Brian J. DeSalvo, Ph.D.

Contact Information

Indiana University Bloomington
Swain Hall West 331
727 E. Third St.
Bloomington, IN 47405

Office: (812) 855-3152
Email: bjdesalv@iu.edu

Academic Positions

2019-Present **Assistant Professor**, Indiana University Bloomington
2015-2019 **Grainger Postdoctoral Fellow**, University of Chicago,
Postdoc Mentor: Cheng Chin

Education

2015 **Ph.D.**, Physics, Rice University
Thesis: Ultralong-Range Molecules and Rydberg Blockade in ^{84}Sr
Advisor: Thomas C. Killian

2012 **M.S.**, Physics, Rice University
Thesis: Degenerate Fermi Gas of ^{87}Sr
Advisor: Thomas C. Killian

2008 **B.S.**, Physics The College of William and Mary
Minor: Mathematics
Thesis: Mode-Locked Diode Laser for Precision Optical Frequency Measurements
Advisor: Seth Aubin

Research Interests

Experimental atomic, molecular, and optical physics: Bose-Einstein condensates, degenerate Fermi gases, Rydberg atoms and molecules, Bose-Fermi mixtures, magnetic and optical Feshbach resonances, Efimov physics.

Publications

16. **B.J. DeSalvo**, Krutik Patel, Geyue Cai, and Cheng Chin, *Observation of fermion-mediated interactions between bosonic atoms*, Nature **568**, 61-64 (2019). Featured in *Nature: News & Views*.

15. **B.J. DeSalvo**, Krutik Patel, Jacob Johansen, and Cheng Chin, *Observation of a degenerate Fermi gas trapped by a Bose-Einstein condensate*, Phys. Rev. Lett. **119**, 233401 (2017). *Editor's Suggestion*. Featured in *Physics*.

14. Jacob Johansen, **B.J. DeSalvo**, Krutik Patel, and Cheng Chin, *Testing universality of Efimov physics across broad and narrow Feshbach resonances*, Nature Physics **13**, 731-735 (2017).

13. Frankie Fung, Mykhaylo Usatyuk, **B.J. DeSalvo**, and Cheng Chin, *Stable thermophoretic trapping of generic particles at low pressures*, Appl. Phys. Lett. **110**, 034102 (2017).

12. J.A. Aman, **B.J. DeSalvo**, F.B. Dunning, T.C. Killian, S. Yoshida, and J. Burgdörfer, *Trap losses induced by near-resonant Rydberg dressing of cold atomic gases*, Phys. Rev. A **93**, 043425 (2016).

11. C. Gaul, **B.J. DeSalvo**, J.A. Aman, F.B. Dunning, T.C. Killian, and T. Pohl, *Resonant Rydberg dressing of alkaline-earth atoms via electromagnetically induced transparency*, Phys. Rev. Lett. **116**, 243001 (2016). *Editor's Suggestion*.

10. **B.J. DeSalvo**, J.A. Aman, C. Gaul, T. Pohl, S. Yoshida, J. Burgdörfer, K.R.A. Hazzard, F.B. Dunning, and T.C. Killian, *Rydberg-blockade effects in Autler-Townes spectra of ultracold strontium*, Phys. Rev. A **93**, 022709 (2016).

9. **B.J. DeSalvo**, J.A. Aman, F.B. Dunning, T.C. Killian, H.R. Sadeghpour, S. Yoshida, and J. Burgdorfer, *Ultralong-range Rydberg molecules in a divalent-atomic system*, Phys. Rev. A **92**, 031403(R) (2015).

8. Mateusz Borkowski, Piotr Morzynski, Roman Ciurylo, Paul S. Julienne, M. Yan, **B.J. DeSalvo**, and T.C. Killian, *Mass scaling and nonadiabatic effects in photoassociation spectroscopy of ultracold strontium atoms*, Phys. Rev. A **90**, 032713 (2014).

7. Mi Yan, **B.J. DeSalvo**, Ying Huang, P. Naidon, and T.C. Killian, *Rabi oscillations between atomic and molecular condensates with coherent one-photon photoassociation*, Phys. Rev. Lett. **111**, 150402 (2013). *Editor's Suggestion.*

6. Mi Yan, **B.J. DeSalvo**, B. Ramachandhran, H. Pu, and T.C. Killian, *Controlling condensate collapse and expansion with an optical Feshbach resonance*, Phys. Rev. Lett. **110**, 123201 (2013).

5. M. Yan, R. Chakraborty, A. Mazurenko, P.G. Mickelson, Y.N. Martinez de Escobar, **B.J. DeSalvo**, and T.C. Killian, *Numerical modeling of collisional dynamics of Sr in an optical dipole trap*, Phys. Rev. A **83**, 032705 (2011).

4. **B.J. DeSalvo**, M. Yan, P.G. Mickelson, Y.N. Martinez de Escobar, and T.C. Killian, *Degenerate Fermi gas of* ^{87}Sr, Phys. Rev. Lett. **105**, 030402 (2010). *Editor's Suggestion.*

3. P.G. Mickelson, Y.N. Martinez de Escobar, M. Yan, **B.J. DeSalvo**, and T.C. Killian, *Bose-Einstein condensation of* ^{88}Sr *through sympathetic cooling with* ^{87}Sr, Phys. Rev. A **81**, 051601(R) (2010).

2. Y.N. Martinez de Escobar, P.G. Mickelson, M. Yan, **B.J. DeSalvo**, S.B. Nagel, and T.C. Killian, *Bose-Einstein condensation of* ^{84}Sr, Phys. Rev. Lett. **103**, 200402 (2009). *Editor's Suggestion.* Featured in *Physics.*

1. P.G. Mickelson, Y.N. Martinez de Escobar, P. Anzel, **B.J. DeSalvo**, S.B. Nagel, A.J. Traverso, M. Yan, and T.C. Killian, *Repumping and spectroscopy of laser-cooled Sr atoms using the* $(5s5p)^3P_2 - (5s4d)^3D_2$ *transition*, J. Phys. B **42**, 235001 (2009).

Fellowships, Awards & Honors

2015 Grainger Postdoctoral Fellowship in Experimental Physics, University of Chicago.
2014 ICAP Student Travel Award.
2012 Texas Instruments Prize, Best Poster Presentation, Rice Quantum Institute.
2012 DAMOP Student Travel Award.

Invited Talks

8. *Creating novel quantum matter with Rydberg dressing*, Special Seminar, Indiana University (February 2019).

7. *Fermion mediated interactions between bosonic atoms*, Physics Colloquium, Indiana University (February 2019).

6. *Fermion mediated interactions between bosonic atoms*, Midwest Cold Atom Workshop (MCAW), University of Illinois at Urbana-Champaign, (November 2018).

5. *Quantum mixology: creating novel interacting Bose-Fermi mixtures with Cs and Li*, Physics Colloquium, University of Virginia, (February 2018).

4. *Quantum mixology: creating novel interacting Bose-Fermi mixtures with Cs and Li*, AMO Special Seminar, Purdue University, (February 2018).

3. *Quantum mixology: creating novel interacting Bose-Fermi mixtures with Cs and Li*, AMO Special Seminar, College of Optical Sciences at The University of Arizona, (January 2018).

2. *Observation of a degenerate Fermi gas trapped by a Bose-Einstein condensate*, QI/AMO Seminar, University of Illinois at Urbana-Champaign, (October 2017).

1. *Quantum degenerate gases of atomic strontium*, AMO Seminar, The College of William and Mary, (May 2012).

Contributed Talks

8. *Boson-boson interactions mediated by a Fermi sea*, APS DAMOP Meeting, (May 2018).

7. *Dual-degeneracy in a Bose-Fermi mixture with extreme mass imbalance*, APS DAMOP Meeting, (June 2017).

6. *Quantum degeneracy in Li-Cs mixtures*, Chicago MRSEC IRG Meeting, (April 2017).

5. *Rydberg blockade effects on Autler-Townes spectra in a dense gas of ^{84}Sr*, APS DAMOP Meeting, (June 2015).

4. *Ultralong-range Rydberg molecules of strontium*, APS DAMOP Meeting, (June 2014).

3. *Coherent photoassociation of an ^{88}Sr BEC*, APS DAMOP Meeting, (June 2013).

2. *Degenerate Fermi gas of ^{87}Sr*, Rice Quantum Institute Colloquium, (August 2010).

1. *Dimple trap for ultracold atomic Sr*, Rice Quantum Institute Colloquium, (August 2009).

Poster Presentations

8. *Efimov universality and quantum degeneracy in a strongly mass-imbalanced Fermi-Bose mixture*, Bose-Einstein Consensation: Frontiers in Quantum Gases, (September 2017).

7. *Progress towards a quantum degenerate mixture with extreme mass imbalance*, APS DAMOP Meeting, (May 2016).

6. *Ultralong-range Rydberg molecules of strontium*, International Conference on Atomic Physics, (August 2014).

5. *Experiments with quantum degenerate strontium*, APS DAMOP Meeting, (June 2012).

4. *Controlling condensate collapse and expansion with an optical Feshbach resonance*, Rice Quantum Institute Colloquium, (August 2012).

3. *Characterization of a degenerate Fermi gas of ^{87}Sr*, APS DAMOP Meeting, (June 2011).

2. *Characterization of a degenerate Fermi gas of ^{87}Sr*, Gordon Research Conference-Atomic Physics, (June 2011).

1. *Quantum degenerate gases of strontium*, APS DAMOP Meeting, (June 2010).

Teaching Experience

2019	Course Instructor, Indiana University Bloomington, P221 (Fall)
2016-2019	Lecture and demonstrations, University of Chicago, SMART+ program (outreach for high school students from backgrounds underrepresented in academia)
2016	Tutorial Lecture, Midwest Cold Atom Workshop
2012	Guest Lecture, Rice University, ELEC 568: Laser Spectroscopy
2011	Recitation Leader, PHYS 126: General Physics for Pre-Meds (Spring)
	Recitation Leader, PHYS 125: General Physics for Pre-Meds (Fall)
2010	Lab Instructor, PHYS 102: General Physics for Scientists and Engineers (Spring)
	Lab Instructor, PHYS 101: General Physics for Scientists and Engineers (Fall)
2009	Lab Instructor, PHYS 102: General Physics for Scientists and Engineers (Spring)

Mentoring

Geyue Cai, University of Chicago, Graduate Student (2017-Present)
Krutik Patel, University of Chicago, Graduate Student (2016-Present)
Allen Chiu, University of Chicago, Undergraduate Summer Intern (2017)

Frankie Fung, University of Chicago, Undergraduate Student (2016 - 2017)
Misha Usatyuk, University of Chicago, Undergraduate Student (2016 - 2017)
Jacob Johansen, University of Chicago, Graduate Student (2015 - 2017)
Joshua Hill, Rice University, Graduate Student, (2015)
James Aman, Rice University, Graduate Student (2013-2015)
Ying Huang, Rice University, Graduate Student (2011-2013)

Professional Service

Referee Physical Review A

Local Organizer Army Research Office/Air Force Office of Scientific Research Multidiciplinary University Research Initiative (ARO-AFOSR MURI) Review Meeting (2016).

Session Chair APS DAMOP Meeting, *Out of equilibrium dynamics in many-body AMO systems* (2016).