

RYAN JORDAN RINGLE

PERSONAL DATA

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WORK EXPERIENCE

Current FRIB, East Lansing, MI, USA

*Senior Physicist
and Adjunct
Professor of
Physics*

- Led LEBIT facility science program
 - 2 accepted FRIB proposals, 2 accepted BMIS proposals, and 14 accepted NSCL proposals, since completing system move in 2012
 - * 5 fundamental interactions
 - * 7 nuclear structure
 - * 6 nuclear astrophysics
 - 14 completed experiments since first online beam delivered in 2015
 - * 11 science publications
 - * 2 manuscripts submitted
 - * 3 manuscripts in preparation
 - 8 completed offline experiments since 2012 using local ion sources
 - * Q-value and mass measurements for neutrinoless double beta decays and ultra-forbidden decays
 - * 8 science publications
 - * 1 manuscript submitted
- Managed daily LEBIT operations, technical developments, and science program
 - supervised or co-supervised 12 graduate students and 5 post docs since 2009
 - served as project leader for LEBIT system move and reconfiguration
 - served as project leader for the single ion Penning trap (SIPT)
 - supervised technical developments for LEBIT
 - * Single Ion Penning Trap (SIPT)
 - * phase-imaging ion cyclotron resonance (in progress)
 - * laser ablation ion source
 - * Stored Waveform Inverse Fourier Transform (SWIFT) in-trap beam purification
 - * miniature Penning trap for constant high-precision magnetic field monitoring
- Served as project leader for design, installation and commissioning of the collision-induced-dissociation (CID) gas cell demonstrator
- Served as project leader for design, installation and commissioning of the BECOLA ion beam cooler and buncher project for laser spectroscopy
- Served as project leader for design, installation and commissioning of the ReA ion beam cooler and buncher project for reaccelerated beams

- Developed and applied codes to simulate space charge effects in gas cells, ion traps, and ion transport devices
- Designed, installed, and commissioned controls and DAQ hardware for FRIB magnetic field mapper

2006–2009 TRIUMF, Vancouver, Canada

*Postdoctoral
Research Fellow*

- Played a major role in the design, construction and commissioning of the TITAN facility
 - assisted in commissioning of TITAN EBIT charge breeder
 - developed space charge simulations for EBIT
 - created data analysis tools for TITAN mass measurements
 - brought TITAN ion beam cooler and buncher into operation and implemented reverse extraction of ions into the collinear laser spectroscopy line
 - installed and commissioned beam line connecting cooler/buncher to TITAN Penning trap
 - commissioned complete TITAN facility and performed first online experiments
- Executed pilot mass measurement program at TITAN focused on halo nuclei and highly charged ions
 - 10 accepted proposals
 - 9 science publications

2000-2006 NSCL, East Lansing, MI, USA

*Research
Associate/Grad
Student*

- Heavily involved in the design, construction and commissioning of the LEBIT facility
 - personally responsible for 9.4 T Penning trap mass spectrometer
 - created and maintained analysis and daq codes
- Assisted in the execution of LEBIT pilot mass measurement program
 - analyzed data for several experiments
 - contributed to multiple proposals
- Executed Penning-trap related technical developments
 - developed Lorentz steerer for ion injection into a Penning trap
 - developed octupole excitation of ions in a Penning trap

1998-2000 MTU, Houghton, MI, USA

Math Tutor

- Tutored individuals and groups at the Math Learning Center in all levels of undergraduate math courses

1999-2000 MTU, Houghton, MI, USA

*Professorial
Assistant*

- Assisted in the preparation and grading of an advanced undergraduate partial differential equation class

1998-1999 MTU, Houghton, MI, USA

Research Assistant

- Aided in the preparation, performance and analysis of experiments involving laser trapping of meso-scale liquid particles
- Developed Mathematica code to calculate laser light scattering amplitudes and particle evaporation rates

EDUCATION

- December, 2006* Michigan State University, East Lansing
Ph.D. in Physics Major: Physics
 Thesis: "High precision mass measurement of ^{38}Ca and development of the LEBIT 9.4-T Penning trap system"
 Advisor: Prof. Georg BOLLEN
- May, 2002* Michigan State University, East Lansing
Masters of Science in Physics Major: Physics
 Advisor: Prof. Georg BOLLEN
- May, 2000* Michigan Tech. University, Houghton
Bachelor of Science in Mathematics *magna cum laude* · Major: Mathematics
- May, 1999* Michigan Tech. University, Houghton
Bachelor of Science in Physics *magna cum laude* · Major: Physics

AWARDS, GRANTS, AND PATENTS

August, 2021

The Precision Frontier at FRIB: Masses, Radii, Moments, and Fundamental Interactions. Total amount - \$4,500,000

November, 2020

Gas Stopper Developments for Improved Purity and Intensity of Low-Energy, Rare-Isotope Ion Beams. Total amount - \$356,000

August, 2015

Patent : Precision Magnetic Field Monitoring in High Radiation Environments (PCT/US15/46228)

April, 2015

NSCL PI for phase 2 SBIR submitted by Translume to develop micro Penning traps for magnetic field monitoring. Total Amount - \$1,165,000 (\$526,643 NSCL subcontract)

April, 2014

NSCL PI for phase 1 SBIR submitted by Translume to develop micro Penning traps for magnetic field monitoring. Total Amount - \$155,000 (\$34,973 NSCL subcontract)

May, 2012

International Union of Pure and Applied Physics (IUPAP) Young Scientist (Early Career) Prize in Fundamental Metrology

September, 2011

NSF Major Research Instrumentation (MRI) for "A Single-Ion Penning Trap Mass Spectrometer (SIPT) for Very Rare Isotopes Produced via Projectile Fragmentation". Amount - \$585,564 (+\$250,956 cost share from NSCL and MSU)

COMMITTEES AND WORKING GROUPS

NSCL Electronics Committee, chair, 2021-2023

NSCL Electronics Committee, member, 2019-2021

Trapped Charged Particles (TCP) conference, chair of local organizing committee, 2018

FRIB Users Ion Trap Working Group, convener, 2016-present

FRIB Users Precision Measurements Working Group, co-convener, 2015-present

NSCL Continuous Improvement Committee, member, 2010-2013

NSCL Seminar Committee, member, 2010-2012

GRADUATE STUDENTS AND POST DOCS SUPERVISED OR CO-SUPERVISED

Rafael Ferrer, Post Doc, 2009-2010

Anna Kwiatkowski, Graduate Student, 2009-2011

David Lincoln, Graduate Student, 2009-2012

Matthew Redshaw, Post Doc, 2009-2012

Scott Bustabad, Graduate Student, 2009-2014

Brad Barquest, Graduate Student, 2009-2014

Sam Novario, Graduate Student, 2011-2014

Adrian Valverde, Graduate Student, 2012-2016

Kerim Gulyuz, Post Doc, 2013-2017

Martin Eibach, Post Doc, 2014-2017

Chris Izzo, Graduate Student, 2014-2018

Rachel Sandler, Graduate Student, 2014-2019

Alec Hamaker, Graduate Student, 2016-2021

Isaac Yandow, Graduate Student, 2017-2023

Daniel Puentes, Graduate Student, 2017-2023

Catherine Nicoloff, Graduate Student, 2019-2022

Erich Leistenschneider, Post Doc, 2019-2021

Nadeesha Gamage, Post Doc, 2021-2023

Scott Campbell, Graduate Student, 2021-present

Christian Ireland, Graduate Student, 2022-present

Hannah Erington, Graduate Student, 2023-present

ACCEPTED EXPERIMENT PROPOSALS

Precision Binding Energies for Pioneering Astrophysical Studies, FRIB, 2023

The Last Piece of the Generalized Brink Axel Hypothesis Puzzle, FRIB, 2023

Exploration of Deformed Shell Closures and Pairing Correlations in $N = Z$ Nuclei Around $A = 80$, FRIB, 2021

Seeking the Holy Grail of Nuclear Structure: Precise Binding Energy Determination of ^{100}Sn , FRIB, 2021

Improved Limit on the Normal-Matter Electron-Neutrino Mass using Momentum Reconstruction in ^7Be EC Decay, NSCL, 2019

High-Precision Mass Measurement of ^{27}P for Improved X-Ray Burst Modelling, NSCL, 2018, complete

High precision mass measurement of ^{24}Si for the astrophysical rp-process, NSCL, 2018, complete

High-Precision Mass Measurements for Nuclear Structure Studies around $N=28$, NSCL, 2017, 50% complete

High-Precision Mass Measurements of Zr Isotopes up to $N=Z=40$ for Improved X-Ray Burst Modeling, NSCL, 2017

Photon Strength Function Following the Decay of ^{70}Cu , NSCL, 2017, complete

High Precision Mass Measurements of ^{52}Co and ^{56}Cu for the Astrophysical rp-Process, NSCL, 2016, complete

Precision Mass Measurements of ^{44}V and ^{44m}V for Studies of Charge-Dependent NN Interactions, NSCL, 2015, complete

High Precision Mass Measurement of ^{28}S for Fundamental Studies, NSCL, 2015, complete

High-Precision Mass Measurements in the Proton-Rich Region for rp-Process Studies, NSCL, 2015, complete

High Precision Mass Measurements for the Astrophysical rp-Process, NSCL, 2014, complete

Exploration of the $N=32,34$ Shell Closures in Scandrium via High-Precision Penning Trap Mass Measurements, NSCL, 2014, complete

High-Precision Measurements of the ^{14}O Superaligned β -decay Q-value, NSCL, 2014, complete

Extending High-Precision Mass Measurements Beyond $N=40$ for Fe and Co and Improving the IMME $A=36, T=2$ Quintet: Re-commissioning of the LEBIT Facility, NSCL, 2010, complete

Mass Measurements for Double Beta Decay Experiments, TRIUMF, 2010

Precision Mass Measurements of the Halo Candidates ^{31}Ne and ^{22}C , TRIUMF, 2010

Investigating the Apparent Disappearance of the $N=28$ Shell Closure, TRIUMF, 2010

High Precision Mass Measurements of Superaligned $T=2$ Nuclear Beta Decay Emitters, TRIUMF, 2009

Mass Measurements of Astatine Isotopes, TRIUMF, 2009

Precision Mass Cartography of the Island of Inversion, TRIUMF, 2009, complete

Measuring the Masses of ^{65}As and ^{66}Se with TITAN, TRIUMF, 2008

Astrophysical Motivation for the ^{70}Kr mass measurement - a Waiting Point Nuclide, TRIUMF, 2008

Precision Mass Measurements of Proton-Rich Aluminum Isotopes, TRIUMF, 2008, complete

Determination of the One Neutron Separation Energy for ^{19}C , TRIUMF, 2008

Formation and Breakup of Radioactive Molecular Sidebands for the NSCL Gas Cell and Test of Beam Purification Techniques, NSCL, 2005, complete

Development and Test of Beam Purification Techniques for the NSCL Gas Cell and LEBIT Projects, NSCL, 2004, complete

LEBIT - Pilot Mass Measurement Program, NSCL, 2002, complete

INVITED TALKS

February 26 - Darmstadt, Germany
March 1, 2024

R. Ringle **Latest news from LEBIT**. Invited contribution at the NUSTAR Conference 2024.

May 8-11, Giessen, Germany
2023

R. Ringle **The Beam Stopping Facility at FRIB**. Invited contribution at the SMI Conference 2023.

April 25-28, Darmstadt, Germany
2023

R. Ringle **News from LEBIT**. Invited contribution at the CS Workshop 2023.

August 6-10, South Bend, Indiana
2022

R. Ringle **Ion Trapping in Rare Isotope Beam Research**. Invited contribution at the Exotic Beam Summer School 2022.

August 5-10, East Lansing, Michigan
2018

R. Ringle **An Overview of Recent Contributions to Nuclear Structure from Mass Measurements with Ion Traps**. Invited contribution at the Nuclear Structure 2018 conference.

July 2, 2018 Tokyo, Japan

R. Ringle **Advancing Penning trap mass spectrometry of rare isotopes at the LEBIT facility**. Colloquium at RIKEN.

Feb. 26 - Darmstadt, Germany
March 2, 2018

R. Ringle **Recent results and developments at the LEBIT facility**. Invited contribution at the NUSTAR 2018 conference.

June 8-10, Lanzhou, China
2016

R. Ringle **Next-generation stopping and manipulation of high-intensity rare isotope beams at NSCL/FRIB**. Invited contribution at the SMI 2016 conference.

March 21-22, Darmstadt, Germany
2016

R. Ringle **LEBIT : Present Status**. Invited contribution at the CS Workshop at GSI.

October 6-11, Waikoloa, Hawaii
2014

R. Ringle **SIPT - An Ultrasensitive Mass Spectrometer for Rare Isotopes**. Invited contribution at the joint 2014 DNP/JPS meeting.

April 10-11, Mainz, Germany
2014

R. Ringle **LEBIT : Controls and Data Analysis**. Invited contribution at the CS Workshop at the University of Mainz.

October 16, South Bend, Indiana
2013

R. Ringle **Penning Trap Mass Spectrometry at the LEBIT Facility**. Invited colloquium speaker at Notre Dame.

February 28 - Darmstadt, Germany
March 1, 2013

R. Ringle **LEBIT: Controls and Data Analysis**. Invited contribution at CS workshop.

December 2-6, Rehovot, Israel
2012

R. Ringle, G. Bollen, S. Bustabad, D. Lincoln, S. Novario, M. Redshaw, S. Schwarz. **Fundamental interaction studies at LEBIT**. Invited contribution at FUNTRAP₁₂ workshop.

June 1-3, 2009 Ann Arbor, Michigan

R. Ringle, M. Brodeur, T. Brunner, M. Smith, V. Ryjkov, A. Lapierre, P. Delheij, D. Lunney, J. Dilling. **Penning trap mass measurements of light, neutron-rich halo nuclei at TITAN**. Workshop on Atomic Physics with Rare Atoms.

February 18, Burnaby, Canada
2008

R. Ringle, M. Brodeur, T. Brunner, M. Smith, V. Ryjkov, A. Lapierre, P. Delheij, D. Lunney, J. Dilling. **Mass Measurements at TRIUMF**. Fifty minute oral lecture at Simon Fraser University.

December 14, Darmstadt, Germany
2005

R. Ringle, G. Bollen, P. Schury, S. Schwarz and T. Sun. **SOMA, Excel and Data Analysis**. Thirty minute oral presentation at the Data Analysis of TOF measurements at ISOLTRAP and SHIPTRAP.

CONFERENCE PRESENTATIONS

September 25 -
September 30, Glasshütte, Germany
2022

R. Ringle, A. Hamaker, E. Leistenschneider, R. Jain, G. Bollen, S. A. Giuliani, K. Lund, W. Nazarewicz, L. Neufcourt, C. R. Nicoloff, D. Puentes, C. S. Sumithrarachchi, T. Yandow, **Mass of ^{80}Zr Reveals a Deformed Double-Shell Closure at $N=Z=40$** . Oral presentation at the TCP 2022 conference.

May 29 - June Dillon, Colorado
2, 2017

R. Ringle, G. Bollen, M. Eibach, K. Gulyuz, A. Hamaker, C. Izzo, S. Schwarz. **Advancing Penning trap mass spectrometry of rare isotopes at the LEBIT facility**. Oral presentation at the ARIS 2017 conference.

May 11-15, Grand Rapids, Michigan
2015

R. Ringle, P. Bado, G. Bollen, M. Dugan. **Micro Penning Traps for Continuous Magnetic Field Monitoring in High-Radiation Environments.** Poster presentation at the EMIS 2015 conference.

June 1-6, 2014 Tokyo, Japan

R. Ringle, G. Bollen, S. Bustabad, K. Gulyuz, R., D.L. Lincoln, S. J. Novario, M. Redshaw, S. Schwarz, A. A. Valverde. **Direct double beta-decay Q-value measurements via Penning trap mass spectrometry with LEBIT.** Poster presentation at the ARIS 2014 conference.

April 12-16, Saariselkä, Finland
2010

R. Ringle, B.R. Barquest, M. Block, G. Bollen, S. Bustabad, C.M. Campbell, R. Ferrer, A. Gehring, A.A. Kwiatkowski, D.L. Lincoln, D.J. Morrissey, G.K. Pang, M. Redshaw, S. Schwarz. **High-precision Penning trap mass measurements of refractory elements produced via projectile fragmentation with LEBIT.** Oral presentation at the Trapped Charged Particles Conference.

May 26-30, Grand Rapids, Michigan
2009

R. Ringle, M. Brodeur, T. Brunner, S. Ettenauer, A. Gallant, M. Smith, A. Lapierre, V. Ryjkov, P. Delheij, D. Lunney, J. Dilling. **Penning Trap Mass Measurements of Light, Neutron-Rich Halo Nuclei and Recent Developments at TITAN.** Oral presentation at the Radioactive Nuclear Beams Conference.

September 7-12, 2008 Ryn, Poland

R. Ringle, M. Brodeur, T. Brunner, M. Smith, V. Ryjkov, A. Lapierre, P. Delheij, D. Lunney, J. Dilling. **Extending the Range of Penning Trap Mass Spectrometry to Nuclides With Half Lives Less Than 10 ms.** Oral presentation at the Exotic Nuclei and Atomic Masses (ENAM) Conference.

January 13-19, Kleinwalsertal, Austria
2008

R. Ringle, M. Brodeur, T. Brunner, M. Smith, V. Ryjkov, A. Lapierre, P. Delheij, D. Lunney, J. Dilling. **TITAN Mass Measurements of ^{11}Li (and other halo nuclei).** Oral presentation at the Modern Aspects in Nuclear Structure and Reactions.

July 11-22, Vancouver, Canada
2005

R. Ringle, G. Bollen, A. Prinke, J. Savory, P. Schury, S. Schwarz and T. Sun. **The LEBIT 9.4 T Penning Trap System.** Poster presentation at the 17th Annual TRIUMF Summer Institute.

September 12-15, 2004 Pine Mountain, Georgia

R. Ringle, G. Bollen, A. Prinke, J. Savory, P. Schury, S. Schwarz and T. Sun. **The LEBIT 9.4 T Penning Trap System.** Poster presentation at the Exotic Nuclei and Atomic Masses (ENAM) Conference.

October 27-30, Chicago, Illinois
2004

R. Ringle, T. Sun, G. Bollen, D. Davies, M. Facina, J. Huikari, E. Kwan, D.J. Morrissey, A. Prinke, J. Savory, P. Schury, S. Schwarz, C.S. Sumithrarachchi. **First Experiments with LEBIT at MSU**. Ten minute oral presentation at the Meeting of the APS Division of Nuclear Physics.

October 9-12, East Lansing, Michigan
2002

R. Ringle, G. Bollen, P. Schury, S. Schwarz and T. Sun. **The LEBIT Penning Trap**. Ten minute oral presentation at the Meeting of the APS Division of Nuclear Physics.

PUBLICATIONS IN REFEREED JOURNALS

F. G. A. Quarati, G. Bollen, P. Dorenbos, M. Eibach, K. Gulyuz, A. Hamaker, C. Izzo, D. K. Keblbeck, X. Mougeot, D. Puentes, M. Redshaw, R. Ringle, R. Sandler, J. Surbrook, and I. Yandow **Measurements and computational analysis of the natural decay of ^{176}Lu** . *Phys. Rev. C.*, **107** (2023) 024313

M. Horana Gamage, R. Bhandari, G. Bollen, N. D. Gamage, A. Hamaker, D. Puentes, M. Redshaw, R. Ringle, S. Schwarz, C. S. Sumithrarachchi, and I. Yandow **Identification of a potential ultralow-Q-value electron-capture decay branch in ^{75}Se via a precise Penning trap measurement of the mass of ^{75}As** . *Phys. Rev. C.*, **106** (2022) 065503

M. Portillo, B. M. Sherrill, Y. Choi, M. Cortesi, K. Fukushima, M. Hausmann, E. Kwan, S. Lidia, P. N. Ostroumov, R. Ringle, M. K. Smith, M. Steiner, O. B. Tarasov, A. C. C. Villari, T. Zhang **Commissioning of the Advanced Rare Isotope Separator ARIS at FRIB**. *Nucl. Instrum. Meth B*, **540** (2023) 151

Z. Meisel, A. Hamaker, G. Bollen, B. A. Brown, M. Eibach, K. Gulyuz, C. Izzo, C. Langer, F. Montes, W.-J. Ong, D. Puentes, M. Redshaw, R. Ringle, R. Sandler, H. Schatz, S. Schwarz, C. S. Sumithrarachchi, A. A. Valverde, and I. T. Yandow **Improved nuclear physics near $A = 61$ refines urca neutrino luminosities in accreted neutron star crusts**. *Phys. Rev. C.*, **105** (2022) 025804

D. Gupta, R. Singh, R. Ringle, C. Nicoloff, I. Rahinov, O. Heber, D. Zajfman **Particle-in-cell techniques for the study of space charge effects in an electrostatic ion beam trap**. *Phys. Rev. E.*, **104** (2021) 065202

A. Hamaker, E. Leistenschneider, R. Jain, G. Bollen, S. A. Giuliani, K. Lund, W. Nazarewicz, L. Neufcourt, C. R. Nicoloff, D. Puentes, R. Ringle, C. S. Sumithrarachchi, I. T. Yandow **Precision mass measurement of lightweight self-conjugate nucleus ^{80}Zr** . *Nature Phys.*, **17** (2021) 1408

R. Ringle, G. Bollen, K. Lund, C. Nicoloff, S. Schwarz, C.S. Sumithrarachchi, A.C.C. Villari **Particle-in-cell techniques for the study of space charge effects in the Advanced Cryogenic Gas Stopper**. *Nucl. Instrum. Meth B*, **496** (2021) 61

J. Surbrook, G. Bollen, M. Brodeur, A. Hamaker, D. Pérez-Loureiro, D. Puentes, C. Nicoloff, M. Redshaw, R. Ringle, S. Schwarz, C. S. Sumithrarachchi, L. J. Sun, A. A. Valverde, A. C. C. Villari, C. Wrede, I. T. Yandow **First Penning trap mass measurement of ^{36}Ca** . *Phys. Rev. C*, **103** (2021) 014323

E. Leistenschneider, E. Dunling, G. Bollen, B.A. Brown, J. Dilling, A. Hamaker, J.D. Holt, A. Jacobs, A.A. Kwiatkowski, T. Miyagi, W.S. Porter, D. Puentes, M. Redshaw, M.P. Reiter, R. Ringle, R. Sandler, C.S. Sumithrarachchi, A.A. Valverde, and I.T. Yandow (The LEBIT Collaboration and the TITAN Collaboration) **Precision Mass Measurements of Neutron-Rich Scandium Isotopes Refine the Evolution of $N=32$ and $N=34$ Shell Closures**. *Phys. Rev. Lett.*, **126** (2021) 042501

D. Puentes, G. Bollen, M. Brodeur, M. Eibach, K. Gulyuz, A. Hamaker, C. Izzo, S. M. Lenzi, M. MacCormick, M. Redshaw, R. Ringle, R. Sandler, S. Schwarz, P. Schury, N. A. Smirnova, J. Surbrook, A. A. Valverde, A. C. C. Villari, and I. T. Yandow **High-precision mass measurements of the isomeric and ground**

states of ^{44}V : Improving constraints on the isobaric multiplet mass equation parameters of the $A=44$, 0^+ quintet. *Phys. Rev. C*, **101** (2020) 064309

C.S. Sumithrarachchi, G. Bollen, D. Lawton, K.R. Lund, D.J. Morrissey, J. Ottarson, R. Ringle, G. Savard, S. Schwarz, A.C.C. Villari. **Beam thermalization in a large gas catcher**. *Nucl. Instrum. Meth B*, **463** (2020) 305

P.D. O'Malley, M. Brodeur, D.P. Burdette, J.W. Klimes, A.A. Valverde, J.A. Clark, G. Savard, R. Ringle, V. Varentsov. **Testing the weak interaction using St. Benedict at the University of Notre Dame**. *Nucl. Instrum. Meth B*, **463** (2020) 488

K.R. Lund, G. Bollen, D. Lawton, D.J. Morrissey, J. Ottarson, R. Ringle, S. Schwarz, C.S. Sumithrarachchi, A.C.C. Villari, J. Yurkon. **Online tests of the Advanced Cryogenic Gas Stopper at NSCL**. *Nucl. Instrum. Meth B*, **463** (2020) 378

S. Schwarz, B.R. Barquest, G. Bollen, R. Ferrer, A.A. Kwiatkowski, D.L. Lincoln, D.J. Morrissey, R. Ringle, J. Savory. **High-precision mass measurements of Ge and As isotopes near $N = Z$** . *Nucl. Phys. A*, **989** (2019) 201

R. Sandler, G. Bollen, N.D. Gamage, A. Hamaker, C. Izzo, D. Puentes, M. Redshaw, R. Ringle, I. Yandow. **Investigation of the potential ultralow Q -value β -decay candidates ^{89}Sr and ^{139}Ba using Penning trap mass spectrometry**. *Phys. Rev. C*, **100** (2019) 024309

R. Sandler, G. Bollen, J. Dissanayake, M. Eibach, K. Gulyuz, A. Hamaker, C. Izzo, X. Mougeot, D. Puentes, F.G.A. Quarati, M. Redshaw, R. Ringle, I. Yandow. **Direct determination of the ^{138}La β -decay Q value using Penning trap mass spectrometry**. *Phys. Rev. C*, **100** (2019) 014308

A.A. Valverde, M. Brodeur, D.P. Burdette, J.A. Clark, J.W. Klimes, D. Lascar, P.D. O'Malley, R. Ringle, G. Savard, V. Varentsov. **Stopped, bunched beams for the TwinSol facility**. *Hyperfine Int.*, **240** (2019) 38

A. Hamaker, B. Bollen, M. Eibach, C. Izzo, D. Puentes, M. Redshaw, R. Ringle, R. Sandler, S. Schwarz, I. Yandow. **SIPT - An ultrasensitive mass spectrometer for rare isotopes**. *Hyperfine Int.*, **240** (2019) 34

W.-J. Ong, M. Brodeur, G. Bollen, M. Eibach, K. Gulyuz, A. Hamaker, C. Izzo, D. Puentes, M. Redshaw, R. Ringle, R. Sandler, S. Schwarz, C.S. Sumithrarachchi, J. Surbrook, A.A. Valverde, A.C.C. Villari, I.T. Yandow. **Mass measurement of ^{51}Fe for the determination of the $^{51}\text{Fe}(p,\gamma)^{52}\text{Co}$ reaction rate**. *Phys. Rev. C*, **98** (2018) 065803

A. Lapiere, G. Bollen, D. Crisp, S. W. Krause, L. E. Linhardt, K. Lund, S. Nash, R. Rencsok, R. Ringle, S. Schwarz, M. Steiner, C. Sumithrarachchi, T. Summers, A. C. C. Villari, S. J. Williams, Zhao, Q. **On-line operation of the EBIT charge breeder of the ReA post-accelerator**. *AIP Conf. Proc.*, **2011** (2018) 070002

A. Lapiere, G. Bollen, D. Crisp, S. W. Krause, L. E. Linhardt, K. Lund, S. Nash, R. Rencsok, R. Ringle, S. Schwarz, M. Steiner, C. Sumithrarachchi, T. Summers, A. C. C. Villari, S. J. Williams, Zhao, Q. **First two operational years of the electron-beam ion trap charge breeder at the National Superconducting Cyclotron Laboratory**. *Phys. Rev. Acc. and Beams*, **21** (2018) 053401

A.A. Valverde, M. Brodeur, G. Bollen, M. Eibach, K. Gulyuz, A. Hamaker, C. Izzo, W.-J. Ong, D. Puentes, M. Redshaw, R. Ringle, R. Sandler, S. Schwarz, C.S. Sumithrarachchi, J. Surbrook, A.C.C. Villari, I.T. Yandow. **High-precision mass measurement of ^{56}Cu and the redirection of the rp -process flow**. *Phys. Rev. Lett.*, **120** (2018) 032701

C. Izzo, G. Bollen, M. Brodeur, M. Eibach, K. Gulyuz, J. D. Holt, J. M. Kelly, M. Redshaw, R. Ringle, R. Sandler, S. Schwarz, S. R. Stroberg, C. S. Sumithrarachchi, A. A. Valverde, A. C. C. Villari. **Precision mass measurements of neutron-rich Co isotopes beyond $N=40$** . *Phys. Rev. C*, **97** (2018) 014309

R. M. E. B. Kandegedara, G. Bollen, M. Eibach, N. D. Gamage, K. Gulyuz, C. Izzo, M. Redshaw, R. Ringle, R. Sandler, A. A. Valverde. **β -decay Q value among the $A=50$ Ti-V-Cr isobaric triplet and atomic masses of the $^{46,47,49,50}\text{Ti}$, $^{50,51}\text{V}$, and $^{50,52-54}\text{Cr}$** . *Phys. Rev. C* **96** (2017) 044321

- B. R. Barquest, G. Bollen, P. F. Mantica, K. Minamisono, R. Ringle, S. Schwarz, C. S. Sumithrarachchi. **RFQ beam cooler and buncher for collinear laser spectroscopy of rare isotopes.** Nucl. Instrum. Meth A **866** (2017) 18
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