

# Nathan H. Frank

Physics and Astronomy Department

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## EDUCATION

Fall 2006 **Ph.D. Physics**, Michigan State University, East Lansing, MI

Thesis Advisor: Dr. M. Thoennessen

Title: Spectroscopy of Neutron Unbound States in Neutron Rich Oxygen Isotopes

Dec. 2001 **M.S. Physics**, Michigan State University, East Lansing, MI

May 2000 **Majors: Physics, Mathematics**, Concordia College, Moorhead, MN

B.A. *cum laude*, Minor: Computer Science

## APPOINTMENTS

2015-Present Associate Professor

Physics Department, Augustana College, Rock Island, IL

2009-2015 Assistant Professor

Physics Department, Augustana College, Rock Island, IL

2007-2009 Visiting Assistant Professor

Physics Department, Illinois Wesleyan University, Bloomington, IL

2006-2007 Visiting Assistant Professor

Department of Physics, Concordia College, Moorhead, MN

2002-2006 Graduate Research Assistant

Department of Physics, Michigan State University, East Lansing, MI

2000-2001 Graduate Teaching Assistant

Department of Physics, Michigan State University, East Lansing, MI

## TEACHING

- Instructor for Physics I (algebra based)

Fall 2009-2015, 2017 (Augustana)

Fall 2007 and 2008 (Illinois Wesleyan)

Fall 2006 (Concordia College)

- Instructor for Physics II (algebra based)  
Spring 2007 (Concordia College)
- Introductory Laboratory Sequence  
2009-Present (Augustana)  
2007-2009 (Illinois Wesleyan)  
2006-2007 (Concordia College)
- Basic Physics II  
Winter 2010 (Augustana)
- Basic Physics III  
Spring 2013-2016, 2018-Present (Augustana)
- Basic Physics Laboratory Sequence  
2009-Present (Augustana)  
2007-2009 (Illinois Wesleyan)  
2006-2007 (Concordia College)  
2000-2001 (Michigan State)
- Modern Physics  
Fall 2008 (Illinois Wesleyan)
- Special Topics in Nuclear Physics  
Fall 2007 (Illinois Wesleyan)
- Computer Applications  
Spring 2012, 2017 and Winter 2014 (Augustana)
- Classical Mechanics I  
Winter 2009, 2011, 2013, 2015, 2017 (Augustana)
- Classical Mechanics II  
Spring 2009 (Augustana)
- Electrodynamics

Spring 2008 (Illinois Wesleyan)

- Advanced Laboratory III  
2010-Present (Augustana)
- Advanced Experimental Physics Laboratory (junior level)  
May 2008 and 2009 (Illinois Wesleyan)

#### PROFESSIONAL DEVELOPMENT, GRANTS, AND AWARDS

2018-2020 MRI Consortium: Development of a Charged Particle Telescope  
by Undergraduate Research Students for Studies of Exotic Nuclei,  
NSF Grant 1827840 (\$83,087)

This award supports students and the PI to purchase, test, and install the new experimental detector system for the use at the NSCL and FRIB at MSU. This device will support experiments involving detection of gamma-rays, neutrons, and charged particles in coincidence.

2017- RUI: Collaboration to Enhance Participation of Minority and Undergraduate Students in Nuclear Science, NSF Grant 1713522 (\$61,000)  
This award supports students and the PI to continue research associated with the NSCL at MSU. Projects will be performed with researchers in the MoNA Collaboration.

2014-2018 RUI: Undergraduate Research on Neutron-Rich Nuclei,  
NSF Grant 1404236 (\$124,000)  
This award supports students and the PI to continue research associated with the NSCL at MSU. Projects will be performed with researchers in the MoNA Collaboration.

2013-2015 NSSC-MSI Research Grant Award: Department of Energy  
National Nuclear Security Administration under Award Number DE-NA0000979  
This award is from the National Nuclear Security Administration (NNSA). It will support N. Frank as a senior investigator in the development of a new segmented target and detector system to be installed in the NSCL at MSU. PI Gueye from Hampton University will lead the effort.

- 2010-2014 RUI: Establishing an Undergraduate Research Group in Nuclear Physics, NSF Grant 0969173 (\$121,000)
- This award supports students and the PI in research associated with the NSCL at MSU. Projects will be performed with researchers in the MoNA Collaboration.
- 2014 National Society of Black Physicists Teaching Excellence Workshop  
Hampton University, Hampton, VA, April 6
- Introduced to active learning techniques useful to all demographic groups
- 2010 American Association of Physics Teachers (AAPT) New Faculty Workshop  
Hilton Garden Inn, Greenbelt, MD, June 28 - July 1
- Given specific guidance on different aspects of professional life including:
- teaching strategies such as JITT, Peer Instruction, Tutorials in Physics
  - faculty issues such as external funding, time management, balancing professional and personal life
- 2008 Activity Based Physics Faculty Institute (ABPFI)  
Dickinson College, Carlisle, PA, June 15-20
- Explored physics education research materials such as Workshop Physics, Interactive Lecture Demonstrations, and RealTime Physics
  - Developed curricula for introductory physics course
- 2007-2008 Carl L. Bailey Centennial Faculty Scholarship Award
- Internal grant/award from Concordia College, Moorhead, MN
  - Title: Probing the Structure of Exotic Nuclei with the MoNA/Sweeper Facility
  - Two undergraduate students analyzed and interpreted data from an experiment using the facility and presented data

## LEADERSHIP, SERVICE, AND OUTREACH

- 2018- Chair of Physics and Astronomy
- 2018- Facilities Planning Committee
- 2016- Advisor for Gaming Club
- 2013- Advisor for Alpha Psi Omega (APO)
- 2014-15 Steering Committee for the "Conference on Laboratory Instruction Beyond the First Year of College II" organized by ALPhA
- 2016 Past President for John Deere Chapter of Sigma Xi
- 2015 President for John Deere Chapter of Sigma Xi
- 2014 President-Elect for John Deere Chapter of Sigma Xi
- 2013-14 First-year Student Advisor
- 2013-16 General Education Committee
- 2013-17 Academic Computing Committee
- 2012-14 Public Safety Committee
- 2012-14 Faculty Research Committee
- 2011-16 Advisor for Pre-medical Professional Students
- 2011-12 Executive Director of the MoNA Collaboration
- 2011-12 Steering Committee for the "2012 Conference on Laboratory Instruction Beyond the First Year" organized by ALPhA
- 2011-13 Secretary for John Deere Chapter of Sigma Xi
- 2011-12 Accommodations Committee for Students with Special Needs
- 2010-14 Safety Officer of the Physics and Astronomy Department
- 2018 Organized Bowlesburg Elementary School Outreach  
for Fourth Graders in which we performed physics demonstrations
- 2016 Organized Bowlesburg Elementary School Outreach  
for Second Graders in which we performed physics demonstrations
- 2011-16 Organized Bowlesburg Elementary School Outreach  
for First Graders in which we performed physics demonstrations

#### COMPUTER EXPERIENCE

- Experienced in C, C++, PAW, ROOT, Fortran, Tcl/Tk, Linux, data acquisition codes, LabView<sup>TM</sup>, IgorPro, and DataStudio

#### PROFESSIONAL AFFILIATIONS

- American Physical Society (APS), 2001-Present
- American Association of Physics Teachers (AAPT), 2006-2017
- Sigma Xi, The Scientific Research Society, 2009-2017
- Advanced Lab Physics Association (ALPhA), 2009-Present

## REFEREED PUBLICATIONS

1. **Search for excited states in  $^{25}\text{O}$** , M.D. Jones, K. Fosse, T. Baumann, P.A. DeYoung, J.E. Finck, N. Frank, A.N. Kuchera, N. Michel, W. Nazarewicz, J. Rotureau, J.K. Smith, S.L. Stephenson, K. Stiefel, M. Thoennessen, and R.G.T. Zegers, *Phys. Rev. C* **96**, 054322 (2017).
2. **Neutron-unbound excited states of  $^{23}\text{N}$** , M.D. Jones, T. Baumann, J. Brett, J. Bullaro, P.A. DeYoung, J.E. Finck, N. Frank, K. Hammerton, J. Hinnefeld, Z. Kohley, A.N. Kuchera, J. Pereira, A. Rabeh, J.K. Smith, A. Spyrou, S.L. Stephenson, K. Stiefel, M. Tuttle-Timm, R.G.T. Zegers, and M. Thoennessen, *Phys. Rev. C* **95**, 044323 (2017).
3. **Neutron correlations in the decay of excited  $^{11}\text{Li}$** , J.K. Smith, T. Baumann, D. Bazin, J. Brown, P.A. DeYoung, N. Frank, M.D. Jones, Z. Kohley, B. Luther, B. Marks, A. Spyrou, S.L. Stephenson, M. Thoennessen, and A. Volya, *Nucl. Phys. A* **955**, pages 2740, November (2016).
4. **Population of  $^{13}\text{Be}$  in nucleon exchange reactions**, B.R. Marks, P.A. DeYoung, J.K. Smith, T. Baumann, J. Brown, N. Frank, J. Hinnefeld, M. Hoffman, M.D. Jones, Z. Kohley, A.N. Kuchera, B. Luther, A. Spyrou, S. Stephenson, C. Sullivan, M. Thoennessen, N. Viscariello, and S.J. Williams, *Phys. Rev. C* **92**, 054320 (2015).
5. **Two-neutron sequential decay of  $^{24}\text{O}$** , M.D. Jones, N. Frank, T. Baumann, J. Brett, J. Bullaro, P.A. DeYoung, J.E. Finck, K. Hammerton, J. Hinnefeld, Z. Kohley, A.N. Kuchera, J. Pereira, A. Rabeh, W.F. Rogers, J.K. Smith, A. Spyrou, S.L. Stephenson, K. Stiefel, M. Tuttle-Timm\*, R.G.T. Zegers, and M. Thoennessen, *Phys. Rev. C* **92**, 051306(R) (2015).
6. **Unbound excited states of the  $N = 16$  closed-shell nucleus  $^{24}\text{O}$** , W.F. Rogers, S. Garrett, A. Grovum, R.E. Anthony, A. Aulie, A. Barker, T. Baumann, J.J. Brett, J. Brown, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, A. Hamann, R.A. Haring-Kaye, J. Hinnefeld, A.R. Howe, N.T. Islam, M.D. Jones, A.N. Kuchera, J. Kwiatkowski, E.M. Lunderberg, B. Luther, D.A. Meyer, S. Mosby, A. Palmisano, R. Parkhurst, A. Peters, J. Smith, J. Snyder, A. Spyrou, S.L. Stephenson, M. Strongman, B. Sutherland, N.E. Taylor, and M. Thoennessen, *Phys. Rev. C* **92**, 034316 (2015).
7. **Search for unbound  $^{15}\text{Be}$  states in the  $3n+^{12}\text{Be}$  channel**, A.N. Kuchera, A. Spyrou, J.K. Smith, T. Baumann, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, M. D. Jones, Z. Kohley, S. Mosby, W.A. Peters, and M. Thoennessen, *Phys. Rev. C* **91**, 017304 (2015).
8. **Three-body correlations in the ground-state decay of  $^{26}\text{O}$** , Z. Kohley, T. Baumann, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, B. Luther, E. Lunderberg, M. Jones, S. Mosby, J.K. Smith, A. Spyrou, and M. Thoennessen, *Phys. Rev. C* **91**, 034323 (2015).

9. **Further insights into the reaction  $^{14}\text{Be}(\text{CH}_2, \text{X})^{10}\text{He}$** , M.D. Jones, Z. Kohley, T. Baumann, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, R.A. Haring-Kaye, A.N. Kuchera, B. Luther, J.K. Smith, J. Snyder, A. Spyrou, S.L. Stephenson, and M. Thoennessen, *Phys. Rev. C* **91**, 044312 (2015).
10. **Selective population of unbound states in  $^{10}\text{Li}$** , J.K. Smith, T. Baumann, J. Brown, P.A. DeYoung, N. Frank, J. Hinnefeld, Z. Kohley, B. Luther, B. Marks\*, A. Spyrou, S.L. Stephenson, M. Thoennessen, and S.J. Williams, *Nuclear Physics A* **940**, 235-241 (2015).
11. **Low-lying neutron unbound states in  $^{12}\text{Be}$** , J.K. Smith, T. Baumann, D. Bazin, J. Brown, S. Casarotto\*, P.A. DeYoung, N. Frank, J. Hinnefeld, M. Hoffman\*, M.D. Jones, Z. Kohley, B. Luther, B. Marks\*, N. Smith\*, J. Snyder, A. Spyrou, S.L. Stephenson, M. Thoennessen, N. Viscariello\*, and S.J. Williams, *Phys. Rev. C* **90**, 024309 (2014).
12. **Determining the  $^7\text{Li}(n, \gamma)$  cross section via Coulomb dissociation of  $^8\text{Li}$** , R. Izsak, A. Horvath, A. Kiss, Z. Seres, A. Galonsky, C.A. Bertulani, Zs. Fulop, T. Baumann, D. Bazin, K. Ieki, C. Bordeanu, N. Carlin, M. Csanaad, F. Deak, P. DeYoung, N. Frank, T. Fukuchi, A. Gade, D. Galaviz, C.R. Hoffman, W.A. Peters, H. Schelin, M. Thoennessen, and G.I. Veres, *Phys. Rev. C* **88**, 065808 (2013).
13. **Exploiting neutron-rich radioactive ion beams to constrain the symmetry energy**, Z. Kohley, G. Christian, T. Baumann, P.A. DeYoung, J.E. Finck, N. Frank, M. Jones, J.K. Smith, J. Snyder, A. Spyrou, and M. Thoennessen, *Phys. Rev. C* **88**, 041601(R) (2013).
14. **Study of Two-Neutron Radioactivity in the Decay of  $^{26}\text{O}$** , Z. Kohley, T. Baumann, D. Bazin, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, M. Jones, E. Lunderberg\*, B. Luther, S. Mosby, T. Nagi, J.K. Smith, J. Snyder, A. Spyrou, and M. Thoennessen, *Phys. Rev. Lett.* **110**, 152501 (2013).
15. **First observation of  $^{13}\text{Li}$  ground state**, Z. Kohley, E. Lunderberg, P.A. DeYoung, A. Volya, T. Baumann, D. Bazin, G. Christian, N.L. Cooper, N. Frank, A. Gade, C. Hall, J. Hinnefeld, B. Luther, S. Mosby, W.A. Peters, J.K. Smith, J. Snyder, A. Spyrou, and M. Thoennessen, *Phys. Rev. C* **87**, 011304(R) (2013).
16. **Spyrou et al. Replies:**, A. Spyrou, Z. Kohley, T. Baumann, D. Bazin, B.A. Brown, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, E. Lunderberg, S. Mosby, W.A. Peters, A. Schiller, J.K. Smith, J. Snyder, M.J. Strongman, M. Thoennessen, and A. Volya, *Phys. Rev. Lett.* **109**, 239202 (2012).
17. **Evidence for the ground-state resonance of  $^{26}\text{O}$** , E. Lunderberg, P.A. DeYoung, Z. Kohley, H. Attanayake, T. Baumann, D. Bazin, G. Christian, D. Divaratne, S.M. Grimes, A. Haagsma, J.E. Finck, N. Frank, B. Luther, S. Mosby, T. Nagi, G.F. Peaslee, A. Schiller, J. Snyder, A. Spyrou, M.J. Strongman, and M. Thoennessen, *Phys. Rev. Lett.* **108**, 142503 (2012).
18. **Reply to Comment on Neutron knockout of  $^{12}\text{Be}$  populating neutron-unbound states in  $^{11}\text{Be}$** , W.A. Peters, T. Baumann, B.A. Brown, J. Brown, P.A. DeYoung, J.E. Finck, N. Frank, K.L. Jones,

- J.-L. Lecouey, B. Luther, G.F. Peaslee, W.F. Rogers, A. Schiller, M. Thoennessen, and, J.A. Tostevin, Phys. Rev. C **86**, 019802 (2012).
19. **Spectroscopy of neutron-unbound  $^{27,28}\text{F}$** , G. Christian, N. Frank, S. Ash, T. Baumann, P.A. DeYoung, J.E. Finck, A. Gade, G.F. Grinyer, B. Luther, M. Mosby, S. Mosby, J.K. Smith, J. Snyder, A. Spyrou, M.J. Strongman, M. Thoennessen, M. Warren, D. Weisshaar, and A. Wersal, Phys. Rev. C **85**, 034327 (2012).
  20. **First Observation of Ground State Dineutron Decay:  $^{16}\text{Be}$** , A. Spyrou, Z. Kohley, T. Baumann, D. Bazin, B.A. Brown, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, E. Lunderberg, S. Mosby, W.A. Peters, A. Schiller, J.K. Smith, J. Snyder, M.J. Strongman, M. Thoennessen, and A. Volya, Phys. Rev. Lett. **108**, 102501 (2012).
  21. **Exploring the Low-Z Shore of the Island of Inversion at  $N = 19$** , G. Christian, N. Frank, S. Ash, T. Baumann, J. Brown, J.E. Finck, A. Gade, G.F. Grinyer, B. Luther, G.F. Peaslee, J.K. Smith, A. Spyrou, M.J. Strongman, M. Thoennessen, M. Warren, D. Weisshaar, and A. Wersal, Phys. Rev. Lett. **108**, 032501 (2012).
  22. **Search for the  $^{15}\text{Be}$  ground state**, A. Spyrou, J.K. Smith, T. Baumann, B.A. Brown, J. Brown, G. Christian, P.A. DeYoung, N. Frank, S. Mosby, W.A. Peters, A. Schiller, M.J. Strongman, M. Thoennessen, and J.A. Tostevin, Phys. Rev. C **84**, 044309 (2011).
  23. **Neutron Unbound States in  $^{25,26}\text{F}$** , N. Frank, D. Albertson, J. Bailey, T. Baumann, D. Bazin, B.A. Brown, J. Brown, P.A. DeYoung, J.E. Finck, A. Gade, J. Hinnefeld, R. Howes, M. Kasperczyk, B. Luther, W.A. Peters, A. Schiller, A. Smith, M. Thoennessen, and J.A. Tostevin, Phys. Rev. C **84**, 037302 (2011).
  24. **Neutron knockout of  $^{12}\text{Be}$  populating neutron-unbound states in  $^{11}\text{Be}$** , W.A. Peters, T. Baumann, B.A. Brown, J. Brown, P.A. DeYoung, J.E. Finck, N. Frank, K.L. Jones, J.-L. Lecouey, B. Luther, G.F. Peaslee, W.F. Rogers, A. Schiller, M. Thoennessen, J.A. Tostevin, and K. Yoneda, Phys. Rev. C **83**, 057304 (2011).
  25. **Observation of a two-neutron cascade from a resonance in  $^{24}\text{O}$** , C.R. Hoffman, T. Baumann, J. Brown, P.A. DeYoung, J.E. Finck, N. Frank, J. Hinnefeld, S. Mosby, W.A. Peters, W.F. Rogers, A. Schiller, J. Snyder, A. Spyrou, S.L. Tabor, and M. Thoennessen, Phys. Rev. C **83**, 031303 (2011).
  26. **First observation of excited states in  $^{12}\text{Li}$** , C.C. Hall, E.M. Lunderberg, P.A. DeYoung, T. Baumann, D. Bazin, G. Blanchon, A. Bonaccorso, B.A. Brown, J. Brown, G. Christian, D.H. Denby, J. Finck, N. Frank, A. Gade, J. Hinnefeld, C.R. Hoffman, B. Luther, S. Mosby, W.A. Peters, A. Spyrou, and M. Thoennessen, Phys. Rev. C **81**, 021302(R) (2010).
  27. **First evidence for a virtual  $^{18}\text{B}$  ground state**, A. Spyrou, T. Baumann, D. Bazin, G. Blanchon, A. Bonaccorso, E. Breitbach, J. Brown, G. Christian, A. DeLine, P.A. DeYoung, J.E. Finck, N. Frank, R. Howes, S. Mosby, W.A. Peters, A. Russel, A. Schiller, M. Strongman, and M. Thoennessen, Phys. Lett. B **683**, (2010) 129133.



28. **Disappearance of the  $N = 14$  Shell**, M.J. Strongman, A. Spyrou, C.R. Hoffman, T. Baumann, D. Bazin, J. Brown, P.A. DeYoung, J.E. Finck, N. Frank, S. Mosby, W. Rogers, W.A. Peters, A. Schiller, S.L. Tabor, and M. Thoennessen, (MoNA Collaboration), *Phys. Rev. C* **80**, 021302(R) (2009).
29. **Neutron decay spectroscopy on neutron-rich oxygen isotopes**, N. Frank, T. Baumann, D. Bazin, B.A. Brown, J. Brown, P.A. DeYoung, J.E. Finck, A. Gade, J. Hinnefeld, R. Howes, J.-L. Lecouey, B. Luther, W.A. Peters, H. Scheit, A. Schiller, M. Thoennessen, and J. Tostevin, *Nucl. Phys. A* **813** (2008) 199.
30. **Ground State Energy and Width of  ${}^7\text{He}$  from  ${}^8\text{Li}$  Proton Knockout**, D.H. Denby, P.A. DeYoung, T. Baumann, D. Bazin, E. Breitbach, J. Brown, N. Frank, A. Gade, C.C. Hall, J. Hinnefeld, C.R. Hoffman, R. Howes, R.A. Jenson, B. Luther, S.M. Mosby, C.W. Olson, W.A. Peters, A. Schiller, A. Spyrou, and M. Thoennessen, *Phys. Rev. C* **78**, 044303 (2008).
31. **Experimental determination of the  $N = 16$  shell closure and evidence for a neutron skin at the oxygen drip line**, C.R. Hoffman, T. Baumann, D. Bazin, J. Brown, G. Christian, P.A. DeYoung, J.E. Finck, N. Frank, J. Hinnefeld, R. Howes, P. Mears, E. Mosby, S. Mosby, J. Reith, B. Rizzo, W. Rogers, G. Peaslee, W.A. Peters, A. Schiller, M. Scott, S.L. Tabor, M. Thoennessen, P. Voss, and T. Williams, *Phys. Rev. Lett.* **100**, 152502 (2008).
32. **Production of Neutron Unbound Nuclei via Primary Fragmentation of  ${}^{48}\text{Ca}$** , G.A. Christian, W.A. Peters, D. Absalon, D. Albertson, T. Baumann, D. Bazin, E. Breitbach, J. Brown, P.L. Cole, D. Denby, P.A. DeYoung, J.E. Finck, N. Frank, A. Fritsch, C. Hall, A.M. Hayes, J. Hinnefeld, C.R. Hoffman, R. Howes, B. Luther, E. Mosby, S. Mosby, D. Padilla, P.V. Pancella, G. Peaslee, W.F. Rogers, A. Stolz, M.J. Strongman, M. Thoennessen, and L.O. Wagner, *Nucl. Phys. A* **801** (2008) 101.
33. **Reconstruction of nuclear charged fragment trajectories from a large gap sweeper magnet**, N. Frank, A. Schiller, D. Bazin, W.A. Peters, and M. Thoennessen, *Nucl. Instrum. Methods Phys. Res. A* **580**, 1478 (2007).
34. **Selective population and neutron decay of an excited state of  ${}^{23}\text{O}$** , A. Schiller, N. Frank, T. Baumann, D. Bazin, B.A. Brown, J. Brown, P.A. DeYoung, J.E. Finck, A. Gade, J. Hinnefeld, R. Howes, J.-L. Lecouey, B. Luther, W.A. Peters, H. Scheit, M. Thoennessen, and J.A. Tostevin, *Phys. Rev. Lett.* **99**, 112501 (2007).
35. **First observation of  ${}^{60}\text{Ge}$  and  ${}^{64}\text{Se}$** , A. Stolz, T. Baumann, N. H. Frank, T. N. Ginter, G. W. Hitt, E. Kwan, M. Mocko, W. Peters, A. Schiller, C. S. Sumithrarachchi, and M. Thoennessen, *Phys. Lett. B* **627** (2005) 32-37.
36. **New Approach for Measuring Properties of rp-Process Nuclei**, R. C. Clement, D. Bazin, W. Benenson, B. A. Brown, A. L. Cole, M. W. Cooper, P. A. DeYoung, A. Estrade, M. A. Famiano, N. H. Frank, A. Gade, T. Glasmacher, P. T. Hosmer, W. G. Lynch, F. Montes, W. F. Mueller, G. F. Peaslee, P. Santi, H. Schatz, B. M. Sherrill, M-J. van Goethem, and M. S. Wallace, *Phys. Rev. Lett.* **92**, 172502 (2004).

37. **Half-life limit of  $^{19}\text{Mg}$** , N. Frank, T. Baumann, D. Bazin, R. R. C. Clement, M.W. Cooper, P. Heckman, W. A. Peters, A. Stolz, M. Thoennessen, and M. S. Wallace, Nucl. Phys. A **746**, 551-554 (2004).
38. **First two energy levels in  $^{15}\text{F}$** , W. A. Peters, T. Baumann, D. Bazin, B. A. Brown, R. R. C. Clement, N. Frank, P. Heckman, B. A. Luther, F. Nunes, J. Seitz, A. Stolz, M. Thoennessen, and E. Tryggestad, Phys. Rev. C **68**, 034607 (2003).
39. **Single proton knock-out reactions from  $^{24,25,26}\text{F}$** , M. Thoennessen, T. Baumann, B. A. Brown, J. Enders, N. Frank, P. G. Hansen, P. Heckman, B. A. Luther, J. Seitz, A. Stolz, and E. Tryggestad, Phys. Rev. C **68**, 044318 (2003).
40. **Half-life limit of  $^{19}\text{Mg}$** , N. Frank, T. Baumann, D. Bazin, R. R. C. Clement, P. Heckman, W. A. Peters, A. Stolz, M. Thoennessen, and M. S. Wallace, Phys. Rev. C **68**, 054309 (2003).
41. **First Search for  $^{16}\text{Be}$** , T. Baumann, N. Frank, B. A. Luther, D. J. Morrissey, J. P. Seitz, B. M. Sherrill, M. Steiner, J. Stetson, A. Stolz, M. Thoennessen, and I. Wiedenhover, Phys. Rev. C **67**, 061303 (2003).
42. **Spectroscopic factors measured in inclusive proton-knockout reactions on  $^8\text{B}$  and  $^9\text{C}$  at intermediate energies**, J. Enders, T. Baumann, B. A. Brown, N. H. Frank, P. G. Hansen, P. R. Heckman, B. M. Sherrill, A. Stolz, M. Thoennessen, J. A. Tostevin, E. J. Tryggestad, S. Typel, and M. S. Wallace, Phys. Rev. C **67**, 064301 (2003).

#### CONFERENCE PROCEEDINGS

1. **Structure and decay correlations of two-neutron systems beyond the dripline**, Z Kohley, T Baumann, D Bazin, G Christian, P.A. DeYoung, J.E. Finck, R.A. Haring-Kaye, J Hinnefeld, N Frank, E Lunderberg, B Luther, S Mosby, W.A. Peters, J.K. Smith, J Snyder, S.L. Stephenson, M.J. Strongman, A Spyrou, M Thoennessen, and A Volya, J. Phys.: Conf. Ser. **569**, 012033 (2014).
2. **Nuclear structure physics with MoNA-LISA**, S.L. Stephenson, J.A. Brown, P.A. DeYoung, J.E. Finck, N.H. Frank, J.D. Hinnefeld, R.A. Kaye, B.A. Luther, G.F. Peaslee, D.A. Meyer, W.F. Rogers and the MoNA Collaboration, in *Neutron Spectroscopy, Nuclear Structure, Related Topics: XIX International Seminar of Neutrons with Nuclei*, (Joint Institute for Nuclear Research, Dubna, Russia, 2012) 138-144.
3. **Measurement of the Efficiency of the Modular Neutron Array (MONA) at the NSCL**, W.A. Peters, T. Baumann, G.A. Christian, D. Denby, J. Finck, N. Frank, C.C. Hall, J. Hinnefeld, A. Schiller, M.J. Strongman, P.A. DeYoung, and M. Thoennessen, Twentieth International Conference for the APPLICATION OF ACCELERATORS IN RESEARCH AND INDUSTRY, AIP Conf. Proc. **1099**, 807 (2009).
4. **Population of Neutron Unbound States via Two-Proton Knockout Reactions**, N. Frank, A. Schiller, T. Baumann, D. Bazin, A. Gade, J.-L. Lecouey, W.A. Peters, H. Scheit, and M. Thoennessen, Proceedings of the

9<sup>th</sup> International Spring Seminar on Nuclear Physics, Changing Facets of Nuclear Structure, edited by A. Covello, p.23, World Scientific (2008).

5. **Exploring Neutron-Rich Oxygen Isotopes with MoNA**, W.A. Peters, N. Frank, T. Baumann, D. Bazin, J. Brown, P.A. DeYoung, J.E. Finck, A. Gade, J. Hinnefeld, R. Howes, J.-L. Lecouey, B. Luther, H. Scheit, A. Schiller, and M. Thoennessen., Proceedings International Conference on Proton Emitting Nuclei and Related Topics, PRO-CON07, edited by L. Ferreira, AIP Conference Proceedings **961**, 143 (2007).
6. **Observation of the First Excited State in  $^{23}\text{O}$** , N. Frank, A. Schiller, T. Baumann, D. Bazin, J. Brown, P. A. DeYoung, J. E. Finck, A. Gade, J. Hinnefeld, R. Howes, J.-L. Lecouey, B. Luther, W. A. Peters, H. Scheit, and M. Thoennessen, Proceedings 23<sup>rd</sup> Winter Workshop on Nuclear Dynamics, edited by W. Bauer, R. Bellwied and J.W. Harris, p.187, EP Systema, Budapest, Hungary (2007).
7. **First Results from MoNA**, A. Schiller, T. Baumann, D. Bazin, B. A. Brown, D. Bazin, P. A. DeYoung, N. Frank, A. Gade, J. Hinnefeld, R. Howes, R. A. Kryger, J.-L. Lecouey, B. Luther, W. A. Peters, J. R. Terry, M. Thoennessen, and K. Yoneda, Proceedings of the International Conference on Frontiers in Nuclear Structure, Astrophysics and Reactions (FINUSTAR), Kos, Greece, September 12-17, 2005; AIP Conference Proceeding **831**, 92-99 (2006).
8. **Can the Neutron Capture Cross Section be Measured with Coulomb Dissociation?**, A. Horvath, K. Ieki, A. Kiss, A. Galonsky, M. Thoennessen, T. Baumann, D. Bazin, C. Bordeanu, N. Carlin, M. Csanad, F. Deak, P. A. DeYoung, N. Frank, T. Fukuchi, Zs. Fülöp, A. Gade, D. R. Galaviy, C. Hoffman, R. Iysak, W. A. Peters, H. Schelin, A. Schiller, R. Sugo, Y. Seres, G. Veres, Eur. Phys. J. A **25**, 217-220 (2005).
9. **Discovery of  $^{60}\text{Ge}$  and  $^{64}\text{Se}$** , A. Stolz, T. Baumann, N. Frank, T. Ginter, G. W. Hitt, E. Kwan, M. Mocko, W. A. Peters, A. Schiller, C. Sumithrarachchi, M. Thoennessen, Eur. Phys. J. A **25**, 335 (2005).
10. **Single proton knock-out from  $^{24}\text{F}$** , M. Thoennessen, B. A. Brown, T. Baumann, J. Enders, N. H. Frank, P. G. Hansen, P. Heckman, B. A. Luther, J. P. Seitz, A. Stolz, and E. Tryggestad, Nucl. Phys. A **746**, 536c-539c (2004).
11. **Half-life limit of  $^{19}\text{Mg}$** , N. Frank, T. Baumann, D. Bazin, R. R. C. Clement, M. W. Cooper, P. Heckman, W. A. Peters, A. Stolz, M. Thoennessen, and M. S. Wallace, Nucl. Phys. A **746**, 551c-554c (2004).
12. **Investigation of neutron-rich oxygen and flourine isotopes**, M. Thoennessen, T. Baumann, J. Enders, N. H. Frank, P. Heckman, J. P. Seitz, A. Stolz, and E. Tryggestad, Nucl. Phys. A **722**, 61c-66c (2003).

## COLLOQUIA AND SEMINARS

1. **Nuclear Physics Fun at the Edge**, Department of Physics, Marquette University, Milwaukee, WI, November 9, 2017.

2. **Studying Atomic Nuclei with Undergraduates**, Department of Physics, Hampton University, Hampton, VA, April 3, 2014.
3. **Undergraduate Research in Nuclear Physics**, Physics and Astronomy Department, Indiana University South Bend, South Bend, IN, March 8, 2012.
4. **Undergraduate Research in Neutron-rich Atomic Nuclei**, Sigma Xi Annual New Member Induction Banquet, Augustana College, Rock Island, IL, December 1, 2011.
5. **Studies of Neutron-rich Nuclei using the Modular Neutron Array**, Department of Physics, Elon University, Elon, NC, February 18, 2008.
6. **Nuclear Physics near the Dripline: Present and Future of MoNA**, Department of Physics, Central Michigan University, Mount Pleasant, MI, March 23, 2007.

## CONTRIBUTED TALKS

1. **Sweeper/MoNA-LISA setup to the S800: Study of  $^{37}\text{Mg}$** , Low Energy Community Meeting, Argonne National Laboratory, Aug. 3-4, 2017.
2. **Selective Population of Unbound Positive Parity States in  $^{25}\text{F}$  and  $^{26}\text{F}$** , April American Physical Society Meeting, Washington, D.C., Jan. 28-31, 2017.
3. **Sweeper/MoNA-LISA setup to the S800**, Low Energy Community Meeting, University of Notre Dame, South Bend, IN, Aug. 10-13, 2016.
4. **Quizzes or Exams: that is the question.**, Fall Meeting of the Iowa and Illinois Sections of the American Association of Physics Teachers, Bettendorf, IA, Oct. 24, 2014.
5. **Physics Active Learning (PAL) Problems in a Biological Context**, American Association of Physics Teachers Summer Meeting, Minneapolis, MN, July 29, 2014.
6. **Simulation of a Novel Active Target for Neutron-Unbound State Measurements**, American Physical Society, Division of Nuclear Physics Meeting, Newport News, VA, Oct. 23-26, Bull. Am. Phys. Soc. 58, No. 13, DJ.00009 (2013).
7. **Research on Unstable Atomic Nuclei with Undergraduates**, Celebration of Scholarship at Augustana College, Feb. 18, 2013.
8. **Formative Assessment in an Algebra-based Physics Course**, Fall Meeting of the Illinois Section of the American Association of Physics Teachers at Sherrard High School in Sherrard, IL, Oct. 8-9, 2010.
9. **Cutting-Edge Undergraduate Research in Nuclear Physics**, American Association of Physics Teachers Winter Meeting, Chicago, IL, Feb. 15, 2009.
10. **First excited state of doubly-magic  $^{24}\text{O}$** , American Physical Society, Division of Nuclear Physics Meeting, Nashville, TN, Oct. 25, 2006.
11. **Search for the First Excited State of  $^{24}\text{O}$** , Second Joint Meeting of the American Physical Society and Japanese Physical Society, Division of Nuclear Physics Meeting, Maui, HI, Sep. 18, 2005.
12. **Commissioning of the MSU/FSU Sweeper Magnet**, American Physical Society, Division of Nuclear Physics Meeting, Chicago, IL, Oct. 29, 2004.
13. **Search for  $^{19}\text{Mg}$** , American Physical Society, Philadelphia, PA, April 5, 2003.
14. **Focal Plane Detector System for the MSU/FSU Sweeper Magnet**, American Physical Society, Division of Nuclear Physics Meeting, Lansing, MI, April 5, 2002.

## STUDENT POSTERS AND PRESENTATIONS

1. **Sequential Decay of  $^{26}\text{F}$** , Hayden Karrick\*, Nathan Frank, Anthony Kuchera, Caleb Sword, Jaclyn Brett, Paul DeYoung, Michael Thoennessen, MoNA Collaboration, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Pittsburgh, PA, October 25-28, Bull. Am. Phys. Soc. 62, No. 11, EA.00167 (2017).
2. **Resonances of  $^{25,26}\text{F}$  Atomic Nuclei**, Matthew Tuttle-Timm\*, Celebration of Learning, Augustana College, Rock Island, IL, May 3, 2017.
3. **Light Output for Unbound Neutron Emission and Simulation Comparison**, Jacob Herman\*, 2016 Quadrennial Physics Congress, San Francisco, CA, Nov. 3-5, 2016.
4. **Unbound Resonances of  $^{26,25}\text{F}$** , Jacob Herman\*, Ali Rabeh\*, Matthew Tuttle-Timm\*, Spring 2016 Meeting of the Illinois Section of the AAPT, University of Illinois, Urbana, IL, April 22-23, 2016.
5. **Unbound Resonance of  $^{26}\text{F}$** , Matthew Tuttle-Timm\*, Ali Rabeh\*, Nathan Frank, Jaclyn Brett, Paul DeYoung, Michael Jones, and Michael Thoennessen, MoNA Collaboration, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Santa Fe, NM, Oct. 28-31, Bull. Am. Phys. Soc. 60, No. 13, EA.108 (2015).
6. **Atomic Nuclei on the Edge: The Story of  $^{25}\text{O}$** , Joseph Bullaro, Celebration of Learning, Augustana College, Rock Island, IL, May 6, 2015.
7. **Segmented Target Design**, Abdul Merhi\*, Celebration of Learning, Augustana College, Rock Island, IL, May 7, 2014.
8. **Segmented Target Design**, Abdul Merhi\*, N. Frank, P. Guye, M. Thoennessen, MoNA Collaboration, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Newport News, VA, Oct. 23-26, Bull. Am. Phys. Soc. 58, No. 13, EA.00074 (2013).
9. **Commissioning a Hodoscope Detector**, Andrew Lulis\*, Abdul Merhi\*, N. Frank, D. Bazin, J. Smith, M. Thoennessen, MoNA Collaboration, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Newport News, VA, Oct. 23-26, Bull. Am. Phys. Soc. 58, No. 13, EA.00072 (2013).
10. **Exploration of Three-Body Decay Using Jacobian Coordinates**, Mark Hoffman, Kyle Williams, Celebration of Learning, Augustana College, Rock Island, IL, May 4, 2013.
11. **Exploration of Three-Body Decay Using Jacobian Coordinates**, Mark Hoffmann, Sigma Xi Research Presentations, Augustana College, Rock Island, IL, Jan. 29, 2013.
12. **Testing and Efficiency of a High Efficiency CsI Scintillator Array**, Natalie Viscariello, Sigma Xi Research Presentations, Augustana College, Rock Island, IL, Jan. 29, 2013.
13. **Active Target Simulation**, Nathan M. Smith, Sigma Xi Research Presentations, Augustana College, Rock Island, IL, Jan. 29, 2013.

14. **Testing and Installation of a High Efficiency CsI Scintillator Array**, Natalie Viscariello, 2012 Quadrennial Physics Congress, Orlando, FL, Nov. 8-10, 2012.
15. **Active Target Simulation**, Nathan Smith, 2012 Quadrennial Physics Congress, Orlando, FL, Nov. 8-10, 2012.
16. **Active Target Simulation**, Nathan Smith\*, Peter Draznik\*, Nathan Frank, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Newport Beach, CA, Oct. 24-27, 2012.
17. **Exploration of Three-Body Decay using Jacobian Coordinates**, Mark Hoffman\*, Kyle Williams\*, Nathan Frank, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Newport Beach, CA, Oct. 24-27, 2012.
18. **Testing and Installation of a High-Efficiency CsI Scintillator Array**, Stuart Casarotto\*, Celebration of Learning, Augustana College, Rock Island, IL, May 5, 2012.
19. **Analysis of Neutron-Rich Isotopes**, Natalie Viscariello\*, Celebration of Learning, Augustana College, Rock Island, IL, May 5, 2012.
20. **Testing and Installation of a High Efficiency CsI Scintillator Array**, Natalie Viscariello\*, Stuart Casarotto\*, N. Frank, J. Smith, and M. Thoennesen, CEU Poster, Bulletin of the American Physical Society DNP11-2011-020091, Division of Nuclear Physics Meeting, East Lansing, MI, Oct. 26-29, 2011.
21. **Analysis of an Experiment on Neutron-Rich Isotopes**, Mark Warren\*, Celebration of Learning, Augustana College, Rock Island, IL, May 7, 2011.
22. **Analysis of an Experiment on Neutron-rich Isotopes**, S. Ash\*, M. Warren\*, G. Christian, N. Frank, A. Gade, A. Spyrou, M. Thoennesen, T. Baumann, G.F. Grinyer, D. Weisshaar, and P.A. DeYoung, CEU Poster, American Physical Society, Division of Nuclear Physics Meeting, Santa Fe, NM, Nov. 2-6, 2010.
23. **A Study of Neutron-Rich Nuclei**, Steven Ash\*, Mark Warren\*, and Nathan Frank, Celebration of Learning, Augustana College, Rock Island, IL, May 8, 2010.
24. **Observation of a Resonance State in  $^{25}\text{F}$** , Alison R. Smith\*, 20<sup>th</sup> John Wesley Powell Student Research Conference, Illinois Wesleyan University, Bloomington, IL, April 18, 2009.
25. **Observation of a Resonance State in  $^{26}\text{F}$** , Mark S. Kasperczyk\*, 20<sup>th</sup> John Wesley Powell Student Research Conference, Illinois Wesleyan University, Bloomington, IL, April 18, 2009.
26. **Observation of a Resonance State in  $^{25}\text{F}$** , Alison R. Smith\*, Mark S. Kasperczyk, Nathan H. Frank, MoNA Collaboration, Spring Meeting of the Illinois Section of the AAPT, Illinois Wesleyan University, Bloomington, IL, April 3-4, 2009.

27. **Observation of a Resonance State in  $^{26}\text{F}$** , Mark S. Kasperczyk\*, Alison R. Smith, Nathan H. Frank, MoNA Collaboration, Spring Meeting of the Illinois Section of the AAPT, Illinois Wesleyan University, Bloomington, IL, April 3-4, 2009.
28. **Observation of a Resonance State in  $^{25}\text{F}$** , Alison R. Smith\*, Mark S. Kasperczyk, Nathan H. Frank, MoNA Collaboration, 19<sup>th</sup> Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics, Argonne National Laboratory, Argonne, IL, Nov. 7, 2008.

## POSTERS

**Targeted Student Experiences in a Superconductivity Lab**, Nathan Frank (Augustana College), Conference on Laboratory Instruction Beyond the First Year of College, University of Pennsylvania and Drexel University, Philadelphia, NJ, July 25-27, 2012.

**Angular Momentum Outside of the Classical Mechanics Courses**, Nathan H. Frank (Augustana College) and Gabriel C. Spalding (Illinois Wesleyan University), Topical Conference on Advanced Laboratories, University of Michigan, Ann Arbor, MI, July 23-25, 2009.

**Search for  $^{19}\text{Mg}$** , N. H. Frank, Radioactive Nuclear Beams 6, Argonne, IL, Sep. 22-26, 2003.