

## Richard James deBoer II

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### Education

Ph.D. Physics, University of Notre Dame, 2012

M.S. Physics, University of Notre Dame, 2009

M.S. Physics, Ball State University, 2005

B.S. Physics, Western Michigan University, 2003, *Cum Laude*

### Research

Research Assistant Professor  
Department of Physics

2016–present  
University of Notre Dame

- Design and execution of experimental nuclear astrophysics and applied physics studies at NSL
- Maintain and develop the AZURE2  $R$ -matrix code
- Advise and mentor ND graduate students

Postdoc  
Joint Institute for Nuclear Astrophysics

2012–2016  
University of Notre Dame

- Created most comprehensive  $R$ -matrix analysis of the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  reaction by combining previous high energy analysis with low energy data. The results have been published in Reviews of Modern Physics.
- Comprehensive  $R$ -matrix analysis of the  $^{10}\text{B}(p, \alpha)^7\text{Be}$  reaction for use as a standard for the National Ignition Facility at Lawrence Livermore National Laboratory.
- Developed Monte Carlo uncertainty analysis technique for use with  $R$ -matrix analyses. Implemented for the analysis of the  $^3\text{He}(\alpha, \gamma)^7\text{Be}$  reaction.
- Constructed multiple exit/entrance channel  $R$ -matrix analysis of the  $^{16}\text{O}$  compound nucleus system and demonstrated the level of agreement between a wide variety of past experimental work. Use results to make a more accurate determination of the reaction rates of the astrophysically important reactions  $^{15}\text{N}(p, \gamma)^{16}\text{O}$ ,  $^{15}\text{N}(p, \alpha)^{12}\text{C}$ , and  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$ .
- Reconstructed silicon detector array in 1.5 meter scattering chamber and made higher energy measurements of  $^{12}\text{C} + \alpha$  reactions, low energy study of  $^{14}\text{N}(p, p)$ , and new measurements on  $^{15}\text{N} + \alpha$  reactions.

Research Assistant  
Dr. Michael Wiescher

2005–2011  
University of Notre Dame

- Co-developer of the  $R$ -matrix code AZURE and publication of data analysis of the reaction  $^{16}\text{O}(\alpha, \gamma)^{20}\text{Ne}$
- Measured astrophysically important states in  $^{26}\text{Mg}$  at the High Intensity  $\gamma$ -ray Source

- Experience with  $\gamma$ -spectroscopy using High Purity Germanium detectors
- Experience with neutron spectroscopy using  $4\pi$   $^3\text{He}$  counter and liquid scintillation detectors utilizing time of flight
- Operation experience using various low energy Van de Graaff accelerators

Research Assistant  
Dr. Saiful Islam

2003–2005  
Ball State University

- Analysis of  $^{65}\text{Cu}(\alpha, p)^{68}\text{Zn}$  cross section data with comparison to Hauser-Feshbach statistical model

### Invited Talks

- *Review of critical reactions for nuclear astrophysics: data and R-matrix perspective*, IReNA Virtual Workshop on Stellar Burning, online, June 2020
- *Neutron and secondary  $\gamma$ -ray spectroscopy for astrophysics and applications*, Ohio University seminar, Athens, Ohio, November 2019.
- *Progress towards a global fit of the  $^{15}\text{N}$  system at low energies*. IAEA workshop: INDEN Light Nuclei, Vienna, Austria, May 2019.
- *$^7\text{Be}$  System: Test 2 Results*. IAEA workshop: CM on R-matrix codes for charged-particle induced reactions in the RRR, Vienna, Austria, May 2019.
- *Crossroads of Nuclear Applications*. The University of Notre Dame, March 2019.
- *Secondary  $\gamma$ -ray studies at the University of Notre Dame*. Los Alamos National Laboratory, February 2019.
- *Neutron Spectroscopy at the University of Notre Dame*. Symposium on Nuclear Physics XLII, January 2019.
- *Uncertainty estimation for global R-matrix analyses*. ISNET-6, TUD, Darmstadt, Germany, October 2018
- *Progress towards a global fit of the  $^{15}\text{N}$  system at low energies*. IAEA workshop: INDEN Light Nuclei, Vienna, Austria, August 2018.
- *$^7\text{Be}$  system: Test1a results* IAEA workshop: CM on R-matrix codes for charged-particle induced reactions in the RRR, Vienna, Austria, August 2018.
- *Data Evaluation and Extrapolation using R-matrix*. NIC XV, June 2018
- *The Importance of  $\alpha$  Clustering in Nuclear Astrophysics*. SOTANCP4, May 2018
- *The Quest for the Holy Grail of Nuclear Astrophysics*. JINA-CEE online seminar series, June 2017.
- *R-matrix needs in nuclear astrophysics*. IAEA workshop on R-matrix codes for charged-particle induced reactions in the resolved resonance region, Vienna, Austria, December 2016.
- *AZURE2: An R-matrix code for nuclear astrophysics*. IAEA workshop on R-matrix codes for charged-particle induced reactions in the resolved resonance region, Vienna, Austria, December 2015.
- *Nuclear Science at the University of Notre Dame*. Ball State University, Muncie, IN, USA, November 2015.
- *The Quest for the Holy Grail of Nuclear Astrophysics*. Ohio University, Athens, OH, USA, October 2015.
- *Reducing uncertainties in nuclear reaction data*. Gordon Research Conference, June 2015.

- *AZURE2: A general R-matrix code for nuclear astrophysics.* Laboratori Nazionali del Gran Sasso, Italy, May 2015.
- *Experimental nuclear physics for light element nucleosynthesis.* Gran Sasso Science Institute, Italy, May 2015.
- *Phenomenological R-matrix analysis of reactions populating the  $^{16}\text{O}$  compound nucleus.* Los Alamos National Laboratory, Los Alamos, NM, March 2015.
- *Solving the Mysteries of  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$ .* Laboratori Nazionali del Gran Sasso, Italy, December 2014.
- *Complementary measurements for nuclear astrophysics:  $^{14}\text{N}(p, \gamma)^{15}\text{O}$  and others.* Laboratori Nazionali del Gran Sasso, Italy, November 2014.
- *Precision measurements for nuclear astrophysics.* Triangle Universities Nuclear Laboratories, Durham, NC, USA, September 2014.
- *The  $^3\text{He}(\alpha, \gamma)^7\text{Be}$  Reaction Rate.* Laboratori Nazionali del Gran Sasso, Italy, October 2013
- *Nuclear Astrophysics at the University of Notre Dame.* Ball State University, Muncie, IN, September 2013
- *Improved Rate Calculations for Low Mass Reactions.* University of Notre Dame, Notre Dame, IN, January 2013
- *Developments of R-matrix Codes for Nuclear Astrophysics by the JINA Collaboration.* University of Edinburgh, September 2012
- *Indirect study of the  $^{22}\text{Ne}(\alpha, n)$  reaction.* Los Alamos National Laboratory, Los Alamos, NM, March 2012
- *Indirect study of the  $^{22}\text{Ne}(\alpha, n)$  reaction.* Lawrence Livermore National Laboratory, June 2012
- *The R-matrix code AZURE: Overview and capabilities.* Triangle Universities Nuclear Laboratory, Durham, NC, January 2009
- *$^{16}\text{O}(\alpha, \gamma)^{20}\text{Ne}$  S factor: Measurements and R-matrix analysis.* University of Notre Dame, Notre Dame, IN, January 2008

### Conference Talks

- 2020 R-matrix Online Workshop on Methods and Applications, Extending the global fitting of the  $^{16}\text{O}$  system to higher energies
- Lithium in the Universe 2019, The Nuclear Physics of Stellar Neutron Sources
- DNP 2019, Extrapolating the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  cross section to astrophysical energies using phenomenological R-matrix
- NPA9 2019, Global R-matrix analysis of the  $^{11}\text{B}(\alpha, n)^{14}\text{N}$  reaction
- DNP 2018, R-matrix fits to secondary  $\gamma$ -ray angular distributions from particle emission reactions
- CGS16 2017, Measurements of the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  reaction in off-resonance regions
- NPA8 2017, Background ( $\alpha, n$ ) reactions at low energies:  $^{10,11}\text{B}(\alpha, n)^{13,14}\text{N}$
- Frontiers 2017, The  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  reaction
- DNP 2016, Interference solutions in the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  reaction
- The 2016 R-matrix Workshop on Methods and Applications, AZURE2 tutorial using the  $^3\text{He}(\alpha, \gamma)^7\text{Be}$  reaction
- Frontiers 2016, Characterizing neutron backgrounds for CASPAR
- APS Prairie 2015, Including higher energy data in the R-matrix extrapolation of  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$
- DNP 2015, Including higher energy data in the R-matrix extrapolation of  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$

- CNR\*15, *R*-matrix analysis of  $^{16}\text{O}$  compound nucleus reactions
- NPA7 2015, Low energy scattering cross sections ratios of  $^{14}\text{N}(p, p)^{14}\text{N}$
- DNP 2014, Monte Carlo Uncertainty Analysis of  $^3\text{He}(\alpha, \gamma)^7\text{Be}$
- Low Energy Nuclear Physics and Astrophysics Town Meeting 2014, *R*-matrix
- DNP 2013, Reaction Rate Uncertainties using *R*-matrix:  $^3\text{He}(\alpha, \gamma)^7\text{Be}$  and  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$
- ECT\*-JINA Workshop 2013, Status of  $^{12}\text{C} + \alpha$  Reactions from an *R*-matrix Viewpoint
- NPA 2013, Reaction Rates with Uncertainties from an *R*-matrix analysis:  $^{15}\text{N}(p, \gamma)^{16}\text{O}$ ,  $^{15}\text{N}(p, \alpha)^{12}\text{C}$ , and  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$
- NIC 2012, JINA *R*-matrix Project
- Frontiers 2012, Simultaneous *R*-matrix Analysis of  $^{16}\text{O}$  Compound Nucleus Reactions
- DNP 2012, Simultaneous *R*-matrix Analysis of  $^{16}\text{O}$  Compound Nucleus Reactions
- EMMI-JINA Workshop 2012, Proton induced fusion reactions as a NIF temperature probe
- THERRA 2011, Simultaneous *R*-matrix Analysis of  $^{16}\text{O}$  Compound Nucleus Reactions
- DNP 2011, *R*-matrix Analysis of  $^{16}\text{O}$  Compound Nucleus Reactions
- APS 2011, Threshold Photoneutron Cross Sections for  $^{26}\text{Mg}$
- Frontiers 2010, Photoexcitation of astrophysically important states in  $^{26}\text{Mg}$
- Nuclear Astrophysics Graduate Student Meeting 2009, Notre Dame Nuclear Science Laboratory overview
- A Workshop on *R*-Matrix and Nuclear Reactions in Stellar Hydrogen and Helium Burning 2008, AZURE *R*-matrix analysis of  $^{21}\text{Na}(p, p)$
- Fourth European Summer School on Experimental Nuclear Astrophysics 2007, The *R*-matrix code AZURE

#### Conference and Workshop Organization or Lecturer

- Co-organizer of the 2021 *R*-matrix workshop on methods and applications, June 21-25, Ohio University, Athens, Ohio 2021
- Co-organizer of the 2020 *R*-matrix online workshop on methods and applications, online, June 22, 2020
- Lecturer at SLENA (School cum Workshop in Low Energy Nuclear Astrophysics) 2020, February 10-14, 2020. The Saha Institute of Nuclear Physics, Kolkata, India
- Lecturer at FRIB TA - TALENT Course 6: Theory of exploring nuclear reaction experiments, June 3 to 21, 2019. The Facility for Rare Isotope Beams on Michigan State University Campus, East Lansing, MI
- Organizer and lecturer of *R*-matrix workshop from September 25-29, 2017 in Lanzhao, China
- Co-chair of the 2016 *R*-matrix Workshop on Methods and Applications held June 27 to July 1 of 2016 (co-sponsored by Los Alamos National Laboratory, Ohio University, and the Joint Institute for Nuclear Astrophysics)
- Organizer and lecturer of student *R*-matrix workshop at Gran Sasso National Laboratory held May 11-14, 2015
- Principle organizer for the 2009 Nuclear Astrophysics Graduate Student Meeting at the University of North Carolina at Chapel Hill, NC

## Awards and Honors

- Larry O. Lamm Memorial Award in Nuclear Physics, Spring 2012
- Cornelius Brown Fellowship, Spring 2011
- Outstanding Graduate Teaching Award, University of Notre Dame, Spring 2006

## Publications in Refereed Journals

- M. Febraro, R. J. deBoer, S. D. Pain, R. Toomey, F. D. Becchetti, A. Boeltzig, Y. Chen, K. A. Chipps, M. Couder, K. L. Jones, E. Lamere, Q. Liu, S. Lyons, K. T. Macon, L. Morales, W. A. Peters, D. Robertson, B. C. Rasco, K. Smith, C. Seymour, G. Seymour, M. S. Smith, E. Stech, B. Vande Kolk, and M. Wiescher. New  $^{13}\text{C}(\alpha, n)^{16}\text{O}$  cross section with implications for neutrino mixing and geoneutrino measurements. *Phys. Rev. Lett.*, 125:062501, Aug 2020.
- Y.K. Gupta, B.K. Nayak, U. Garg, K. Hagino, K.B. Howard, N. Sensharma, M. Şenyiğit, W.P. Tan, P.D. O'Malley, M. Smith, Ramandeep Gandhi, T. Anderson, R.J. deBoer, B. Frentz, A. Gyurjinyan, O. Hall, M.R. Hall, J. Hu, E. Lamere, Q. Liu, A. Long, W. Lu, S. Lyons, K. Ostdiek, C. Seymour, M. Skulski, and B. Vande Kolk. Determination of hexadecapole ( $\beta_4$ ) deformation of the light-mass nucleus  $^{24}\text{Mg}$  using quasi-elastic scattering measurements. *Physics Letters B*, 806:135473, 2020.
- W. P. Tan, A. Boeltzig, C. Dulal, R. J. deBoer, B. Frentz, S. Henderson, K. B. Howard, R. Kelmar, J. J. Kolata, J. Long, K. T. Macon, S. Moylan, G. F. Peaslee, M. Renaud, C. Seymour, G. Seymour, B. Vande Kolk, M. Wiescher, E. F. Aguilera, P. Amador-Valenzuela, D. Lizcano, and E. Martinez-Quiroz. New measurement of  $^{12}\text{C} + ^{12}\text{C}$  fusion reaction at astrophysical energies. *Phys. Rev. Lett.*, 124:192702, May 2020.
- Y. P. Shen, B. Guo, R. J. deBoer, Z. H. Li, Y. J. Li, X. D. Tang, D. Y. Pang, S. Adhikari, C. Basu, J. Su, S. Q. Yan, Q. W. Fan, J. C. Liu, C. Chen, Z. Y. Han, X. Y. Li, G. Lian, T. L. Ma, W. Nan, W. K. Nan, Y. B. Wang, S. Zeng, H. Zhang, and W. P. Liu. Constraining the external capture to the  $^{16}\text{O}$  ground state and the  $E_2 S$  factor of the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  reaction. *Phys. Rev. Lett.*, 124:162701, Apr 2020.
- R. J. deBoer, C. R. Brune, M. Febraro, J. Görres, I. J. Thompson, and M. Wiescher. Sensitivity of the  $^{13}\text{C}(\alpha, n)^{16}\text{O}$   $S$  factor to the uncertainty in the level parameters of the near-threshold state. *Phys. Rev. C*, 101:045802, Apr 2020.
- Q. Liu, M. Febraro, R. J. deBoer, S. Aguilar, A. Boeltzig, Y. Chen, M. Couder, J. Görres, E. Lamere, S. Lyons, K. T. Macon, K. Manukyan, L. Morales, S. Pain, W. A. Peters, C. Seymour, G. Seymour, R. Toomey, B. Vande Kolk, J. Weaver, and M. Wiescher. Low-energy cross-section measurement of the  $^{10}\text{B}(\alpha, n)^{13}\text{N}$  reaction and its impact on neutron production in first-generation stars. *Phys. Rev. C*, 101:025808, Feb 2020.
- A. Best, F.R. Pantaleo, A. Boeltzig, G. Imbriani, M. Aliotta, J. Balibrea-Correa, D. Bemmerer, C. Broggini, C.G. Bruno, R. Buompane, A. Caciolli, F. Cavanna, T. Chillery, G.F. Ciani, P. Corvisiero, L. Csedreki, T. Davinson, R.J. deBoer, R. Depalo, A. Di Leva, Z. Elekes, F. Ferraro, E.M. Fiore, A. Formicola, Zs. Flp, G. Gervino, A. Guglielmetti, C. Gustavino, Gy. Gyrky, M. Junker, I. Kochanek, M. Lugaro, P. Marigo, R. Menegazzo, V. Mossa, V. Patichio, R. Perrino, D. Piatti, P. Prati, L. Schiavulli, K. Stekel, O. Straniero, F. Strieder, T. Szcs, M.P. Takcs, D. Trezzi, M. Wiescher, and S. Zavatarelli. Cross section of the reaction  $^{18}\text{O}(p, \gamma)^{19}\text{F}$  at astrophysical energies: The 90 keV resonance and the direct capture component. *Physics Letters B*, 797:134900, 2019.

- Q. Liu, M. Febraro, R. J. deBoer, A. Boeltzig, Y. Chen, C. Cerjan, M. Couder, B. Frentz, J. Görres, E. A. Henry, E. Lamere, K. T. Macon, K. V. Manukyan, L. Morales, P. D. O'Malley, S. D. Pain, W. A. Peters, D. Schneider, C. Seymour, G. Seymour, E. Temanson, R. Toomey, B. Vande Kolk, J. Weaver, and M. Wiescher. Measurement of the  $^{10}\text{B}(\alpha, n_0)^{13}\text{N}$  cross section for  $2.2 < E_\alpha < 4.9$  MeV and its application as a diagnostic at the National Ignition Facility. *Phys. Rev. C*, 100:034601, Sep 2019.
- M. Febraro, R. Toomey, S.D. Pain, K.A. Chipps, B. Becker, R.J. Newby, Z. Meisel, T.N. Massey, C.R. Brune, Q. Liu, R.J. deBoer, K.T. Macon, A. Boeltzig, J. O'Neill, M.S. Smith, M. Wiescher, D. Soltesz, I. Sultana, K. Brandenburg, S. Subedi, S. Paneru, T. Danley, and Y. Alberty-Jones. The ORNL Deuterated Spectroscopic Array - ODeSA. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 946:162668, Aug 2019.
- Ian J. Thompson, R. J. deBoer, P. Dimitriou, S. Kunieda, M. T. Pigni, G. Arbanas, H. Leeb, Th. Srdinko, G. Hale, P. Tamagno, and P. Archier. Verification of  $R$ -matrix calculations for charged-particle reactions in the resolved resonance region for the  $^7\text{Be}$  system. *The European Physical Journal A*, 55(6):92, Jun 2019.
- G. Imbriani and R. J. deBoer. Present knowledge of  $^3\text{He}(^3\text{He}, 2p)^4\text{He}$  and  $^3\text{He}(\alpha, \gamma)^7\text{Be}$ . In *Solar Neutrinos: Proceedings of the 5th International Solar Neutrino Conference*, pages 207–220, May 2019.
- A. Boeltzig and A. Best and F.R. Pantaleo and G. Imbriani and M. Junker and M. Aliotta and J. Balibrea-Correa and D. Bemmerer and C. Brogini and C.G. Bruno and R. Buompane and A. Caciolli and F. Cavanna and T. Chillery and G.F. Ciani and P. Corvisiero and L. Csedreki and T. Davinson and R.J. deBoer and R. Depalo and A. Di Leva and Z. Elekes and F. Ferraro and E.M. Fiore and A. Formicola and Zs. Fülöp and G. Gervino and A. Guglielmetti and C. Gustavino and Gy. Gyürky and I. Kochanek and M. Lugaro and P. Marigo and R. Menegazzo and V. Mossa and F. Munnik and V. Patichchio and R. Perrino and D. Piatti and P. Prati and L. Schiavulli and K. Stöckel and O. Straniero and F. Strieder and T. Szücs and M.P. Takács and D. Trezzi and M. Wiescher and S. Zavatarelli. Direct measurements of low-energy resonance strengths of the  $^{23}\text{Na}(p, \gamma)^{24}\text{Mg}$  reaction for astrophysics. *Physics Letters B*, 795:122 – 128, 2019.
- S. Lyons, J. Görres, R. J. deBoer, E. Stech, Y. Chen, G. Gilardy, Q. Liu, A. M. Long, M. Moran, D. Robertson, C. Seymour, B. Vande Kolk, M. Wiescher, and A. Best. Determination of  $^{20}\text{Ne}(p, \gamma)^{21}\text{Na}$  cross sections from  $E_p = 500 - 2000$  keV. *Phys. Rev. C*, 97:065802, Jun 2018.
- A. M. Long, T. Adachi, M. Beard, G. P. A. Berg, M. Couder, R. J. deBoer, M. Dozono, J. Görres, H. Fujita, Y. Fujita, K. Hatanaka, D. Ishikawa, T. Kubo, H. Matsubara, Y. Namiki, S. O'Brien, Y. Ohkuma, H. Okamura, H. J. Ong, D. Patel, Y. Sakemi, Y. Shimbara, S. Suzuki, R. Talwar, A. Tamii, A. Volya, T. Wakasa, R. Watanabe, M. Wiescher, R. Yamada, and J. Zenihiro.  $\alpha$ -unbound levels in  $^{34}\text{Ar}$  from  $^{36}\text{Ar}(p, t)^{34}\text{Ar}$  reaction measurements and implications for the astrophysical  $^{30}\text{S}(\alpha, p)^{33}\text{Cl}$  reaction rate. *Phys. Rev. C*, 97:054613, May 2018.
- A Boeltzig, A Best, G Imbriani, M Junker, M Aliotta, D Bemmerer, C Brogini, C G Bruno, R Buompane, A Caciolli, F Cavanna, T Chillery, G F Ciani, P Corvisiero, L Csedreki, T Davinson, R J deBoer, R Depalo, A Di Leva, Z Elekes, F Ferraro, E M Fiore, A Formicola, Z Flp, G Gervino, A Guglielmetti, C Gustavino, G Gyrky, I Kochanek, R Menegazzo, V Mossa, F R Pantaleo, V Patichchio, R Perrino, D Piatti, P Prati, L Schiavulli, K Stckel, O Straniero, F Strieder, T Szcs, M P Takcs, D Trezzi,

- M Wiescher, and S Zavatarelli. Improved background suppression for radiative capture reactions at LUNA with HPGe and BGO detectors. *Journal of Physics G: Nuclear and Particle Physics*, 45(2):025203, 2018.
- N. Özkan, R. T. Güray, C. Yalçın, W. P. Tan, A. Aprahamian, M. Beard, R. J. deBoer, S. Almaraz-Calderon, S. Falahat, J. Görres, Q. Li, A. Sauerwein, K. Sonnabend, M. Wiescher, Zs. Fülöp, Gy. Gyürky, E. Somorjai, and J. Greene. Proton capture reaction cross section measurements on  $^{162}\text{Er}$  as a probe of statistical model calculations. *Phys. Rev. C*, 96:045805, Oct 2017.
- X. Fang, W. P. Tan, M. Beard, R. J. deBoer, G. Gilardy, H. Jung, Q. Liu, S. Lyons, D. Robertson, K. Setoodehnia, C. Seymour, E. Stech, B. Vande Kolk, M. Wiescher, R. T. deSouza, S. Hudan, V. Singh, X. D. Tang, and E. Uberseder. Experimental measurement of  $^{12}\text{C} + ^{16}\text{O}$  fusion at stellar energies. *Phys. Rev. C*, 96:045804, Oct 2017.
- R. J. deBoer, J. Görres, M. Wiescher, R. E. Azuma, A. Best, C. R. Brune, C. E. Fields, S. Jones, M. Pignatari, D. Sayre, K. Smith, F. X. Timmes, and E. Uberseder. The  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  reaction and its implications for stellar helium burning. *Rev. Mod. Phys.*, 89:035007, Sep 2017.
- A. M. Long, T. Adachi, M. Beard, G. P. A. Berg, Z. Buthelezi, J. Carter, M. Couder, R. J. deBoer, R. W. Fearick, S. V. Förtsch, J. Görres, J. P. Mira, S. H. T. Murray, R. Neveling, P. Papka, F. D. Smit, E. Sideras-Haddad, J. A. Swartz, R. Talwar, I. T. Usman, M. Wiescher, J. J. Van Zyl, and A. Volya. Indirect study of the stellar  $^{34}\text{Ar}(\alpha, p)^{37}\text{K}$  reaction rate through  $^{40}\text{Ca}(p, t)^{38}\text{Ca}$  reaction measurements. *Phys. Rev. C*, 95:055803, May 2017.
- M. Wiescher, R. J. deBoer, J. Görres, and R. E. Azuma. Low energy measurements of the  $^{10}\text{B}(p, \alpha)^7\text{Be}$  reaction. *Phys. Rev. C*, 95:044617, Apr 2017.
- G. L. Guardo, C. Spitaleri, L. Lamia, M. Gulino, M. La Cognata, X. Tang, R. deBoer, X. Fang, V. Goldberg, J. Mrazek, A. Mukhamedzhanov, M. Notani, R. G. Pizzone, G. G. Rapisarda, M. L. Sergi, and M. Wiescher. Assessing the near threshold cross section of the  $^{17}\text{O}(n, \alpha)^{14}\text{C}$  reaction by means of the trojan horse method. *Phys. Rev. C*, 95:025807, Feb 2017.
- R. Talwar, T. Adachi, G. P. A. Berg, L. Bin, S. Bisterzo, M. Couder, R. J. deBoer, X. Fang, H. Fujita, Y. Fujita, J. Görres, K. Hatanaka, T. Itoh, T. Kadoya, A. Long, K. Miki, D. Patel, M. Pignatari, Y. Shimbara, A. Tamii, M. Wiescher, T. Yamamoto, and M. Yosoi. Probing astrophysically important states in the  $^{26}\text{Mg}$  nucleus to study neutron sources for the  $s$  process. *Phys. Rev. C*, 93:055803, May 2016.
- Q. Li, J. Görres, R. J. deBoer, G. Imbriani, A. Best, A. Kontos, P. J. LeBlanc, E. Uberseder, and M. Wiescher. Cross section measurement of  $^{14}\text{N}(p, \gamma)^{15}\text{O}$  in the CNO cycle. *Phys. Rev. C*, 93:055806, May 2016.
- A. Boeltzig, C. G. Bruno, F. Cavanna, S. Cristallo, T. Davinson, R. Depalo, R. J. deBoer, A. Di Leva, F. Ferraro, G. Imbriani, P. Marigo, F. Terrasi, and M. Wiescher. Shell and explosive hydrogen burning. *The European Physical Journal A*, 52(4):1–13, 2016.
- B. Bucher, X. D. Tang, X. Fang, A. Heger, S. Almaraz-Calderon, A. Alongi, A. D. Ayangeakaa, M. Beard, A. Best, J. Browne, C. Cahillane, M. Couder, R. J. deBoer, A. Kontos, L. Lamm, Y. J. Li, A. Long, W. Lu, S. Lyons, M. Notani, D. Patel, N. Paul, M. Pignatari, A. Roberts, D. Robertson, K. Smith, E. Stech, R. Talwar, W. P. Tan,

- M. Wiescher, and S. E. Woosley. First direct measurement of  $^{12}\text{C}(^{12}\text{C}, n)^{23}\text{Mg}$  at stellar energies. *Phys. Rev. Lett.*, 114:251102, Jun 2015.
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### Technical Reports (not peer reviewed)

### Teaching Experience

- Practical introduction to  $R$ -matrix fitting, Notre Dame, April–June 2016
- Co-supervisor for REU student Gabriel Calderon, May–July 2015
- Teacher of the 2015  $R$ -matrix workshop at Gran Sasso National Laboratory, 7 graduate student participants, May 11–14, 2015
- Co-supervisor for visiting graduate student David Mountford, January–June 2013
- Teaching Assistant, Undergraduate Physics Laboratory, University of Notre Dame, 2005–2007
- Teaching Assistant, Nuclear Warfare, University of Notre Dame, 2007
- Teaching Assistant, Undergraduate Physics Laboratory, Ball State University, 2003–2005
- Mathematics and Physics tutor, Ball State University, 2004–2005
- Mathematics tutor, Western Michigan University, 2001–2002