

Ana María Rey

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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.
Associate JILA Fellow August 2008-January 2012.
JILA Fellow, January 2012-present.
Research Assistant Professor Physics, University of Colorado, August 2008-present.

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

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:

Immanuel Bloch (University of Mainz)
Charles. W. Clark (NIST and University of Maryland,JQI)
Eugene Demler (Harvard University)
Markus Greiner (Harvard University)
Vladimir Gritsev (Universite de Fribourg)
Victor Gurarie (University of Colorado)
Michael Hermele (University of Colorado). Murray Holland (JILA, University of Colorado)
Mikhail Lukin (Harvard University)
Chris Oates (NIST)
Anatoli Polkovnikov (Boston University)
Leo Radzihovsky (University of Colorado)
Indubala Satija (George Mason University)
David Weiss (Penn State University)
Jun Ye (JILA, NIST, University of Colorado)
Susanne Yelin (University of Connecticut)
Peter Zoller (Universität Innsbruck)

MENTORS:

PhD Advisors: Charles W. (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.

STUDENTS AND
POSTDOCTORAL
ASSOCIATES:

Salvador Manmana (June 2010-Present).
Gang Chen (June 2010-Present).
Kaden Hazzard (June 2010-Present).
Chester Rubbo (September 2008-Present).
Shuming Li (September 2008-Present).
Michael Foss-Feig (September 2008-Present).
Javier Von Stecher (September 2008- August 2011).

EDUCATION

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 *Precise time keeping needs many-body physics* , Physics Colloquium,U. of Princeton, Princeton, NY March/2012.
- 1 *Precise time keeping needs many-body physics* , Applied Math Colloquium, U. of Colorado at Boulder, Boulder Jan/2012.
- 2 *Exploring Many-body physics with alkaline earth atoms*, Aspen Winter conference, Aspen, CO January/2012.
- 3 *Precise time keeping needs many-body physics*, Physics Colloquium, George Mason University, Fairfax, Virginia November/2011.
- 4 *Resolved interaction sidebands*, SPIE Conference 2011, San Diego, CA August/2011.
- 5 *New perspectives with alkaline earth atoms*, Gordon Conference on Atomic Physics, West Dover, VT June/2011.
- 6 *Ultra-cold bosonic atoms in optical lattices*, APS-Tutorial March Meeting, Dallas, March 20/2011.
- 7 *Probing the Kondo Lattice Model with ultracold atoms*, CUA/MIT Boston, MA, September/2010.
- 8 *Two-orbital $SU(N)$ magnetism with ultracold alkaline-earth atoms*, APS DAMOP Meeting, Houston, May 26/2010.
- 9 *Quantum simulations with ultra-cold atoms*, Physics Colloquium at Colorado State University, March 22/2010.
- 10 *Kick off meeting Venue:OLE Program*, Miami, December 3/2009.
- 11 *Controlling and probing interaction induced ferromagnetism in optical superlattices*, AMO Seminar U. of Toronto, December 1/2009.
- 12 *The super cool atom computer Venue:Saturday Physics Series*, JILA and University of Colorado, November 14/2009.
- 13 *Two-orbital $SU(N)$ magnetism with ultracold alkaline-earth atoms*, Ultracold Group II workshop, University of Maryland College Park, September 17/2009.
- 14 *Ultracold atoms as quantum simulators of condensed matter Hamiltonians*, Optics Seminar, JILA and University of Colorado, December 1/2008.
- 15 *Ultracold atoms as quantum simulators of condensed matter Hamiltonians*, Physics Department Colloquium, University of Mines,Colorado, November 18/2008
- 16 *Alkaline-Earth -Atoms Tool Box*, New Laser Scientist Conference, Rochester, NY October 24/2008.
- 17 *Alkaline-Earth -Atoms Tool Box*,The Center for Advanced Studies Seminar , University of New Mexico, October 9/ 2008.
- 18 *Exploring quantum magnetism in optical super-lattices*, Quantum Seminar, Los Alamos Laboratory, October 2/2008.

- 19 *Alkaline earth atoms as quantum simulators of novel Hamiltonians* Informal AMO Theory Seminar, JILA and University of Colorado, September 25/2008.
- 20 *Exploring quantum magnetism with optical super-lattices*, Bigroup Seminar, JILA and University of Colorado, September 15/ 2008.
- 21 *Preparation and Detection of d-wave superfluidity with cold atoms*, APS DAMOP Meeting, Penn State University, May 28/2008 .
- 22 *Preparation and Detection of d-wave superfluidity with cold atoms*, Cambridge-Connecticut AMO Open House, Harvard university, April 11/2008.
- 23 *Probing and controlling quantum magnetism with ultra-cold atoms*, APS March Meeting, New Orleans, March 12/2008.
- 24 *Preparation and Detection of Magnetic Quantum Phases in Optical Superlattices*, Uconn AMO Seminar, September 24/2007.
- 25 *Quantum magnetism in optical superlattices*, AMO Seminar Stony Brook, Dec. 3/2007 .
- 26 *Controllable generation of entanglement and frustrated spin states in optical lattices*, QIBEC Seminar series at NIST, Gaithersburg, MD, August 02/2007.
- 27 *Condensate and non-condensate dynamics in optical lattices*, Non-equilibrium behavior in superfluid gases at finite temperature workshop in Sandbjerg, Denmark, June 12/2007.
- 28 *Preparation and detection of magnetic quantum phases in optical superlattices*, AMO seminar at the University of Delaware, Newark, DE, April 23/2007.
- 29 *Preparation and detection of magnetic quantum phases in optical superlattices*, AMO Seminar at University of Massachusetts, Boston, MA, April 18/2007.
- 30 *Robust entanglement generation with strongly interacting atoms*, CIAR Quantum Simulation Meeting, Vancouver-Canada, February 21/2007.
- 31 *Equilibrium and non-equilibrium dynamics of atoms in optical lattices*, University of Maryland College Park, JQI seminar series, January 29/2007.
- 32 *Theory of strongly correlated atoms*, Emerging Themes in Physics Workshop, University of Texas at Austin, October 2006.
- 33 *Quantum coherence of Hard-Core-Bosons and Fermions: Extended, Glassy and Mott Phases*, ITAMP-Harvard Physics Department Joint Atomic Physics Colloquium, April/2006.
- 34 *Quantum coherence of hard core bosons in superlattices*, University of Texas at Austin AMO Seminar, April/2006.
- 35 *Hanbury Brown Twiss interferometry in superlattices*, Laser Physics Workshop, L'Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, August/2006.
- 36 *Extended fermionization of 1D bosons in optical lattices*, Third International Workshop in Theory of Quantum Gases and Quantum Coherence, Cortona, Italy, November/2005.
- 37 *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, Maryland, April/2005.

- 38 *Fermionization of Bosons in an Optical Lattice: A simple picture*, Statistical Physics Seminar, University of Maryland, College Park, Maryland, March/2005.
- 39 *Bragg Spectroscopy of bosonic atoms in one dimensional lattices*, CAMP Seminar, Pennsylvania State University, State College, Pennsylvania, November/2004.
- 40 *Bragg Spectroscopy of ultracold atoms loaded in an optical lattice*, Quantum Coherence and Information Seminar, University of Maryland, College Park, Maryland, April/2004.
- 41 *BEC dynamics in a patterned loaded optical lattice*, AMO Physics Seminar, State University of New York at Stony Brook, NY, December/2003.
- 42 *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.
- 43 *Quantum dynamics of a period-three pattern loaded BEC in an optical lattice*, Quantum Coherence and Information seminar, University of Maryland, College Park, Maryland, February/2003.

OUTREACH

Co-organized together with Profs. E. Demler, M. Lukin, G. Refael, the Itamp Workshop: “Non-equilibrium dynamics and correlations in strongly interacting atomic, optical and solid state systems”, held on Jan. 26-28, 200 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

- 1 C. P. Rubbo, I. I. Satija, W. P. Reinhardt, R. Balakrishnan, A. M. Rey and S. R. Manmana *Quantum Dynamics of Solitons in Strongly Interacting Systems on Optical Lattices*, Accepted in Phys. Rev. A, arXiv:1202.3400.
- 2 K. R. A. Hazzard, V. Gurarie, M. Hermele and A. M. Rey. *High temperature thermodynamics of fermionic alkaline earth atoms in optical lattices* , Phys. Rev. A (Rapid) **85**, 041604 (2012) .
- 3 A. Chotia, B. Neyenhuis, S. A. Moses, B. Yan, J. P. Covey, M. Foss-Feig, A. M. Rey, D. S. Jin, and J. Ye *Long-Lived Dipolar Molecules and Feshbach Molecules in a 3D Optical Lattice*, Phys. Rev. Lett. **108**, 080405 (2012).
- 4 K. He, I. I. Satija, C. W. Clark, A. M. Rey, and M. Rigol *Noise correlation scalings: Revisiting the quantum phase transition in incommensurate lattices with hard-core bosons*, Phys. Rev. A **85**, 013617 (2012).
- 5 K. A. Kuns, A. M. Rey, and A. V. Gorshkov *d-wave superfluidity in optical lattices of ultracold polar molecules*, Phys. Rev. A **84**, 063639 (2011).
- 6 A. D. Ludlow, N. D. Lemke, J. A. Sherman, C. W. Oates, G. Quemener, J. von Stecher, A. M. Rey *Cold collision shift cancelation and inelastic scattering in a Yb optical lattice clock* , Phys. Rev. A **84**, 052724 (2011).
- 7 M. Bishof, M. J Martin, M. D. Swallows, C. Benko, Y. Lin, G. Qumner, A. M. Rey, J. Ye *Inelastic collisions and density-dependent excitation suppression in a ^{87}Sr optical lattice clock* Phys. Rev. A **84**, 052716 (2011).
- 8 S. R. Manmana, K. R. A. Hazzard, G. Chen, A. E. Feiguin, and A. M. Rey, *$SU(N)$ magnetism in chains of ultracold alkaline earth atoms: Mott transitions and quantum correlations*, Phys. Rev. A **84**, 043601 (2011).
- 9 R. Sensarma, D. Pekker, A. M. Rey, M. Lukin, E. Demler. *Relaxation of Fermionic Excitations in a Strongly Attractive Fermi Gas in an Optical Lattice* , Phys. Rev. Lett. **107**, 145303 (2011).
- 10 M. Foss-Feig, A. M. Rey. *Phase diagram of the bosonic Kondo-Hubbard model*, Phys. Rev. A **84**, 053619 (2011).
- 11 C. P. Rubbo, S. R. Manmana, B. M. Peden, M. J. Holland, A. M. Rey. *Resonantly Enhanced Tunneling and Transport of Ultracold Atoms on Tilted Optical Lattices* , Phys. Rev. A **84**, 033638 (2011).
- 12 Andreas Nunnenkamp, Ana Maria Rey, and Keith Burnett, Superposition states of ultracold bosons in rotating rings with a realistic potential barrier, Phys. Rev. A **84**, 053604 (2011).
- 13 N. D. Lemke, J. von Stecher, J. A. Sherman, A. M. Rey, C. W. Oates and A. D. Ludlow. *P-Wave cold collisions in an optical lattice clock* , Phys. Rev. Lett. **107**, 103902 (2011).
- 14 K. R. A. Hazzard, A.V. Gorshkov A. M. Rey. *Spectroscopy of dipolar fermions in 2D pancakes and 3D lattices* , Phys. Rev. A **84**, 033608 (2011).
- 15 A. V. Gorshkov, S. R. Manmana, G. Chen, E. Demler, M. D. Lukin and A. M. Rey. *Quantum Magnetism with Polar Alkali Dimers* , Phys. Rev. A **84**, 033619 (2011)
- 16 A. V. Gorshkov, S. R. Manmana, G. Chen, J. Ye, E. Demler, M. D. Lukin and A. M. Rey. *Tunable Superfluidity and Quantum Magnetism with Ultracold Polar Molecules* , Phys. Rev. Lett. **107**, 115301 (2011).

- 17 J. von Stecher, V. Gurarie, L. Radzihovsky, and A. M. Rey. *Lattice-induced resonances in one-dimensional bosonic systems*, Phys. Rev. Lett **106**, 235301 (2011).
- 18 M. Bishof, Y. Lin, M. D. Swallows, A. V. Gorshkov, J. Ye, A.M. Rey. *Resolved atomic interaction sidebands in an optical clock transition* Phys. Rev. Lett. **106**, 250801 (2011).
- 19 M. D. Swallows, M. Bishof, Y. Lin, S. Blatt, M. J. Martin, A. M. Rey, J. Ye. *Suppression of collisional shifts in a strongly interacting lattice clock* Science **331**, 1043 (2011).
- 20 M. Foss-Feig, M. Hermele, V. Gurarie, and A. M. Rey. *Heavy fermions in an optical lattice*, Phys. Rev. A **82**, 053624 (2010).
- 21 M. Foss-Feig, M. Hermele, and A. M. Rey. *Probing the Kondo lattice model with alkaline-earth-metal atoms*, Phys. Rev. A (Rapid communication) **81**, 051603 (2010).
- 22 J. von Stecher, E. Demler, M. D. Lukin, and A. M. Rey. *Probing interaction-induced ferromagnetism in optical superlattices*, New Journal of Physics **12**, 055009 (2010).
- 23 J. von Stecher, B. Wunsch, M. Lukin, E. Demler and A. M. Rey. *Double quantum dots in carbon nanotubes*, Phys. Rev. B **82**, 125437 (2010).
- 24 S. Li, I. I. Satija, C. W. Clark and A. M. Rey. *Exploring complex phenomena using ultracold atoms in bichromatic lattices* Phys. Rev. E. **82**, 016217 (2010).
- 25 A. V. Gorshkov, M. Hermele, V. Gurarie, C. Xu, P. S. Julienne, J. Ye, P. Zoller, E. Demler, M. D. Lukin, A. M. Rey. , *Two-orbital $SU(N)$ magnetism with ultracold alkaline-earth atoms*, Nature Physics **6**, 289 (2010).
- 26 A. Nunnenkamp, A. M. Rey and K. Burnett., *Routes to Quantum Vortex Nucleation*, Royal Society Proceedings A **466**, 1247(2010).
- 27 A. M. Rey, A. V. Gorshkov, C. Rubbo. *Many-Body Treatment of the Collisional Frequency Shift in Fermionic Atoms*, Phys. Rev. Lett. **103** 260402 (2009).
- 28 A. M. Rey, *Physics*, **2**, 103 (2009).
- 29 R. M. Rajapakse, T. Bragdon , A. M. Rey, T. Calarco, S. Yellin., *Single-photon nonlinearities using arrays of cold polar molecules*, Phys. Rev. A **80** 013810 (2009).
- 30 E. Toth, A. M. Rey, B. Blakie., *Theory of correlations between ultra-cold bosons released from an optical lattice*, Phys. Rev. A **78** 029901 (2008).
- 31 F. Mintert, A. M. Rey, I. I. Satija and C. W. Clark. *Phase transitions, entanglement and quantum noise interferometry in cold atoms*, EPL **86** 17003 (2009).
- 32 A. V. Gorshkov, A. M. Rey, A.J. Daley, M. M. Boyd, J. Ye, P. Zoller, M.D. Lukin. *Alkaline-Earth Atoms as Few-Qubit Quantum Registers*, Phys. Rev. Lett. **102** 110503 (2009).
- 33 A. M. Rey, R. Sensarma, S. Foelling, M. Greiner, E. Demler, M.D. Lukin. *Controlled preparation and detection of d-wave superfluidity in two-dimensional optical superlattices*, EPL **87**, 60001 (2009).
- 34 Michael Hermele, Victor Gurarie, Ana Maria Rey. *Mott Insulators of Ultracold*

- Fermionic Alkaline Earth Atoms: Underconstrained Magnetism and Chiral Spin Liquid*, Phys. Rev. Lett. **103**, 135301 (2009).
- 35 L. Jiang, A. M. Rey, O. Romero-Isart, J. J. Garcia-Ripoll, A. Sanpera, M. D. Lukin. *Preparation of Decoherence Free Cluster States with Optical Superlattices*, Phys. Rev. A **79** 022309 (2009).
- 36 E. Toth, A. M. Rey, B. Blakie. *Theory of correlations between ultra-cold bosons released from an optical lattice*, Phys. Rev. A **78**, 013627 (2008).
- 37 A. M. Rey, L. Jiang, M. Fleischhauer, E. Demler and M.D. Lukin., *Many-body protected entanglement generation in interacting spin systems*, Phys. Rev. A **77**, 052305 (2008).
- 38 A. Nunnenkamp, A. M. Rey, and Keith Burnett. *Generation of macroscopic superposition states in ring superlattices*, Phys. Rev. A **77**, 023622 (2008).
- 39 P. Barmettler, A. M. Rey, E. Demler, M. Lukin and V. Gritsev., *Quantum many-body dynamics of coupled double-well superlattices*, Phys. Rev. A. **78**, 012330 (2008).
- 40 S. Trotzky P. Cheinet, S. Fölling, M. Feld, U. Schnorrberger, A. M. Rey, A. Polkovnikov, E. A. Demler, M. D. Lukin and I. Bloch., *Time-Resolved Observation and Control of Superexchange Interactions with Ultracold Atoms in Optical Lattices*, Science, **319**, 295 (2008).
- 41 A. M. Rey, K. Burnett, I. I. Satija, and C. W. Clark., *Entanglement and the Mott transition in a rotating bosonic ring lattice*, Phys. Rev. A **75**, 063616 (2007).
- 42 A. M. Rey, V. Gritsev, I. Bloch, E. Demler and M.D. Lukin. *Preparation and detection of magnetic quantum phases in optical superlattices.*, Phys. Rev. Lett **99**, 140601 (2007).
- 43 A. M. Rey, L. Jiang and M. D. Lukin. *Quantum limited measurements of atomic scattering properties*, Phys. Rev. A **76**, 053617 (2007)
- 44 A. M. Rey, I. I. Satija and C. W. Clark. *Noise correlations of fermions and hard core bosons in a quasi-periodic potential*, Laser Physics **17**, 205 (2007).
- 45 P. B. Blakie, A. M. Rey and A. Bezett. *Thermodynamics of quantum degenerate gases in optical lattices*, Laser Physics **17**, 198 (2007).
- 46 Ana Maria Rey, Indubala I. Satija, Charles W. Clark. *Hanbury-Brown-Twiss interferometry for fractional and integer Mott phases*, New Journal of Phys. **8**, Art. No. 155 (2006).
- 47 Guido Pupillo, Ana Maria Rey, Carl J. Williams, Charles W. Clark. *Extended fermionization of 1D bosons in optical lattices*, New Journal of Phys. **8**, Art. No. 161 (2006).
- 48 Guido Pupillo, Ana Maria Rey, George G. Batrouni. *Bragg spectroscopy of trapped one-dimensional strongly interacting bosons in optical lattices: Probing the cake structure*, Phys. Rev. A **74**, 013601 (2006).
- 49 Ana Maria Rey, Indubala I. Satija, Charles W. Clark. *Quantum coherence of hard-core bosons: Extended, glassy, and Mott phases*, Phys. Rev. A **73** 063610 (2006).
- 50 Ana Maria Rey, Indubala I. Satija, Charles W. Clark. *Noise correlations of*

- hard-core bosons: quantum coherence and symmetry breaking*, Journal of Phys. B **39**, S177 (2006).
- 51 Ana Maria Rey, Guido Pupillo, James V. Porto. *The role of interactions, tunneling and harmonic confinement on the adiabatic loading of bosons in an optical lattice*, Phys. Rev. A **73**, 023608 (2006).
- 52 Esteban Calzetta, Bei-Lok Hu, Ana Maria Rey. *Bose-Einstein-condensate superfluid-Mott-insulator transition in an optical lattice*, Physical Review A **73**, 023610 (2006).
- 53 Julio Gea-Banacloche, Ana Maria Rey, Guido Pupillo, Carl J. Williams, Charles W. Clark. *Mean-field treatment of the damping of the oscillations of a one-dimensional Bose gas in an optical lattice*, Phys. Rev. A. **73**, 013605 (2006).
- 54 Ana Maria Rey, Guido Pupillo, Carl J. Williams, Charles W. Clark. *Ultra-cold atoms confined in an optical lattice plus parabolic potential: a closed-form approach*, Phys. Rev. A **72**, 033616 (2005).
- 55 Ana Maria Rey, P. Blair Blakie, Guido Pupillo, Carl J. Williams, Charles W. Clark. *Bragg spectroscopy of ultracold atoms loaded in an optical lattice*, Phys. Rev. A **72**, 023407 (2005).
- 56 Ana Maria Rey, Bei-Lok Hu, Esteban Calzetta, Charles W. Clark. *Quantum kinetic theory of a Bose-Einstein gas confined in a lattice*, Physical Review A **72**, 023604 (2005).
- 57 Guido Pupillo, Ana Maria Rey, Gavin Brennen, Carl J. Williams, Charles W. Clark. *Scalable quantum computation in systems with Bose-Hubbard dynamics*, J. Mod. Opt. **51**, 2395 (2004).
- 58 G. K. Brennen, Guido Pupillo, Ana Maria Rey, Charles W. Clark, Carl J. Williams. *Scalable register initialization for quantum computing in an optical lattice*, J. Phys. B: At. Mol. Opt. Phys: **38**, 1687 (2005).
- 59 Ana Maria Rey, Bei-Lok Hu, Esteban Calzetta, Albert Roura, Charles W. Clark. *Non-equilibrium Dynamics of Optical Lattice- Loaded BEC Atoms: Beyond HFB Approximation*, Phys. Rev A. **69**, 033610 (2004).
- 60 Ana Maria Rey, Bei-Lok Hu, Esteban Calzetta, Albert Roura, Charles W. Clark. *BEC with fluctuations: beyond the HFB approximation*, Proceedings of the Laser Physics Workshop 2003, Las. Phys., **14** (2), 318 (2004).
- 61 Ana Maria Rey, Peter B. Blakie, Charles W. Clark. *Dynamics of a period-three pattern loaded Bose-Einstein condensate in an optical lattice*, Phys. Rev. A, **67** 053610 (2003).
- 62 Ana Maria Rey, Keith Burnett, Robert Roth, Mark Edwards, Carl J. Williams, Charles W. Clark. *Bogoliubov approach to superfluidity of atoms in an optical lattice*, J. Phys. B: At. Mol. Opt. Phys, **36**, 825 (2003).
- 63 Ana Maria Rey, Adil B. Hassam. *Convection in an asymmetrically sourced Z pinch*, Phys. Plasmas, **8**, 5151 (2001).
- 64 K. R. A. Hazzard, A. M. Rey, R. T. Scalettar. *Universality class of quantum criticality in the two-dimensional Hubbard model at intermediate temperatures ($t^2/U \ll T \ll t$)*, Preprint:arXiv:1106.2330. Submitted to Phys. Rev. Lett.