

Jun.-Prof. Dr. Dieter Ries

December 31, 2020

Scientific talks (in reverse chronological order):

Physics Colloquium, Johannes Gutenberg University Mainz, invited talk:
"Probing the Standard Model of Particle Physics with Ultracold Neutrons",
Mainz, Germany, 17.11.2020 (remote)

American Conference on Neutron Scattering, invited talk:
"A new measurement of the electric dipole moment of the neutron",
Boulder, CO, USA, 13.07.2020 (remote)

Colloquium of the PRISMA+ Cluster of Excellence, invited talk:
"A new measurement of the electric dipole moment of the neutron",
Mainz, Germany, 24.06.2020 (remote)

Symposium on Precision Probes of the Standard Model, invited talk:
"Probing the Standard Model with electric dipole moment measurements",
Heidelberg, Germany, 13.03.2020

INT Workshop INT-19-75W: Fundamental Symmetries Research with Beta Decay, invited talk:
"The τ SPECT Neutron Lifetime Experiment",
Seattle, WA, USA, 6.11.2019

SPIN 2018, 23rd International SPIN Symposium, invited talk:
"Measuring the free neutron lifetime with spin-polarized ultracold neutrons at TRIGA Mainz",
Ferrara, Italy, 13.09.2018

7th International Symposium on Symmetries in Subatomic Physics, invited talk:
"Sources for ultracold neutrons: a world-wide comparison",
Aachen, Germany, 12.06.2018

DPG Frühjahrstagung 2018, invited talk:
"Measuring the Free Neutron Lifetime with Ultracold Neutrons at TRIGA Mainz",
Bochum, Germany, 01.03.2018

Workshop "nEDM2017", invited talk:
"Neutron EDM Measurement with a Pulsed Beam",
Harrison Hot Springs, BC, Canada, 16.10.2017

PSI Laboratory for Particle Physics seminar,
"Comparing UCN sources worldwide",
Villigen, 07.03.2016

Joint ETHZ / UZH PhD Seminar 2015,

"Studies of neutron transport and extraction at the PSI source for Ultracold Neutrons",
Villigen, 26.08.2015

Los Alamos National Laboratory P25 Seminar,

"UCN Physics at the Paul Scherrer Institute - Status of the UCN Source and nEDM Experiment",

Los Alamos, NM, USA, 09.02.2015

Workshop "Challenges of the world-wide experimental search for the electric dipole moment of the neutron",

"Status of the source for ultracold neutrons at the Paul Scherrer Institute",

Ascona, 04.11.2014

Joint ETHZ / UZH PhD Seminar 2014,

"Status of the PSI source for Ultracold Neutrons",

University of Zürich, 11.09.2014

Physics of fundamental Symmetries and Interactions - PSI2013,

"Status of the source for ultracold neutrons at the Paul Scherrer Institute",

Villigen, 10.09.2013

Swiss Institute for Particle Physics (CHIPP) PhD Winter School 2013,

"Optimization of the source for ultracold neutrons at the Paul Scherrer Institute",

Grindelwald, 25.01.2013

Publications in peer reviewed journals (in reverse chronological order):

Entries marked with * are peer reviewed conference proceedings.

Most of my work within collaborations has been published in alphabetic order of the authors.

- [1] C. Abel, N. Ayres, G. Ban, *et al.*, “**A search for neutron to mirror-neutron oscillations using the nedm apparatus at psi**,” *Physics Letters B*, vol. 812, p. 135993, 2021. doi:<https://doi.org/10.1016/j.physletb.2020.135993>.
- [2] C. Abel, S. Afach, N. J. Ayres, *et al.*, “**Optically pumped cs magnetometers enabling a high-sensitivity search for the neutron electric dipole moment**,” *Phys. Rev. A*, vol. 101, p. 053419, May 2020. arXiv:1912.04631, doi:[10.1103/PhysRevA.101.053419](https://doi.org/10.1103/PhysRevA.101.053419).
- [3] C. Abel, S. Afach, N. J. Ayres, *et al.*, “**Measurement of the permanent electric dipole moment of the neutron**,” *Phys. Rev. Lett.*, vol. 124, p. 081803, Feb 2020. arXiv:2001.11966, doi:[10.1103/PhysRevLett.124.081803](https://doi.org/10.1103/PhysRevLett.124.081803).
- [4] G. Bison, B. Blau, M. Daum, *et al.*, “**Neutron optics of the PSI ultracold-neutron source: characterization and simulation**,” *The European Physical Journal A*, vol. 56, no. 2, p. 33, 2020. arXiv:1907.05730, doi:[10.1140/epja/s10050-020-00027-w](https://doi.org/10.1140/epja/s10050-020-00027-w).
- [5] C. Abel, N. Ayres, G. Bison, *et al.*, “**Statistical sensitivity of the nEDM apparatus at PSI to n - n ' oscillations**,” **EPJ Web Conf.*, vol. 219, p. 07001, 2019. arXiv:1811.01906, doi:[10.1051/epjconf/201921907001](https://doi.org/10.1051/epjconf/201921907001).
- [6] C. Abel, N. Ayres, G. Ban, *et al.*, “**nEDM experiment at PSI: Data-taking strategy and sensitivity of the dataset**,” **EPJ Web Conf.*, vol. 219, p. 02001, 2019. arXiv:1811.04012, doi:[10.1051/epjconf/201921902001](https://doi.org/10.1051/epjconf/201921902001).
- [7] C. Abel, N. J. Ayres, G. Ban, *et al.*, “**The n2EDM experiment at the Paul Scherrer Institute**,” **EPJ Web Conf.*, vol. 219, p. 02002, 2019. arXiv:1811.02340, doi:[10.1051/epjconf/201921902002](https://doi.org/10.1051/epjconf/201921902002).
- [8] D. Rozpedzik, K. Bodek, B. Lauss, *et al.*, “**Oscillating ultra-cold neutron spectrometer**,” **EPJ Web Conf.*, vol. 219, p. 10007, 2019. doi:[10.1051/epjconf/201921910007](https://doi.org/10.1051/epjconf/201921910007).
- [9] E. Chanel, Z. Hodge, D. Ries, *et al.*, “**The pulsed neutron beam EDM experiment**,” **EPJ Web Conf.*, vol. 219, p. 02004, 2019. arXiv:1812.03987, doi:[10.1051/epjconf/201921902004](https://doi.org/10.1051/epjconf/201921902004).
- [10] C. Abel, N. J. Ayres, T. Baker, *et al.*, “**Magnetic-field uniformity in neutron electric-dipole-moment experiments**,” *Phys. Rev. A*, vol. 99, p. 042112, Apr 2019. arXiv:1811.06085, doi:[10.1103/PhysRevA.99.042112](https://doi.org/10.1103/PhysRevA.99.042112).
- [11] A. Anghel, T. L. Bailey, G. Bison, *et al.*, “**Solid deuterium surface degradation at ultracold neutron sources**,” *The European Physical Journal A*, vol. 54, p. 148, Sep 2018. arXiv:1804.08616, doi:[10.1140/epja/i2018-12594-2](https://doi.org/10.1140/epja/i2018-12594-2).

- [12] G. Ban, G. Bison, K. Bodek, *et al.*, “**Demonstration of sensitivity increase in mercury free-spin-precession magnetometers due to laser-based readout for neutron electric dipole moment searches**,” *Nucl. Instrum. Meth.*, vol. A896, pp. 129 – 138, 2018. arXiv:1804.05838, doi:<https://doi.org/10.1016/j.nima.2018.04.025>.
- [13] J. Kahlenberg, D. Ries, K. U. Ross, *et al.*, “**Upgrade of the ultracold neutron source at the pulsed reactor TRIGA Mainz**,” *The European Physical Journal A*, vol. 53, p. 226, Nov 2017. arXiv:1706.07795, doi:10.1140/epja/i2017-12428-9.
- [14] C. Abel, N. J. Ayres, G. Ban, *et al.*, “**Search for axion-like dark matter through nuclear spin precession in electric and magnetic fields**,” *Phys. Rev. X*, vol. 7, p. 041034, Nov 2017. arXiv:1708.06367, doi:10.1103/PhysRevX.7.041034.
- [15] G. Bison, M. Daum, K. Kirch, *et al.*, “**Comparison of ultracold neutron sources for fundamental physics measurements**,” *Phys. Rev. C*, vol. 95, p. 045503, Apr 2017. arXiv:1610.08399, doi:10.1103/PhysRevC.95.045503.
- [16] G. Wyszynski, K. Bodek, S. Afach, *et al.*, “**Active compensation of magnetic field distortions based on vector spherical harmonics field description**,” *AIP Advances*, vol. 7, no. 3, p. 035216, 2017. doi:10.1063/1.4978394.
- [17] G. Ban, G. Bison, K. Bodek, *et al.*, “**Ultracold neutron detection with ^6Li -doped glass scintillators**,” *The European Physical Journal A*, vol. 52, no. 10, p. 326, 2016. arXiv:1606.07432, doi:10.1140/epja/i2016-16326-4.
- [18] G. Bison, F. Burri, M. Daum, *et al.*, “**An ultracold neutron storage bottle for UCN density measurements**,” *Nucl. Instrum. Meth.*, vol. A830, pp. 449 – 453, 2016. arXiv:1606.01804, doi:<http://dx.doi.org/10.1016/j.nima.2016.06.025>.
- [19] S. Afach, G. Ban, G. Bison, *et al.*, “**A device for simultaneous spin analysis of ultracold neutrons**,” *Eur. Phys. J.*, vol. A51, no. 11, p. 143, 2015. arXiv:1502.06876, doi:10.1140/epja/i2015-15143-7.
- [20] J. M. Pendlebury, S. Afach, N. J. Ayres, *et al.*, “**Revised experimental upper limit on the electric dipole moment of the neutron**,” *Phys. Rev.*, vol. D92, no. 9, p. 092003, 2015. arXiv:1509.04411, doi:10.1103/PhysRevD.92.092003.
- [21] S. Afach, N. J. Ayres, G. Ban, *et al.*, “**Observation of gravitationally induced vertical striation of polarized ultracold neutrons by spin-echo spectroscopy**,” *Phys. Rev. Lett.*, vol. 115, no. 16, p. 162502, 2015. arXiv:1506.00446, doi:10.1103/PhysRevLett.115.162502.
- [22] S. Afach, C. A. Baker, G. Ban, *et al.*, “**Measurement of a false electric dipole moment signal from ^{199}Hg atoms exposed to an inhomogeneous magnetic field**,” *Eur. Phys. J.*, vol. D69, no. 10, p. 225, 2015. arXiv:1503.08651, doi:10.1140/epjd/e2015-60207-4.
- [23] S. Afach, N. J. Ayres, C. A. Baker, *et al.*, “**Gravitational Depolarization of Ultracold Neutrons: Comparison with Data**,” *Phys. Rev.*, vol. D92, no. 5, p. 052008, 2015. arXiv:1506.06563, doi:10.1103/PhysRevD.92.052008.

- [24] S. Afach, G. Ban, G. Bison, *et al.*, “**Highly stable atomic vector magnetometer based on free spin precession,**” *Opt. Express*, vol. 23, pp. 22108–22115, Aug 2015. arXiv:1507.08523, doi:10.1364/OE.23.022108.
- [25] S. Afach, G. Ban, G. Bison, *et al.*, “**Constraining interactions mediated by axion-like particles with ultracold neutrons,**” *Phys. Lett.*, vol. B745, pp. 58–63, 2015. arXiv:1412.3679, doi:10.1016/j.physletb.2015.04.024.
- [26] F. Piegsa, D. Ries, U. Filges, and P. Hautle, “**A Drabkin-type spin resonator as tunable neutron beam monochromator,**” *Nucl. Instrum. Meth.*, vol. A794, pp. 47–53, 2015. URL: <http://www.sciencedirect.com/science/article/pii/S0168900215005379>, doi:10.1016/j.nima.2015.04.049.
- [27] H. Becker, G. Bison, B. Blau, *et al.*, “**Neutron production and thermal moderation at the PSI UCN source,**” *Nucl. Instrum. Meth.*, vol. A777, pp. 20–27, 2015. arXiv:1408.3217, doi:10.1016/j.nima.2014.12.091.
- [28] S. Afach, C. Baker, G. Ban, *et al.*, “**A measurement of the neutron to ^{199}Hg magnetic moment ratio,**” *Phys. Lett.*, vol. B739, pp. 128–132, 2014. arXiv:1410.8259, doi:10.1016/j.physletb.2014.10.046.