

Ana María Rey

CONTACT INFORMATION JILA and Department of Physics, University of Colorado, *Phone:* (303) 492-8089
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RESEARCH INTERESTS Degenerate Fermi gases and Bose-Einstein condensates, optical lattices, quantum phase transitions, strongly correlated systems, quantum information, quantum simulations, precision measurements, non-equilibrium phenomena, entanglement generation, quantum magnetism, disordered systems, alkaline earth atoms, polar molecules.

EDUCATION **University of Maryland**, College Park, Maryland, USA.

Ph.D., Physics, August 2004.

- Dissertation Title: “Ultracold bosonic atoms in optical lattices.”
- Advisors: Charles W. Clark and Theodore R. Kirkpatrick.

Universidad de los Andes, Bogotá, Colombia

B.S., Physics, March 1999.

- Dissertation Title: “Propagation of electromagnetic radiation in Kerr’s metric.”
- Advisor: Rafael Bautista.

APPOINTMENTS **JILA and University of Colorado Physics Department** at Boulder, CO, USA.

JILA Fellow, January 2012–present.

Associate Research Professor, Physics Department, University of Colorado, January 2013–present

Associate JILA Fellow August 2008–January 2012.

Research Assistant Professor, Physics Department, University of Colorado, August 2008–January 2013.

Institute of Theoretical, Molecular and optical Physics (ITAMP) at the Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts, USA.

Postdoctoral fellow, September 2005–July 2008.

National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, USA,
Postdoctoral researcher, September 2004–August 2005.

University of Maryland, College Park, Maryland, USA,

Research Assistant, September 2000–August 2004.

HONORS AND
AWARDS

Elected APS Fellow by the Topical Group Precision Measurement & Fundamental Constants, 2015.
Early Career National Hispanic Scientist of the Year, Museum of Science and Industry, Tampa, FL, 2014.
Maria Goeppert Mayer Award, 2014.
Presidential Early Career Award for Scientists and Engineers, December 2013.
MacArthur Fellow, September 2013.
Great Minds in STEM, “Most Promising Scientist award,” October 2013.
CSWP Woman Physicist of the Month Award, June 2012.
Fundacion Alejandro Angel Escobar, Exact, Physical and Natural Sciences Prize, September 2007.
Postdoctoral fellowship, ITAMP 2005–2008.
Atomic, Molecular, and Optical Physics Outstanding Doctoral Thesis Award (DAMOP thesis prize), American Physical Society, 2005.
Cooperative Fellowship NIST/Chemical Physics (UMD), 2002-2004.
Departmental Fellowship, University of Maryland, 2000-2002.
Magna cum Laude B.S. Physics degree, Universidad de los Andes, 1999.
Best GPA award, Universidad de los Andes, 1997 and 1998.
“Beca 40 años” Fellowship, Universidad de los Andes, 1994–1998.

CURRENT
COLLABORATORS

John Bollinger (NIST)
Charles. W. Clark (NIST and University of Maryland, JQI)
Andrew Daley (University of Strathclyde)
Eugene Demler (Harvard University)
Alexey Gorshkov (NIST and University of Maryland, JQI)
Victor Gurarie (University of Colorado)
Kaden Hazard (Rice University)
Michael Hermele (University of Colorado)
Murray Holland (JILA, University of Colorado)
Michael Kastner (National Institute for Theoretical Physics, South Africa)
Andrew Ludlow (NIST)
Mikhail Lukin (Harvard University)
Chris Oates (NIST)
Tilman Pfau (Stuttgart University)
Anatoli Polkovnikov (Boston University)
Leo Radzihovsky (University of Colorado)
Mariana Safronova (University of Delaware)
Florian Schreck (University of Amsterdam)
James Thompson (JILA, University of Colorado, NIST)
Jun Ye (JILA, NIST, University of Colorado)
Susanne Yelin (University of Connecticut)
Peter Zoller (Universität Innsbruck)

MENTORS

PhD Advisors: Charles W. Clark (2000–2004) NIST, University of Maryland.
Postdoctoral Advisor: Charles W. Clark (2004–2005) NIST, University of Maryland.
Postdoctoral Advisor: Mikhail Lukin (2005–2008), ITAMP-Harvard.

CURRENT STUDENTS Óscar Leonardo Acevedo Pabón (September 2015–Present).

AND
POSTDOCTORAL
ASSOCIATES

Martin Gärttner (November 2014–Present).

Leonid Isaev (November 2014–Present).

Arghavan Safavi-Naini (September 2014–Present).

Johannes Schachenmayer (June 2012–Present).

Michael Wall (June 2012–Present).

Peiru He (January 2014–Present).

Andrew Koller (June 2012–Present).

Bihui Zhu (June 2012–Present).

PRIOR STUDENTS Shuming Li (September 2008–July 2014).

AND
POSTDOCTORAL
ASSOCIATES

Alex Pirovski (August 2012–January 2014).

Kaden Hazzard (June 2010–June 2014).

Gang Chen (June 2010–January 2013).

Michael Foss-Feig (September 2008–November 2012).

Salvador Manmana (June 2010–September 2012).

Chester Rubbo (September 2008–June 2012).

Javier Von Stecher (September 2008–August 2011).

TEACHING

Spring 2016: Phys 7550, Atomic and Molecular Spectra.

Spring 2014: Phys 7550, Atomic and Molecular Spectra.

Spring 2012: Phys 7550, Atomic and Molecular Spectra.

Spring 2011: Phys 2210, Classical Mechanics and Mathematical Methods.

Spring 2010: Phys 3320, Principles of Electricity and Magnetism II.

Spring 2009: Phys 4410, Introduction to Quantum Mechanics II.

INVITED TALKS

- 1 *Building with Crystals of Light and Quantum Matter: From Clocks to Computers*, 11th Annual Conference for Undergraduate Women in Physics, University of California, San Diego, San Diego, CA, January 2016.
- 2 *New Perspectives on Quantum Simulation with Alkaline Earth Atoms*, Institute for Advanced Study Program and Croucher Conference on Topological Phases in Condensed Matter and Cold Atomic Systems, Hong Kong University of Science and Technology Jockey Club Institute for Advanced Study, Hong Kong, December 2015.
- 3 *New Frontiers in Quantum Simulation with Alkaline-earth Atoms*, Max Planck Institute of Quantum Optics Colloquium, Garching, Germany, December 2015.
- 4 *Building with Crystals of Light and Quantum Matter: From Clocks to Computers*, Cornell University Physics Colloquium, Krumhansl Lecture, Ithaca NY, November 2015.
- 5 *Construyendo con cristales de luz y átomos fríos*, Universidad Nacional de Colombia, Physics colloquium, Bogotá, Colombia, October 2015.
- 6 *New Perspectives in Quantum Simulations with Alkaline-earth Atoms*, Second International Workshop on Ultracold Quantum Matter (UQUAM), Innsbruck,

Austria, September 2015.

- 7 *Building with Crystals of Light and Quantum Matter: From Clocks to Computers*, Yale University Physics Club, New Haven CT, September 2015.
- 8 *Dynamics of Long-range Interacting Spin Systems*, Synthetic Quantum Magnetism International Workshop, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 2015.
- 9 *New Frontiers in Quantum Simulation With Precision Laser Spectroscopy*, 22nd International Conference on Laser Spectroscopy (ICOLS 2015), Singapore, June–July 2014.
- 10 *New Perspectives on Quantum Simulation with Ultra-cold Polar Molecules*, Colombia in the International Year of Light 2015, Universidad de los Andes, Bogotá, Colombia and Universidad de Antioquia, Medellín, Colombia, June 2015.
- 11 *Building with Crystals of Light and Quantum Matter*, Argonne National Laboratory Physics Colloquium, Lemont, IL, May 2015.
- 12 *Building with Crystals of Light and Quantum Matter*, University of Chicago Physics Colloquium, Chicago, IL, May 2015.
- 13 *Quantum Magnetism at Temperature Regimes Above Quantum Degeneracy*, Topological and Strongly Correlated Phases in Cold Atoms Conference, Princeton University, Princeton, NJ, April 2015.
- 14 *Building with Crystals of Light and Quantum Matter*, University of Houston Physics Colloquium, Houston, TX, April 2015.
- 15 *Quantum Magnetism at Temperature Regimes Above Quantum Degeneracy*, Institute for Nuclear Theory Program INT-15-1, Frontiers in Quantum Simulation with Cold Atoms, Seattle, WA, April 2015.
- 16 *New Frontiers on Quantum Simulation with Ultra-cold Polar Molecules*, German Physical Society (Deutsche Physikalische Gesellschaft) Spring Meeting, Graduating Symposium, Heidelberg, Germany, March 2015.
- 17 *Building with Crystals of Light and Quantum Matter*, University of Connecticut, Physics Colloquium, Storrs, CT, March 2015.
- 18 *Building with Crystals of Light and Quantum Matter*, Williams College, Physics Colloquium, Williamstown, MA, March 2015.
- 19 *Synchronization of Radiating Dipoles*, Exploratory workshop: Rydberg physics with two electron systems, University of Hamburg, Hamburg, Germany, February 2015.
- 20 *Building with Crystals of Light and Quantum Matter*, Colorado State Physics Colloquium Fort Collins, CO, December 2014.
- 21 *Building with Crystals of Light and Quantum Matter*, Museum of Science and Industry (MOSI), Hispanic Scientist of the Year, Tampa, Florida, October 2014.
- 22 *About Ana Maria Rey, MOSI Hispanic Scientist of the Year*, Museum of Science and Industry, Hispanic Scientist of the Year, Tampa, Florida, October 2014.
- 23 *Synchronization of Radiating Dipoles, Many-Body Dynamics and Open Quantum Systems*, University of Strathclyde, Glasgow, Scotland, October 2014.
- 24 *Building with Crystals of Light and Quantum Matter*, Heidelberg Center for

- Quantum Dynamics Colloquium, University of Heidelberg, Germany, October 2014.
- 25 *Building with Crystals of Light and Quantum Matter*, Duke University, Physics Colloquium Durham, North Carolina, September 2014.
 - 26 *New Perspectives on Quantum Simulation*, IWQCDII, Medellin, Antioquia, Colombia, August 2014.
 - 27 *Construyendo con cristales de luz y atomos*, Explora en Bicicleta, Medellin, Antioquia, Colombia, August 2014.
 - 28 *New Perspectives on Quantum Simulation*, “Quantum Science”, Gordon Research Conference Easton, MA, July 2014.
 - 29 *ICAP Summer school lectures*, Williamsburg, VA, July 2014.
 - 30 *New Perspectives on Quantum Simulation*, DAMOP Meeting, Prize Session 2014, Madison, WI, June 2014 [addtocounterenum1](#)
 - 30 *Building with Crystals of Light and Quantum Matter*, University of Hamburg Physics Colloquium, Hamburg, Germany, June 2014.
 - 31 *New Perspectives on Quantum Simulation*, Lectures, SFB925 Summer Conference and Summer School “Light induced dynamics and control of correlated quantum systems”, Hohwacht, Germany, June 2014.
 - 32 *Building with Crystals of Light and Quantum Matter: From Clocks to Computers*, Louisiana State University Physics Colloquium, Baton Rouge, LA, May 2014.
 - 33 *Building with Crystals of Light and Quantum Matter: From Clocks to Computers*, NIST Colloquium, Gaithersburg, MD, May 2014.
 - 34 *Building with Crystals of Light and Quantum Matter: From Clocks to Computers*, Massachusetts Institute of Technology Physics Colloquium, Boston, MA, May 2014.
 - 35 *New Perspectives on Quantum Simulation*, Center for Ultracold Atoms Seminar, Harvard University, Boston, MA, May 2014.
 - 36 *Building with Crystals of Light: From Clocks to Computers*, AFOSR Colloquium, Arlington, VA, May 2014.
 - 37 *New Frontiers in Quantum Simulations Enabled by Precision Spectroscopy*, From Atomic to Mesoscale: The Role of Quantum Coherence in Systems of Various Complexities, ITAMP Workshop, Cambridge, MA, March 2014.
 - 38 *Quantum Simulation with Polar Molecules*, March Meeting, Denver, CO, March 2014.
 - 39 *Building with Crystals of Light: From Clocks to Computers*, Saturday Physics Series, Boulder, CO, February 2014.
 - 40 *New Frontiers in Quantum Simulations Enabled by Precision Spectroscopy*, The Moore Workshop on Quantum Materials in AMO and Condensed Matter Physics, Carmel Valley, CA, February 2014.
 - 41 *Optical lattices: From Precise Timekeepers to Quantum Simulators*, Physics Colloquium, Universidad de los Andes, Bogotá, Colombia, October 2013.

- 42 *Optical lattices: From Precise Timekeepers to Quantum Simulators*, Physics Colloquium, Universidad nacional, Bogotá, Colombia, October 2013.
- 43 *Exploring Quantum Magnetism with Polar Molecules*, Center for Quantum Information and Control (CQuIC) seminar series, University of New Mexico, Albuquerque, NM, August 2013.
- 44 *Exploring Quantum Magnetism with Polar Molecules*, Aspen Workshop on Optical Lattice Emulators and Beyond, Aspen, CO, August 2013.
- 45 *Exploring Quantum Magnetism with Polar Molecules*, CLEO conference, San Jose, CA, June 2013.
- 46 *Non-Equilibrium Many-Body Physics with Alkaline-Earth Atoms and Polar Molecules*, 11th US-Japan Joint Seminar, Nara, Japan, April 2013.
- 47 *Exploring Non-equilibrium Many-Body Physics with Polar Molecules*, Kavli Institute for Theoretical Physics (KITP), UCSB, Santa Barbara, CA, March 2013.
- 48 *Atomic Clocks: From Precise Timekeepers to Quantum Simulators*, Session: What is Hot in Cold, AAAS meeting, Boston, MA, February 2013.
- 49 *Exploring Quantum Many-Body Physics in Atomic Clocks*, Group II workshop, Tokyo, Japan, October 2012.
- 50 *Quantum Magnetism with Polar Molecules*, AMO Seminar, University of California, Berkeley, CA, September 2012.
- 51 *Quantum Dynamics in Strongly Correlated Systems*, "Quantum Science" Gordon Conference, Stonehill College, MA, August 2012.
- 52 *Precise Time Keeping Needs Many-Body Physics*, Physics Colloquium, University of Princeton, Princeton, NY March 2012.
- 53 *Precise Time Keeping Needs Many-Body Physics*, Applied Math Colloquium, University of Colorado Boulder, Boulder, CO January 2012.
- 54 *Exploring Many-Body Physics with Alkaline Earth Atoms*, Aspen Winter Conference, Aspen, CO, January 2012.
- 55 *Precise Time Keeping Needs Many-Body Physics*, Physics Colloquium, George Mason University, Fairfax, VA, November 2011.
- 56 *Resolved Interaction Sidebands*, SPIE Conference 2011, San Diego, CA, August 2011.
- 57 *New Perspectives with Alkaline Earth Atoms*, Gordon Conference on Atomic Physics, West Dover, VT, June 2011.
- 58 *Ultra-cold Bosonic Atoms in Optical Lattices*, APS-Tutorial March Meeting, Dallas, TX March 2011.
- 59 *Probing the Kondo Lattice Model with Ultracold Atoms*, CUA/MIT Boston, MA, September 2010.
- 60 *Two-orbital $SU(N)$ Magnetism with Ultracold Alkaline-Earth Atoms*, APS DAMOP Meeting, Houston, May 26, 2010.
- 61 *Quantum Simulations with Ultra-Cold Atoms*, Physics Colloquium at Colorado State University, Fort Collins, CO, March 22, 2010.
- 62 *Optical Lattice Emulator Phase II Kick-Off Meeting*, Miami, FL, December 3,

2009.

- 63 *Controlling and Probing Interaction-Induced Ferromagnetism in Optical Superlattices*, AMO Seminar University of Toronto, Toronto, Canada, December 1, 2009.
- 64 *The Super Cool Atom Computer*, Saturday Physics Series, JILA and University of Colorado, November 14, 2009.
- 65 *Two-orbital $SU(N)$ Magnetism with Ultracold Alkaline-Earth Atoms*, Ultracold Group II workshop, University of Maryland, College Park, MD, September 17, 2009.
- 66 *Ultracold Atoms as Quantum Simulators of Condensed Matter Hamiltonians*, Optics Seminar, JILA and University of Colorado, Boulder, CO, December 1, 2008.
- 67 *Ultracold Atoms as Quantum Simulators of Condensed Matter Hamiltonians*, Physics Department Colloquium, Colorado School of Mines, Golden, CO, November 18, 2008
- 68 *Alkaline-Earth-Atoms Tool Box*, New Laser Scientist Conference, Rochester, NY October 24, 2008.
- 69 *Alkaline-Earth-Atoms Tool Box*, The Center for Advanced Studies Seminar, University of New Mexico, October 9, 2008.
- 70 *Exploring Quantum Magnetism in Optical Super-Lattices*, Quantum Seminar, Los Alamos National Laboratory, Los Alamos, NM, October 2, 2008.
- 71 *Alkaline Earth atoms as Quantum Simulators of Novel Hamiltonians* Informal AMO Theory Seminar, JILA and University of Colorado, Boulder, CO, September 25, 2008.
- 72 *Exploring Quantum Magnetism with Optical Super-Lattices*, Bi-group Seminar, JILA and University of Colorado, Boulder, CO, September 15, 2008.
- 73 *Preparation and Detection of d-wave Superfluidity with Cold Atoms*, APS DAMOP Meeting, Pennsylvania State University, State College, PA, May 28, 2008 .
- 74 *Preparation and Detection of d-wave Superfluidity with Cold Atoms*, Cambridge-Connecticut AMO Open House, Harvard University, Boston, MA, April 11, 2008.
- 75 *Probing and Controlling Quantum Magnetism with Ultra-Cold atoms*, APS March Meeting, New Orleans, LA, March 12, 2008.
- 76 *Preparation and Detection of Magnetic Quantum Phases in Optical Superlattices*, AMO Seminar, University of Connecticut, Storrs, CT, September 24, 2007.
- 77 *Quantum magnetism in optical superlattices*, AMO Seminar, Stony Brook University, Stony Brook, NY, December 3, 2007 .
- 78 *Controllable generation of entanglement and frustrated spin states in optical lattices*, QIBEC Seminar series at NIST, Gaithersburg, MD, August 2, 2007.
- 79 *Condensate and non-condensate dynamics in optical lattices*, Non-equilibrium Behavior in Superfluid Gases at Finite Temperature Workshop, Sandbjerg, Denmark, June 12, 2007.
- 80 *Preparation and detection of magnetic quantum phases in optical superlattices*, AMO seminar, University of Delaware, Newark, DE, April 23, 2007.

- 81 *Preparation and detection of magnetic quantum phases in optical superlattices*, AMO Seminar, University of Massachusetts, Boston, MA, April 18, 2007.
- 82 *Robust entanglement generation with strongly interacting atoms*, CIAR Quantum Simulation Meeting, Vancouver, Canada, February 21, 2007.
- 83 *Equilibrium and non-equilibrium dynamics of atoms in optical lattices*, JQI Seminar Series, University of Maryland, College Park, MD, January 29, 2007.
- 84 *Theory of strongly correlated atoms*, Emerging Themes in Physics Workshop, University of Texas, Austin, TX October 2006.
- 85 *Quantum coherence of Hard-Core-Bosons and Fermions: Extended, Glassy and Mott Phases*, ITAMP-Harvard Physics Department Joint Atomic Physics Colloquium, April, 2006.
- 86 *Quantum coherence of hard core bosons in superlattices*, AMO Seminar, University of Texas, Austin, April 2006.
- 87 *Hanbury Brown Twiss interferometry in superlattices*, Laser Physics Workshop, L'Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, August 2006.
- 88 *Extended fermionization of 1D bosons in optical lattices*, Third International Workshop in Theory of Quantum Gases and Quantum Coherence, Cortona, Italy, November 2005.
- 89 *Damped center of mass oscillations of a 1-D Bose gas in an optical lattice*, Quantum Coherence and Information Seminar, University of Maryland, College Park, MD, April 2005.
- 90 *Fermionization of Bosons in an Optical Lattice: A simple picture*, Statistical Physics Seminar, University of Maryland, College Park, MD, March 2005.
- 91 *Bragg Spectroscopy of bosonic atoms in one dimensional lattices*, CAMP Seminar, Pennsylvania State University, State College, PA, November 2004.
- 92 *Bragg Spectroscopy of ultracold atoms loaded in an optical lattice*, Quantum Coherence and Information Seminar, University of Maryland, College Park, MD, April 2004.
- 93 *BEC dynamics in a patterned loaded optical lattice*, AMO Physics Seminar, State University of New York at Stony Brook, NY, December 2003.
- 94 *Going beyond the Popov approximation to describe dynamical and equilibrium properties of a BEC in an optical lattice*, Laser Physics Workshop, Hamburg University, Hamburg, Germany, August 2003.
- 95 *Quantum dynamics of a period-three pattern loaded BEC in an optical lattice*, Quantum Coherence and Information Seminar, University of Maryland, College Park, MD, February 2003.

OUTREACH

Building with Crystals of Light and Quantum Matter: From Clocks to Computers, 11th Annual Conference for Undergraduate Women in Physics, University of California, San Diego, San Diego, CA, January 2016. Lecture and meetings targeted to undergraduate women in physics to encourage them to continue in physics, and to share professional experiences, advice, and ideas.

Ana Maria Rey. *Who Am I?*, Catedra Huellas que Inspiran (Footsteps that Inspire), Universidad Nacional de Colombia, Bogotá, Colombia, October 2015. Lecture to approximately 2000 undergraduate students to inspire them to continue and complete their academic careers (http://www.unal.edu.co/diracad/catedras/huellas/2015-II/huellas_2015_II/invitados.html).

Ana Maria Rey. *Construyendo con cristales de luz y atomos fríos*, physics colloquium, Universidad Nacional de Colombia, Bogotá, Colombia, October 2015.

Universidad de los Andes, Bogotá, Colombia, March 2015. Undergraduate commencement speech.

Building with crystals of light and quantum matter, Williams College, Physics Colloquium, Williamstown, MA, March 2015. Lecture targeted to approximately 25 undergraduate students.

About Ana Maria Rey, MOSI, Hispanic Scientist of the year, (<http://mosinsoy.org/>) Museum of Science and Industry, Tampa, FL, October 2014. Three lectures at IMAX-MOSI Tampa, each given to approximately 300 school students brought to "Meet the Scientist Day" at MOSI, to meet and listen to presentations by the scientists about their life stories and path to a career in science.

New perspectives on quantum simulation, IWQCDII, Medellin, Antioquia, Colombia, August 2014. Lecture given to participants of the IWQCDII workshop. August 2014.

Construyendo con cristales de luz y atomos, Explora en Bicicleta, Medellin, Antioquia, Colombia, August 2014. Public lecture in Colombia: <http://www.parqueexplora.org/visitenos/noticias/desde-relojes-hasta-computadores-cuanticos-con-cristales-de-luz-y-atomos/> and <http://www.parqueexplora.org/visitenos/noticias/reviva-los-ciencia-en-bicicleta-de-agosto/>

ICAP Summer school lectures, Williamsburg, VA, July 2014. Three lectures targeted to 50 graduate students.

New perspectives on quantum simulation, Summer school lectures, "Light induced dynamics and control of correlated quantum systems" Summer School, Hohwacht, Germany, June 2014. Summer school lectures targeted to approximately 50 graduate students

Co-organized (with Profs. E. Demler, M. Lukin, and G. Refael), the ITAMP Workshop: "Non-equilibrium dynamics and correlations in strongly interacting atomic, optical and solid state systems", held January 26–28, 2009 at ITAMP, Harvard.

Member of the American Physical Society.

Referee for several international journals.

Member (2010) and chair (2011) of The DAMOP Thesis Prize Committee.

Reviewer and panel review member of NSF

BOOKS

1 M. L. Wall, K. R. A. Hazzard, and A. M. Rey, "Quantum Magnetism with Ultracold Molecules", in *The Role of Quantum Coherence in Systems of Various Complexities*, edited by S. Malinovskaya and I. Novikova, **World Scientific**, 2015, pp. 3–37.

item *Annual Review of Cold Atoms and Molecules*, edited by Kirk W. Madison, Yiqiu Wang, Ana Maria Rey and Kai Bongs, **World Scientific**, Volume 3, Singapore (2015).

- 2 *Annual Review of Cold Atoms and Molecules*, edited by Kirk W. Madison, Yiqiu Wang, Ana Maria Rey and Kai Bongs, **World Scientific**, Volume 2, Singapore (2014).
- 3 *Annual Review of Cold Atoms and Molecules*, edited by Kirk W. Madison, Yiqiu Wang, Ana Maria Rey and Kai Bongs, **World Scientific**, Volume 1, Singapore (2013).

- 1 M. L. Wall, A. P. Koller, S. Li, X. Zhang, N. R. Cooper, J. Ye, and A. M. Rey, *Synthetic Spin-Orbit Coupling in an Optical Lattice Clock*, Phys. Rev. Lett. **116**, 035301 (2016).
- 2 D. Dylewsky, J. K. Freericks, M. L. Wall, A. M. Rey, and M. Foss-Feig, *Non-perturbative calculation of phonon effects on spin squeezing*, Phys. Rev. A **93**, 013415 (2016).
- 3 A. Safavi-Naini, M. L. Wall, and A. M. Rey, *Role of interspecies interactions in the preparation of a low-entropy gas of polar molecules in a lattice*, Phys. Rev. A **92**, 063416 (2015).
- 4 C. Zhang, A. Safavi-Naini, A. M. Rey and B. Capogrosso-Sansone, *Equilibrium phases of tilted dipolar lattice bosons*, New J. Phys., **17**, 123014 (2015).
- 5 A. M. Kaufman, B. J. Lester, M. Foss-Feig, M. L. Wall, A. M. Rey and C. A. Regal, *Entangling two transportable neutral atoms via local spin exchange*, Nature, **527**, 208 (2015)
- 6 L. Isaev and A. M. Rey, *Heavy-Fermion Valence-Bond Liquids in Ultracold Atoms: Cooperation of the Kondo Effect and Geometric Frustration*, Phys. Rev. Lett. **115**, 165302 (2015).
- 7 A. P. Koller, J. Mundinger, M. L. Wall, and A. M. Rey, *Demagnetization dynamics of noninteracting trapped fermions*, Phys. Rev. A **92**, 033608 (2015)
- 8 N. R. Cooper and A. M. Rey, *Adiabatic Control of Atomic Dressed States for Transport and Sensing*, Phys. Rev. A., **92**, 021401 (2015).
- 9 B. Zhu, J. Schachenmayer, F. H. Urbina, J. G. Restrepo, J. G. , M. J. Holland, and A. M. Rey, *Synchronization of Interacting Quantum Dipole*, New Journal of Physics, **17**, 083063 (2015).
- 10 M. L. Wall, K. R. A. Hazzard, and A. M. Rey, *Effective many-body parameters for atoms in nonseparable Gaussian optical potentials*, Phys. Rev. A **92**, 013610 (2015).
- 11 M. Gärttner, S. V. Syzranov, A. M. Rey, V. Gurarie, and L. Radzihovsky, *Disorder-driven transition in a chain with power-law hopping*, Phys. Rev. B **92**, 041406(R) (2015).
- 12 J. Schachenmayer, A. Pikovski, and A. M. Rey, *Dynamics of correlations in two-dimensional spin models with long-range interactions: A phase-space Monte-Carlo study*, New Journal of Physics, **17**, 065009 (2015).
- 13 J. Schachenmayer, A. Pikovski, and A. M. Rey, *Many-body quantum spin dynamics with Monte Carlo trajectories on a discrete phase space*, Physical Review X, **5**, 011022 (2015).
- 14 S. V. Syzranov, M. L. Wall, V. Gurarie, and A. M. Rey, *Spinorbital dynamics in a system of polar molecules*, Nature Communications, **5**, 5391 (2014).
- 15 K. R. A. Hazzard, M. van den Worm, M. Foss-Feig, S. R. Manmana, E. G. Dalla Torre, T. Pfau, M. Kastner, and A. M. Rey, *Quantum correlations and entanglement in far-from-equilibrium spin systems*, Physical Review A, **90**(6), 063622 (2014).
- 16 M. A. Cazalilla and A. M. Rey, *Ultracold Fermi gases with emergent $SU(N)$ symmetry*, Reports on Progress in Physics, **77**(12), 124401 (2014).

- 17 A. Hazzard, B. Gadway, M. Foss-Feig, B. Yan, S. A. Moses, S. A. , J. P. Covey, N.Y. Yao, M. D. Lukin, J. Ye, D. S. Jin, and A. M. Rey, *Many-Body Dynamics of Dipolar Molecules in an Optical Lattice*, Physical Review Letters, **113**(19), 195302 (2014).
- 18 A. M. Kaufman, B. J. Lester, C. M. Reynolds, M. L. Wall, M. Foss-Feig, K. R. A. Hazzard, A. M. Rey, and C. A. Regal, *Two-particle quantum interference in tunnel-coupled optical tweezers*, Science, **345**, 306 (2014).
- 19 A. P. Koller, M. Beverland, A. V. Gorshkov, and A. M. Rey, *Beyond the Spin Model Approximation for Ramsey Spectroscopy*, Physical Review Letters, **112**, 123001 (2014).
- 20 X. Zhang, M. Bishof, S. L Bromley, C. V. Kraus, M. S. Safronova, P. Zoller, A. M. Rey, and J. Ye, *Spectroscopic observation of $SU(N)$ -symmetric interactions in Sr orbital magnetism*, Science, **345**, 1467 (2014).
- 21 A. M. Rey, A. V. Gorshkov, C. V. Kraus, M. J. Martin, M. Bishof, M. D. Swallows, X. Zhang, C. Benko, J. Ye, N. D. Lemke and A. D. Ludlow, *Probing many-body interactions in an optical lattice clock*, Annals of Physics, **340**, 311 (2014).
- 22 Bihui Zhu, Bryce Gadway, Michael Foss-Feig, Johannes Schachenmayer, Michael Wall, Kaden R. A. Hazzard, Bo Yan, Steven A. Moses, Jacob P. Covey, Deborah S. Jin, Jun Ye, Murray Holland, and Ana Maria Rey *Suppressing the loss of ultracold molecules via the continuous quantum Zeno effect*, Physical Review Letters **112**, 070404 (2014) [“Editor’s Suggestion”].
- 23 Andrew G. Sykes, John P. Corson, Jose P. D’Incao, Andrew P. Koller, Chris H. Greene, Ana Maria Rey, Kaden R. A. Hazzard, and John L. Bohn, *Quenching to unitarity: Quantum dynamics in a 3D Bose gas*, Phys. Rev. A (rapid), **89**, 021601 (2014)
- 24 B. H. Zhu and G. Quemener and A. M. Rey and M. J. Holland ,*Evaporative cooling of reactive polar molecules confined in a two-dimensional geometry* Phys. Rev. A, **88**, 063405 (2013).
- 25 M. J. Martin, M. Bishof, M. D. Swallows, X. Zhang, C. Benko, J. von-Stecher, A. V. Gorshkov, A. M. Rey, Jun Ye ,*A quantum many-body spin system in an optical lattice clock* Science, **341**, 632 (2013).
- 26 Michael Foss-Feig, Kaden R A Hazzard, John J Bollinger, Ana Maria Rey, Charles W Clark *Dynamical quantum correlations of Ising models on an arbitrary lattice and their resilience to decoherence* New J. Phys. **15**, 113008 (2013).
- 27 M. Foss-Feig, K. R. A. Hazzard, J. J. Bollinger, A.M. Rey, *Non-equilibrium dynamics of Ising models with decoherence: an exact solution*, Phys. Rev. A. **87**, 042101 (2013).
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