Travis Nicholson
nicholson@nus.edu.sg
+65 6601 6192

Experience

Assistant Professor, National University of Singapore. 2017 - Present

Principal Investigator, Centre for Quantum Technologies. 2017 - Present

Postdoctoral Fellow, Massachusetts Institute of Technology. 2015 - 2017

Advisors: Vladan Vuletic and Mikhail Lukin. Used Rydberg EIT to achieve a robust controlled phase shift for photons, which has been a longstanding goal of quantum information science.

Graduate Research Scientist, JILA. 2007 - 2015

Advisor: Jun Ye. Led experiments with a fermionic strontium optical lattice clock. Achieved the best atomic clock ever reported, surpassing the previous record holders in both stability and accuracy. Ranked as one of the top 10 research breakthroughs of 2015 by Cosmos magazine.

Undergraduate Research Scientist, JILA. 2003 - 2006

Advisor: Deborah Jin. Part of the team that built an ultracold K-Rb polar molecule experiment, which was recognized in 2008 as a top research breakthrough by the American Physical Society.

Education

Ph.D., University of Colorado, 2015

Degree in physics.

B.A., University of Colorado, 2006

Degree in physics and mathematics. Graduated with top honors.

Awards/Recognition of Talents

Harvard Quantum Optics Center postdoctoral fellowship finalist, 2014

International Frequency Control Symposium graduate student research prize, 2013

Winner of the student prize at the world's largest conference on atomic clocks and frequency control.

College of arts and sciences medal of distinction, 2006

Awarded to the top graduates from the University of Colorado College of Arts and Sciences.

Summa cum laude honors, 2006

Top honors awarded for high GPA, quality of thesis, and quality of thesis defense. Honors thesis: Optical Trapping in a Cold Molecule Experiment.

Phi Beta Kappa inductee, 2004

John W Fisher scholarship, 2002 - 2006

Competitive, merit-based private scholarship awarded by Ball Aerospace. Four years of funding covering tuition and expenses.

Travis Nicholson
nicholson@nus.edu.sg
+65 6601 6192

Publications

1. Q.-Y. Liang, A.V. Venkatramani, S.H. Cantu, **T.L. Nicholson**, M.J. Gullans, A.V. Gorshkov, J.D. Thompson, C. Chin, M.D. Lukin, and V. Vuletic, Observation of three-photon bound states in a quantum nonlinear medium, *Science* **359**, 783 (2018).

2. J.D. Thompson*, **T.L. Nicholson***, Q.-Y. Liang, S.H. Cantu, A.V. Venkatramani, S. Choi, I.A. Fedorov, D. Viscor, T. Pohl, M.D. Lukin, and V. Vuletic, Symmetry-protected collisions between strongly interacting photons, *Nature* **542**, 206 (2017).
(*Publication lists these authors as "contributed equally.")

3. S.L. Bromley, B. Zhu, M. Bishof, X. Zhang, T. Bothwell, J. Schachenmayer, **T.L. Nicholson**, R. Kaiser, S.F. Yelin, M.D. Lukin, A.M. Rey, and J. Ye, Collective atomic scattering and motional effects in a dense coherent medium, *Nature Communications* **7**, 11039 (2016).

4. **T.L. Nicholson**, S. Blatt, B.J. Bloom, J.R. Williams, J. Ye, and P.S. Julienne, Optical Feshbach resonances: Field-dressed theory and experimental comparisons, *Physical Review A* **92**, 022709 (2015).

5. **T.L. Nicholson**, S.L. Campbell, R.B. Hutson, G.E. Marti, B.J. Bloom, R.L. McNally, W. Zhang, M.D. Barrett, M.S. Safronova, G.F. Strouse, W.L. Tew, and J. Ye, Systematic evaluation of an atomic clock at 2×10^{-18} total uncertainty, *Nature Communications* **6**, 6896 (2015).

   Recognition:
   a) Ranked one of the top 10 technology breakthroughs of 2015 by Cosmos magazine.
   b) Featured in Washington Post, Los Angeles Times, The Guardian, Chicago Daily Herald, Sydney Morning Herald, Huffington Post, Daily Mirror, Singapore Straits Times, Bangkok Post, Gulf Times, El Pais, The London Weekly, Live Science, International Business Times, Smithsonian Magazine.

6. B.J. Bloom*, **T.L. Nicholson***, J. R. Williams, S.L. Campbell, M. Bishof, X. Zhang, W. Zhang, S.L. Bromley, and J. Ye, An optical lattice clock with accuracy and stability at the 10^{-18} level, *Nature* **506**, 71 (2014).
(*Publication lists these authors as "contributed equally.")

   Recognition:
   a) Featured in Physics Today, NPR, Physics World, Huffington Post, CBS news, NBC news, Der Spiegel, The Guinness Book of World Records.

7. **T.L. Nicholson**, M.J. Martin, J.R. Williams, B.J. Bloom, M. Bishof, M.D. Swallows, S.L. Campbell, and J. Ye, Comparison of two independent Sr optical clocks with 1×10^{-17} stability at 10^3s, *Physical Review Letters* **109**, 230801 (2012).

   Recognition:
   a) Featured as an "Editor's Suggestion" paper by the journal.

8. S. Blatt, **T.L. Nicholson**, B.J. Bloom, J.R. Williams, J.W. Thomsen, P.S. Julienne, and J. Ye, Measurement of optical Feshbach resonances in an ideal gas, *Physical Review Letters* **107**, 073202 (2011).

9. M.D. Swallows, G.K. Campbell, A.D. Ludlow, M.M. Boyd, J.W. Thomsen, M.J. Martin, S. Blatt, **T.L. Nicholson**, and J. Ye, Precision measurement of fermionic collisions using an ^{87}Sr optical lattice clock with 1 x 10^{-16} inaccuracy, *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* **57**, 574 (2010). Invited paper.

10. G.K. Campbell, M.M. Boyd, J.W. Thomsen, M.J. Martin, S. Blatt, M.D. Swallows, **T.L. Nicholson**, T. Fortier, C.W. Oates, S.A. Diddams, N.D. Lemke, P. Naidon, P. Julienne, J. Ye, and A.D. Ludlow, Probing interactions between ultracold fermions, *Science* **324**, 360 (2009).

11. J.J. Zirbel, K.-K. Ni, S. Ospelkaus, **T.L. Nicholson**, M.L. Olsen, P.S. Julienne, C.E. Wieman, J. Ye, and D.S. Jin, Heteronuclear molecules in an optical dipole trap, *Physical Review A* **78**, 013416 (2008).

Invited Talks

1. 2017 Harvard University ITAMP seminar
   T.L. Nicholson, Symmetry protected nonlinear quantum optics with Rydberg atoms

2. 2017 Cocoa Beach AMO seminar
   T.L. Nicholson, Spin exchange in Rydberg EIT

3. 2017 University of Connecticut AMO seminar
   T.L. Nicholson, Spin exchange in Rydberg EIT

4. 2016 National Institute of Standards and Technology seminar
   T.L. Nicholson, Spin exchange in Rydberg EIT

5. 2014 University of California at Berkeley AMO Seminar
   T.L. Nicholson, A new generation of atomic clocks

6. 2014 Harvard Quantum Optics Center seminar
   T.L. Nicholson, The Sr optical lattice clock at JILA: A new record in atomic clock performance

7. 2014 Massachusetts Institute of Technology Center for Ultracold Atoms seminar
   T.L. Nicholson, The Sr optical lattice clock at JILA: A new record in atomic clock performance

8. 2013 Max Planck Institute for Quantum Optics seminar
   T.L. Nicholson, The JILA Sr clock: New decades of stability and systematic uncertainty

9. 2013 International Frequency Control Symposium and European Frequency and Time Forum conference,
   T.L. Nicholson, M.J. Martin, J.R. Williams, B.J. Bloom, M. Bishof, M.D. Swallows, S.L. Campbell, and J. Ye, Optical lattice clocks near the QPN limit: a tenfold improvement in optical clock stability.

10. 2013 DAMOP conference
    T.L. Nicholson, Optical lattice clocks near the QPN limit: a tenfold improvement in optical clock stability.