

Yong-il Shin

Department of Physics and Astronomy
Seoul National University, Gwanak-gu, Seoul 151-747, Korea
E-mail: yishin@snu.ac.kr (Phone: +82-2-880-4226)
Web: <http://phy.snu.ac.kr/yishin>
ResearchID: <http://www.researcherid.com/rid/B-1955-2008>

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA, USA
Doctor of Philosophy in Physics, February 2006.
Thesis: *Experiments with Bose-Einstein condensates in a double-well potential*
Research advisor: Prof. Wolfgang Ketterle and Prof. David E. Pritchard

Seoul National University, Seoul, Korea
Bachelor of Science in Physics, February 2000.

RESEARCH AND PROFESSIONAL EXPERIENCE

Department of Physics and Astronomy, Seoul National University

2015.03 – Present Associate Professor
2011.03 – 2015.02 Assistant Professor
2009.09 – 2011.02 WCU-Assistant Professor

MIT-Harvard Center for Ultracold Atoms, Research Laboratory of Electronics, MIT

2008.08 – 2009.08 Research Scientist
2006.01 – 2008.07 Postdoctoral Associate
Research topics: Strongly-interacting Fermi gases, Optical lattices emulators
Advisor: Prof. Wolfgang Ketterle
2001.08 – 2005.12 Research Assistant
Research topics: BEC interferometry, Atom chips
Advisor: Prof. Wolfgang Ketterle and Prof. David E. Pritchard

Seoul National University

2000.03 – 2001.06 Research Assistant
Research topic: Atom optics, Hollow-core optical fiber
Advisor: Prof. Wonho Jhe

MAJOR SCIENTIFIC ACHIEVEMENTS

- First demonstration of atom interferometry with trapped BECs
- Direct observation of decay of a doubly quantized vortex in a BEC
- Observation of quantum reflection of BECs from room-temperature solid surfaces
- Development of tomographic *in situ* RF spectroscopy for a trapped Fermi gas
- Quantitative determination of the phase diagram of a unitary Fermi gas
- Observation of thermally activated vortex pairs in a quasi-2D Bose gas
- Observation of half-quantum vortices in an antiferromagnetic spinor condensate

AWARDS, HONORS AND FELLOWSHIPS

- Associate Member of the Korean Academy of Science and Technology (2016).
- KPS Young Career Physicist Award (2013).
- TJ Park Science Fellowship (2011).
- Finalist in the competition for the APS award for Outstanding Doctoral Thesis Research in Atomic, Molecular and Optical Physics (2006).
- Martin Deutsch Award for Excellence in Experimental Physics from MIT (2005).
- Fellowship from the Korea Foundation for Advanced Studies (1995-2000).
- Bronze medal in the 25th International Physics Olympiad, Beijing, China (1994).

PROFESSIONAL ACTIVITIES

- Member of American Physical Society and Korean Physical Society.
- Associate Member of the Korean Academy of Science and Technology.
- Secretary for the KPS Division of Atomic and Molecular Physics (2011-2012, 2015-present).
- Reviewer for scientific journals: Nature, Nature Physics, Physical Review Letters, Physical Review A, Optics Express, Optical communications, and Journal of the Korean Physical Society.

FIVE MOST CITED PAPERS WITH FIRST OR CORRESPONDING AUTHORSHIP (as of 2016/09 from ResearchID.com)

1. *Atom interferometry with Bose-Einstein condensates in a double-well potential*
Physical Review Letters **92**, 050405 (2004). 303 citations
2. *Observation of phase separation in a strongly interacting imbalanced Fermi gas*
Physical Review Letters **97**, 030401 (2006). 274 citations
3. *Phase diagram of a two-component Fermi gas with resonant interactions*
Nature **451**, 689 (2008). 197 citations.
4. *Dynamical instability of a doubly quantized vortex in a Bose-Einstein condensate*
Physical Review Letters **93**, 160406 (2004). 128 citations.
5. *Interference of Bose-Einstein condensates split with an atom chip*
Physical Review A **72**, 021604(R) (2005). 100 citations.

PUBLICATIONS (Total citations: **3269**, h-index: **26**)

1. J. H. Kim, W. J. Kwon, and Y. Shin, "Role of thermal friction in relaxation of turbulent Bose-Einstein condensates," Physical Review A **94**, 033612 (2016).
2. S. Kim, S. W. Seo, H.-R. Noh, and Y. Shin, "Optical pumping effect in absorption imaging of F=1 atomic gases," Physical Review A **94**, 023625 (2016).
3. S. W. Seo, W. J. Kwon, S. Kang, and Y. Shin, "Collision of Half-Quantum Vortices in a Spinor Bose-Einstein Condensate," Physical Review Letters **116**, 185301 (2016).
4. M.-S. Kim, M. Lee, J. H. Han, and Y. Shin, "Experimental Apparatus for Generating Quantum Degenerate Gases of Ytterbium Atoms," Journal of the Korean Physical Society **67**, 1719 (2015).

5. G. Moon, W. J. Kwon, H. Lee, and Y. Shin, “Thermal friction on quantum vortices in a Bose-Einstein condensate,” *Physical Review A* **92**, 051601(R) (2015).
6. W. J. Kwon, S. W. Seo, and Y. Shin, “Periodic shedding of vortex dipoles from a moving penetrable obstacle in a Bose-Einstein condensate,” *Physical Review A* **92**, 033613 (2015).
7. S. W. Seo, S. Kang, W. J. Kwon, and Y. Shin, “Half-Quantum Vortices in an Antiferromagnetic Spinor Bose-Einstein Condensate,” *Physical Review Letters* **115**, 015301 (2015).
8. W. J. Kwon, G. Moon, S. W. Seo, and Y. Shin, “Critical velocity for vortex shedding in a Bose-Einstein condensate,” *Physical Review A* **91**, 053615 (2015).
9. S. Kang, J. Choi, S. W. Seo, W. J. Kwon, and Y. Shin, “Rotating a Bose-Einstein condensate by shaking an anharmonic axisymmetric magnetic potential,” *Physical Review A* **91**, 013603 (2015).
10. M. Lee, J. H. Han, M.-S. Kim, and Y. Shin, “Gauge Field for Neutral Atoms near a Current loop,” *Journal of the Korean Physical Society* **65**, 2053 (2014).
11. W. J. Kwon, G. Moon, J. Choi, S. W. Seo, and Y. Shin, “Relaxation of superfluid turbulence in highly oblate Bose-Einstein condensates,” *Physical Review A* **90**, 063627 (2014).
12. S. W. Seo, J. Choi, and Y. Shin, “Scaling behavior of density fluctuations in an expanding quasi-2D degenerate Bose gas,” *Physical Review A* **89**, 043606 (2014).
13. S. W. Seo, J. Choi, and Y. Shin, “Free expansion of quasi-2D Bose-Einstein condensates with quantized vortices,” *Journal of the Korean Physical Society* **64**, 53 (2014).
14. J. Choi, S. Kang, S. W. Seo, W. J. Kwon, and Y. Shin, “Observation of a Geometric Hall Effect in a Spinor Bose-Einstein Condensate with a Skyrmion Spin Texture,” *Physical Review Letters* **111**, 245301 (2013).
15. Y. Shin and J. Choi, “Gauge Potential for Neutral Atoms in a Magnetic Quadrupole Field,” *Journal of the Korean Physical Society* **63**, 951 (2013).
16. J. Choi, S. W. Seo, and Y. Shin, “Observation of Thermally Activated Vortex Pairs in a Quasi-2D Bose Gas,” *Physical Review Letters* **110**, 175302 (2013).
17. W. J. Kwon, J. Choi, and Y. Shin, “Calibration of saturation absorption imaging of ultracold atom clouds,” *Journal of the Korean Physical Society* **61**, 1970 (2012).
18. H.-G. Hong, W. Seo, Y. Song, M. Lee, H. Jeong, Y. Shin, W. Choi, R. R. Dasari, and K. An, “Spectrum of the Cavity-QED Microlaser: Strong Coupling Effects in the Frequency Pulling at Off Resonance,” *Physical Review Letters* **109**, 243601 (2012).
19. J. Choi, S. W. Seo, W. J. Kwon, and Y. Shin, “Probing Phase Fluctuations in a 2D Degenerate Bose Gas by Free Expansion,” *Physical Review Letters* **109**, 125301 (2012).
20. J. Choi, W. J. Kwon, M. Lee, H. Jeong, K. An, and Y. Shin, “Imprinting Skyrmion spin textures in spinor Bose-Einstein condensates,” *New Journal of Physics* **14**, 053013 (2012).
21. J. Park, M. Saunders, Y. Shin, K. An, and H. Jeong, “Bell-inequality tests with entanglement between an atom and a coherent state in a cavity,” *Physical Review A* **85**, 022120 (2012).
22. J. Choi, W. J. Kwon, and Y. Shin, “Observation of Topologically Stable 2D Skyrmions in an Antiferromagnetic Spinor Bose-Einstein Condensate,” *Physical Review Letters* **108**, 035301 (2012).
23. J. Choi, M.-S. Heo, and Y. Shin, “Experimental Apparatus for Producing Large ^{23}Na Bose-Einstein Condensates,” *Journal of the Korean Physical Society* **59**, 211 (2011).
24. M.-S. Heo, J. Choi, and Y. Shin, “Fast Production of ^{23}Na Bose-Einstein condensates in an optically plugged magnetic quadrupole trap,” *Physical Review A* **83**, 013622 (2011).

25. Y. Shin, "RF Spectroscopy of a Resonantly-interacting Fermi Gas," *Journal of the Korean Physical Society* **57**, 395 (2010).
26. C. S. Sanner, E. J. Su, A. Keshet, R. Gommers, Y. Shin, W. Huang, and W. Ketterle, "Suppression of Density Fluctuation in a Quantum Degenerate Fermi Gas," *Physical Review Letters* **105**, 040402 (2010).
27. Y. Shin, "Surprise in the strong regime," *Nature* **463**, 1029 (2010).
28. Y. Shin, A. Schirotzek, C. H. Schunck, and W. Ketterle, "Mapping the phase diagram of a two-component Fermi gas with strong interactions," *Proceedings of the XXI International Conference on Atomic physics*, pp.230-239 (World Scientific, 2009).
29. W. Ketterle, Y. Shin, A. Schirotzek, and C. H. Schunck, "Superfluidity in a gas of strongly interacting fermions," *Journal of Physics: Condensed Matter* **21**, 164206 (2009).
30. A. Schirotzek, Y. Shin, C. H. Schunck, and W. Ketterle, "Determination of the Superfluid Gap in Atomic Fermi Gases by Quasiparticle Spectroscopy," *Physical Review Letters* **101**, 140403 (2008).
31. C. A. Christensen, S. Will, M. Saba, G.-B. Jo, Y. Shin, W. Ketterle, and D. E. Pritchard, "Trapping of ultracold atoms in a hollow-core photonic crystal fiber," *Physical Review A* **78**, 033429 (2008).
32. Y. Shin, C. H. Schunck, A. Schirotzek, and W. Ketterle, "Realization of a strongly interacting Bose-Fermi mixture with a two-component Fermi gas," *Physical Review Letters* **101**, 070404 (2008).
33. C. H. Schunck, Y. Shin, A. Schirotzek, and W. Ketterle, "Determination of the fermion pair size in a resonantly interacting superfluid," *Nature* **454**, 739 (2008).
34. Y. Shin, "Determination of the equation of state of a polarized Fermi gas at unitarity," *Physical Review A* **77**, 041603(R) (2008).
35. Y. Shin, C. H. Schunck, A. Schirotzek, and W. Ketterle, "Phase diagram of a two-component Fermi gas with resonant interactions," *Nature* **451**, 689 (2008).
36. Y. Shin, C. H. Schunck, A. Schirotzek, and W. Ketterle, "Tomographic rf Spectroscopy of a Trapped Fermi Gas at Unitarity," *Physical Review Letters* **99**, 090403 (2007).
37. W. Ketterle and Y. Shin, "Fermi gases go with the superfluid flow," *Physics World* **20**, 39 (June 2007).
38. C. H. Schunck, Y. Shin, A. Schirotzek, M. W. Zwierlein, and W. Ketterle, "Pairing without Superfluidity: The Ground State of an Imbalanced Fermi Mixture," *Science* **316**, 867 (2007).
39. G.-B. Jo, Y. Shin, S. Will, T. A. Pasquini, M. Saba, W. Ketterle, D. E. Pritchard, M. Vengalattore, and M. Prentiss, "Long Phase Coherence Time and Number Squeezing of Two Bose-Einstein condensates on an Atom Chip," *Physical Review Letters* **98**, 030407 (2007).
40. T. A. Pasquini, M. Saba, G.-B. Jo, Y. Shin, W. Ketterle, D. E. Pritchard, T.A. Savas, and N. Mulders, "Low Velocity Quantum Reflection of Bose-Einstein Condensates," *Physical Review Letters* **97**, 093201 (2006).
41. Y. Shin, M. W. Zwierlein, C. H. Schunck, A. Schirotzek, and W. Ketterle, "Observation of Phase Separation in a Strongly Interacting Imbalanced Fermi Gas," *Physical Review Letters* **97**, 030401 (2006).
42. Y. Shin, G.-B. Jo, M. Saba, T. A. Pasquini, W. Ketterle, and D. E. Pritchard, "Optical Weak Link between Two Spatially Separate Bose-Einstein Condensates," *Physical Review Letters* **95**, 170402 (2005).
43. Y. Shin, C. Sanner, G.-B. Jo, T. A. Pasquini, M. Saba, W. Ketterle, and D. E. Pritchard, M. Vengalattore, M. Prentiss, "Interference of Bose-Einstein condensates split with an atom chip," *Physical Review A* **72**, 021604(R) (2005).

44. M. Saba, T. A. Pasquini, C. Sanner, Y. Shin, W. Ketterle, and D. E. Prichard, "Light Scattering to Determine the Relative Phase of Two Bose-Einstein Condensates," *Science* **307**, 1945 (2005).
45. T. A. Pasquini, Y. Shin, C. Sanner, M. Saba, A. Schirotzek, D. E. Prichard, and W. Ketterle, "Quantum Reflection from a Solid Surface at Normal Incidence," *Physical Review Letters* **93**, 223201 (2004).
46. Y. Shin, M. Saba, M. Vengalattore, T. A. Pasquini, C. Sanner, A. E. Leanhardt, M. Prentiss, D. E. Prichard, and W. Ketterle, "Dynamical Instability of a Doubly Quantized Vortex in a Bose-Einstein condensate," *Physical Review Letters* **93**, 160406 (2004).
47. Y. Shin, M. Saba, A. Schirotzek, T. A. Pasquini, A. E. Leanhardt, D. E. Pritchard, and W. Ketterle, "Distillation of Bose-Einstein Condensates in a Double-Well Potential," *Physical Review Letters* **92**, 150401 (2004).
48. Y. Shin, M. Saba, T. A. Pasquini, W. Ketterle, D. E. Pritchard, and A. E. Leanhardt, "Atom Interferometry with Bose-Einstein Condensates in a Double-Well Potential," *Physical Review Letters* **92**, 050405 (2004).
49. A. E. Leanhardt, T. A. Pasquini, M. Saba, A. Schirotzek, Y. Shin, D. Kielpinski, D. E. Pritchard, and W. Ketterle, "Cooling Bose-Einstein Condensates Below 500 Picokelvin," *Science* **301**, 1513 (2003).
50. Y. Shin, M. Heo, J.-W. Kim, W. Shim, H.-R. Noh, and W. Jhe, "Diffraction-limited optical dipole trap with a hollow optical fiber," *Journal of the Optical Society of America B* **20**, 937 (2003).
51. A. E. Leanhardt, Y. Shin, D. Kielpinski, D. E. Pritchard, and W. Ketterle, "Coreless Vortex Formation in a Spinor Bose-Einstein Condensate," *Physical Review Letters* **90**, 140403 (2003).
52. A. E. Leanhardt, Y. Shin, A. P. Chikkatur, D. Kielpinski, W. Ketterle, and D. E. Pritchard, "Bose-Einstein Condensates near a Microfabricated Surface," *Physical Review Letters* **90**, 100404 (2003).
53. A. E. Leanhardt, A. Görlitz, A. P. Chikkatur, D. Kielpinski, Y. Shin, D. E. Pritchard, and W. Ketterle, "Imprinting Vortices in a Bose-Einstein Condensate using Topological Phases," *Physical Review Letters* **89**, 190403 (2002).
54. A. P. Chikkatur, Y. Shin, A. E. Leanhardt, D. Kielpinski, E. Tsikata, T. L. Gustavson, D. E. Pritchard, and W. Ketterle, "A Continuous Source of Bose-Einstein Condensed Atoms," *Science* **296**, 2193 (2002).
55. A. E. Leanhardt, A. P. Chikkatur, D. Kielpinski, Y. Shin, T. L. Gustavson, W. Ketterle, and D. E. Pritchard, "Propagation of Bose-Einstein Condensates in a Magnetic Waveguide," *Physical Review Letters* **89**, 040401 (2002).
56. Y. Shin, K. Kim, J.-A. Kim, H.-R. Noh, W. Jhe, K. Oh, and U.-C. Paek, "Diffraction-limited dark laser spot produced by a hollow optical fiber," *Optics Letters* **26**, 119 (2001).