of the lower states of light muonic atoms**

*Thursday, 29 June 2023 09:30 (30 minutes)*

**Primary author:** Prof. INDELICATO, Paul (Laboratoire Kastler Brossel-CNRS)

**Presenter:** Prof. INDELICATO, Paul (Laboratoire Kastler Brossel-CNRS)

**Session Classification:** QED



Contribution ID: **41**

Type: **Talk**

**TBD**

*Thursday, 29 June 2023 10:00 (30 minutes)*

**Primary author:** EIDES, Michael (University of Kentucky)

**Presenter:** EIDES, Michael (University of Kentucky)

**Session Classification:** QED

Contribution ID: 42

Type: **Talk**

## The PRad experiments at Jefferson Lab

*Thursday, 29 June 2023 11:00 (30 minutes)*

**Primary author:** GASPARIAN, Ashot (NC A and T State University)

**Presenter:** GASPARIAN, Ashot (NC A and T State University)

**Session Classification:** PRAD and ULQ2

Contribution ID: 43

Type: **Talk**

# Measurement of the proton charge radius during the ULQ2 experiment

*Thursday, 29 June 2023 11:30 (30 minutes)*

**Primary author:** LEGRIS, Clement (ELPH, Tohoku University (Japan))

**Presenter:** LEGRIS, Clement (ELPH, Tohoku University (Japan))

**Session Classification:** PRAD and ULQ2

Contribution ID: 44

Type: **Talk**

## **Low-energy electron scattering for nucleon and nuclei including exotic ones**

*Thursday, 29 June 2023 12:00 (30 minutes)*

**Primary author:** SUDA, Toshimi (ELPH, Tohoku University)

**Presenter:** SUDA, Toshimi (ELPH, Tohoku University)

**Session Classification:** PRAD and ULQ2

Contribution ID: 45

Type: **Talk**

## **TBD (REMOTE)**

*Thursday, 29 June 2023 14:30 (30 minutes)*

**Primary author:** VACCHI, Andrea (Department of Mathematics, Computer Science and Physics University of Udine & INFN Trieste)

**Presenter:** VACCHI, Andrea (Department of Mathematics, Computer Science and Physics University of Udine & INFN Trieste)

**Session Classification:** Muonic Atom exp.

Contribution ID: 46

Type: **Talk**

## **Laser spectroscopy of muonic helium ions**

*Thursday, 29 June 2023 15:00 (30 minutes)*

**Primary author:** Prof. ANTOGNINI, Aldo (ETH Zurich and PSI, Switzerland)

**Presenter:** Prof. ANTOGNINI, Aldo (ETH Zurich and PSI, Switzerland)

**Session Classification:** Muonic Atom exp.

Contribution ID: 47

Type: **Talk**

## **The Muonic Hydrogen hyperfine splitting experiment at PSI**

*Thursday, 29 June 2023 15:30 (30 minutes)*

**Primary author:** OUF, Ahmed (JGU Mainz & Paul Scherrer institute)

**Presenter:** OUF, Ahmed (JGU Mainz & Paul Scherrer institute)

**Session Classification:** Muonic Atom exp.

Contribution ID: 48

Type: **Talk**

## **The Generalized Polarizabilities of the proton (REMOTE)**

*Thursday, 29 June 2023 16:30 (30 minutes)*

**Primary authors:** ATAC, Hamza; SPARVERIS, Nikos (Temple University)

**Presenters:** ATAC, Hamza; SPARVERIS, Nikos (Temple University)

**Session Classification:** Polarizabilities & anti- $\pi$  scatt.



Contribution ID: 49

Type: **Talk**

## **Measurement of Compton scattering at MAMI and extraction of nucleon polarizabilities**

*Thursday, 29 June 2023 17:00 (30 minutes)*

**Primary author:** SOKHOYAN, Vahe

**Presenter:** SOKHOYAN, Vahe

**Session Classification:** Polarizabilities & anti- $\pi$  scatt.

Contribution ID: 50

Type: **Talk**

## **Measurement of the Nucleon Axial Form Factor from Charged-Current Elastic Antineutrino Scattering on Hydrogen (REMOTE)**

*Thursday, 29 June 2023 17:30 (30 minutes)*

**Primary author:** MCFARLAND, Kevin (University of Rochester)

**Presenter:** MCFARLAND, Kevin (University of Rochester)

**Session Classification:** Polarizabilities & anti- $\bar{\nu}$  scatt.

Contribution ID: 51

Type: **Talk**

## **Electromagnetic form factors of the proton and neutron from lattice QCD**

*Friday, 30 June 2023 09:00 (30 minutes)*

**Primary author:** Mr SALG, Miguel (University of Mainz)

**Presenter:** Mr SALG, Miguel (University of Mainz)

**Session Classification:** Proton FF

Contribution ID: 52

Type: **Talk**

## At the heart of the proton (REMOTE)

*Wednesday, 28 June 2023 15:30 (30 minutes)*

**Primary author:** TOMASI, Egle (IRFU/SPhN)

**Presenter:** TOMASI, Egle (IRFU/SPhN)

**Session Classification:** LFV,  $\mu$  scatt., fits

Contribution ID: 53

Type: **Talk**

# **A precise determination of the weak mixing angle by parity violating electron scattering**

*Friday, 30 June 2023 11:00 (30 minutes)*

**Presenter:** MAAS, Frank

**Session Classification:** PV

Contribution ID: 54

Type: **Talk**

## **Electroweak nuclear radii constrain isospin-breaking corrections to $V_{ud}$**

*Friday, 30 June 2023 11:30 (30 minutes)*

**Primary author:** GORSHTEYN, Misha (JGU Mainz)

**Presenter:** GORSHTEYN, Misha (JGU Mainz)

**Session Classification:** PV

Contribution ID: 55

Type: **Talk**

## **Hyperfine spin-flip spectroscopy of trapped HD<sup>+</sup>: towards solving a $9\sigma$ discrepancy with theory (REMOTE)**

*Monday, 26 June 2023 17:00 (30 minutes)*

**Primary author:** KOELEMEIJ, Jeroen (Vrije Universiteit Amsterdam)

**Presenter:** KOELEMEIJ, Jeroen (Vrije Universiteit Amsterdam)

**Session Classification:** HD<sup>+</sup> and H<sub>2</sub><sup>+</sup>

Contribution ID: 56

Type: **Talk**

## **Proton Form Factor Program at MESA**

*Friday, 30 June 2023 09:30 (30 minutes)*

**Presenter:** MERKEL, Harald

**Session Classification:** Proton FF



Contribution ID: 57

Type: **Talk**

## **TBD (REMOTE)**

*Wednesday, 28 June 2023 10:00 (30 minutes)*

**Primary author:** FRUGIUELE, Claudia

**Presenter:** FRUGIUELE, Claudia

**Session Classification:** New Physics I

Contribution ID: 58

Type: **Talk**

## **Nucleon structure in and out of muonic hydrogen**

**Presenter:** Dr LENSKY, Vadim (JGU Mainz)

**Session Classification:**  $\mu$ ASTI session

Contribution ID: 59

Type: **Talk**

## μASTI session

**Session Classification:** μASTI session

Contribution ID: **60**

Type: **not specified**

## μASTI session

**Session Classification:** μASTI session