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14. ABSTRACT We summarize our program on demonstrating quantum simulations of strongly-interacting magnetic spin systems, using individual trapped ions and atoms. We have simulated phase diagrams for particular classes of spin and lattice Hamiltonians prevalent in models of quantum magnetism and quantum transport, and verified with known theoretical techniques applied to simple cases of the Hamiltonians. The quantum spins in this work are represented primarily by hyperfine ground states in cold atoms, and the spin-spin couplings are realized with various forms of interactions with optical fields and optical lattices. Our work points the way for future work in the simulation of					
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STEM Participants:

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Accomplishments: We report below the progress and accomplishments across the OLE Maryland team, listed by experimental platform and theory teams.

I. TRAPPED IONS

(A) JQI-MARYLAND

The JQI ion trap group (PI Monroe) continually increased the number and complexity of the trapped ion quantum simulator, using linear ion traps. We have learned how to apply spin-dependent forces to linear crystals while coupling to all modes of motion. Our qubit was the 12.6 GHz hyperfine clock states in the ground state of $^{171}\text{Yb}^+$. We control the spins with an effective transverse magnetic field generated with optical Raman transitions, and through the application of spin-dependent optical dipole forces we engineered long-range Ising interactions between pairs of ion qubits. The pairwise interaction strength depends on the distance between ions approximately as a power law, with exponent tunable between 0 and 3 by controlling the spin-dependent force frequency. This allows for the implementation of variable-range Ising models, and we were able to directly measure ground state magnetic ordering in this system for various ratios of transverse field to Ising strength ratio, as well as the range of the interaction. We also began studies of dynamics in this system, first as we learned that the adiabatic ramping down of the transverse field was not slow enough to prevent excitations. Later work deliberately created nonequilibrium states for further studies in this system.

(B) NIST-BOULDER

At NIST (PI Bollinger) we developed the quantum control techniques necessary for implementing quantum magnetic interactions between several hundred ions that form a single-plane crystal in a Penning ion trap. The goal of this effort was to improve our understanding of quantum magnetism in atomic systems with long-range interactions. A unique capability of our system was the generation of 2D trapped ion arrays. Specifically at NIST we employ a Penning ion trap to generate a 2D trapping potential and Doppler laser cooling to routinely generate single plane crystals of Be^+ ions with ion numbers ranging between 100 and 400. Within each ion we isolate and control an effective two level system or qubit. Our qubit was the 124 GHz electron spin-flip transition in the ground state of $^9\text{Be}^+$. We control the spins similarly to the Maryland team, with an effective transverse magnetic field generated with 124 GHz microwaves and spin-dependent optical dipole forces for the Ising interactions again with variable range. We benchmarked the engineered Ising interactions by comparing measurements of interaction-

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induced spin-precession with the predictions of mean-field theory. We also demonstrated that spin-dependent optical dipole forces can be used to excite and characterize the vibrational modes of trapped ion crystals. A detailed characterization of the motional modes of trapped ion crystals is necessitated by the fact that the modes set the type of quantum magnetic interactions that can be engineered.

(C) GEORGIA TECH RESEARCH INSTITUTE

At GTRI (PI Slusher) we concentrated on the design and fabrication of a new type of "symmetric" chip trap for optimizing long ion chains for quantum simulation experiments. It differs from the more common micro-fabricated surface traps in that the ion is trapped symmetrically between two opposing RF electrodes. The upper control electrodes are connected by vias to leads on a lower metal layer. These leads fan out to wire bond pads at the chip edges. These vias allow for a single mask that defines all the upper layer features. The advantages of this trap include a large radial trapping depth, approximately 1 eV for 171Yb^+ , wide angle through chip laser access and no line of sight to exposed oxides. It was hoped that these properties would be valuable in forming long lived ion chains for the quantum magnet simulations planned by the Monroe group. Newly fabricated symmetric traps have been packaged and tested in the later stages of the performance period. Although several improvements in testing and packaging have been implemented, no ion trapping has been observed. Improvements in the fabrication process have been developed that address concerns about electrode roughness and electrode shape control. Two versions of the symmetric trap were successfully fabricated and tested. Four chips were tested; one trapped ions and the remaining three did not. The trap and chamber that did work were delivered to UMD during the summer of 2012 for testing. It was tested there but the UMD group was not able to load Yb ions in the delivered trap.

(D) THEORY

The Michigan theory team (PI Duan) collaborated extensively with the trapped ion experimental team lead by PI Monroe, contributing to the first trapped ion simulation of the frustrated quantum magnetic models and observation of the onset of the quantum phase transition with we increase of the number of ions. We have found an unusual sharp phase transition in the trapped ion spin system with long range interaction where the transition width shrinks down exponentially with the number of particles.

The Georgetown group (PI Freericks) worked closely with experimental teams at JQI-Maryland and NIST-Boulder, represented by 6 papers and one review article. The Georgetown group also developed a number of theory papers on the subject, with a focus on phonon properties both for Paul traps and for Penning traps.

II. OPTICAL LATTICES

(A) JQI-NIST

The JQI-NIST team (PIs Porto, Spielman, and Phillips) established two phases: an initial phase where we benchmarked an atomic many-body system against theory to prove the ability of cold atom many-body systems to emulate many-body physics, and a second phase to extend emulation into novel control of dissipation, in addition to the already demonstrated coherent control. Phase one was very successful, where we realized and studied the 2D Bose-Hubbard model, a non-trivial but calculable condensed matter model that can act as a system for evaluating emulation. Using a kinetic focusing technique and by isolating 2D planes of atoms, we measured the phase diagram of the 2D superfluid-insulator transition as a function of the scaled interaction strength. This phase diagram was then successfully benchmarked against theory within the OLE collaboration. In addition to the phase diagram, in collaboration with the Spielman group, we developed new techniques to emulate charge particles in magnetic fields, a revolutionary new approach to emulation that has led to a increased applicability of cold atoms to simulate existing and as-yet unrealized condensed mater systems. During phase II, we built a new quantum degenerate mixture apparatus, with the goal to engineer dissipation for cooling and novel quantum state preparation. The approach is to engineer a "vacuum", in the form of a BEC, into which energy and entropy of a different species of atoms trapped in an optical lattice can be dissipated. We successfully developed a quantum degenerate mixture of Ytterbium and Rubidium where with a Rb-blind optical lattice that traps Yb atoms, an apparatus capable of realizing a bath of Rb atoms for the Ytterbium atoms. We discovered that the collisional properties of the Yb/Rb mixture is unfavorable for some of the initial proposed studies, and used the Rb-blind lattice to make high precision measurements of transition matrix elements relevant for accurate corrections of atomic clocks.

(B) CHICAGO

The Chicago team (PI Chin) has developed a novel scheme to achieve fast, runaway evaporative cooling of cesium atoms in optical traps. This is realized by tilting the optical potential with a magnetic field gradient. Runaway evaporation is possible in this trap geometry due to the very weak dependence of trapping frequencies on trap

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depth, which preserves atomic density during the evaporation process. We have also developed a new scheme to image ultracold atoms in a mono-layer of two dimensional optical lattices. This is realized by compressing the atoms using a light sheet and vertical optical lattice with large lattice spacing. The atomic density distribution in the lattice is directly observed by absorption imaging and a transformation of the density profile from the superfluid regime to the Mott insulator regime is directly observed. Using these tools we have demonstrated a global invariance of scale and a universal description of 2D gases with different interaction strengths. The extracted universal thermodynamic functions confirm the wide critical regime near the BKT transition, provide a sensitive test to Monte Carlo calculations, and point toward growing density-density correlations in the critical regime. We have also developed a complete recipe to extract the density-density correlations and the static structure factor of a 2D atomic quantum gas from in situ imaging. We extract the static structure factor and report the results on interacting 2D Bose gases or in a 2D optical lattice. In related work we have prepared and studied strongly interacting two-dimensional Bose gases in the superfluid, the classical Berezinskii-Kosterlitz-Thouless (BKT) transition, and the vacuum-to-superfluid quantum critical regimes. A wide range of the two-body interaction strength $0.05 < g < 3$ is covered by tuning the scattering length and by loading the sample into an optical lattice. Based on the equations of state measurements, we extract the coupling constants as well as critical thermodynamic quantities in different regimes. In the BKT and the quantum critical regimes, all measured thermodynamic quantities show logarithmic dependence on the interaction strength, a tendency confirmed by the extended classical-field and renormalization calculations. Finally, we have observed Sakharov acoustic oscillations, conventionally discussed in cosmology, in atomic superfluids. To generate sound waves, we quench the atomic interactions by Feshbach tuning to different values, and analyze the density fluctuations.

(C) BERKELEY

The Berkeley experimental team (PI Stamper-Kurn) has extensively studied magnetic phenomena in quantum gases: Quantum gases can be prepared in an admixture of atomic spin states. Brought to ultracold temperatures and into the regime of quantum degeneracy, the gas can become both superfluid and magnetically ordered. The controlled environment of these gases, and also the highly precise methods for measuring their properties, allow for detailed studies of these interrelated properties and thereby of paradigmatic topics in condensed-matter physics. The Stamper-Kurn group investigated the dynamics of a system undergoing a spontaneous symmetry breaking transition, focusing experimentally on the $F=1$ spinor Bose gas of 87Rb , and theoretically interpreting these dynamics as a potentially noiseless, local, parametric amplification of spin fluctuations. The nature of the ferromagnetic superfluid state realized by this gas was probed. Unexpected instabilities were observed, and while a theoretical description of these instabilities was developed, it did not properly account for observations. Equilibration dynamics were also investigated, confirming the predicted phase diagram that includes easy-axis and easy-plane ferromagnetism, and also highlighting the role of coarsening dynamics. More recently, methods were developed to perform high-precision measurements on magnon excitations in a ferromagnetic superfluid gas, opening the door to studies and uses of coherent magnon optics. Following the work described above, the laboratory efforts turned to the realization of a kagome-geometry optical lattice. The lattice is formed by overlapping triangular optical lattices formed by two different wavelengths of light. Initial investigations demonstrated the use of coherent atom optics to characterize the lattice potential. The bichromatic lattice allowed for investigations of quantum phase transitions that are induced by changes in the geometry of the lattice potential (this investigation is ongoing). Such work led to a theoretical investigation of new insulating phases of matter that might be realized in geometrically frustrated lattices, characterized by fractional filling that is achieved without breaking the underlying point symmetries of the lattice.

(D) THEORY

The Michigan team (PI Duan) proposed several experimental schemes to realize topological states of matter, including Majorana fermions in a two-dimensional Fermi gas under light-induced spin-orbital coupling and topological Mott insulators in an optical super-lattice. We also proposed methods to probe the fractional braiding statistics of Majorana fermions or the topological Chern number in an optical super-lattice. We also proposed a method to stabilize and observe the p-wave superfluid state with Feshbach-resonant fermions in an optical lattice using the dissipation induced blockade; a scheme to realize a spin liquid state with hard-core bosons in a square optical lattice through control of the Raman assisted tunneling; and finally studied the supersolid state with dipolar gas in an optical lattice under anisotropic interaction.

The Georgetown team (PI Freericks) examined mixtures of different species of atoms for the neutral atoms in optical lattices, describing pattern formation and also discussing new ways to perform calculations of these systems. In addition, work on strong-coupling perturbation theory, especially of the momentum distribution, for the bosonic Hubbard model was also carried out. This resulted in 17 publications.

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The UC-Davis team (PI Scalettar) performed direct comparisons of phase diagrams from Quantum Monte Carlo (QMC) simulations with OLE experiments for the Bose and Fermi Hubbard Hamiltonians. The second was to explore the rich physics of more complex Hamiltonians and solid state materials, especially those which might also be emulated with trapped atoms. Thirty two journal articles have appeared to date, including seven in Physical Review Letters. Examples of the former class of projects, for bosonic atoms, were our works “Universal state diagrams for harmonically trapped bosons in optical lattices” (Phys. Rev. A79, 053605); and “Finite temperature study of bosons in a two dimensional optical lattice” (Phys. Rev. B84, 054302). Together these papers allowed us to make direct comparisons with the data of the group of Ian Spielman and Trey Porto at NIST, and help benchmark temperatures. In summer 2014 we completed a project with the Hulet group at Rice University which makes direct comparison of QMC with 3D trapped fermionic atoms. Using the local density approximation, we determined the density profile, the spin correlations and the compressibility as functions of distance from the trap center. The experiments build in a significant way upon the 2008 work of Jördens et.al. and Schneider et.al. by going to lower temperatures (so that antiferromagnetic correlations can be observed) and also by measuring the local values of these correlations, not just their averages over the trap. Our theoretical work matches this experimental progress by providing data of significantly great accuracy than the atomic limit and dynamical mean field theory methods originally employed to benchmark experiment.

The Berkeley theory team (PIs Moore and Vishwanath) conducted research directly motivated by existing experiments in the OLE team, e.g., when an unexpected phenomenon was observed and required a theoretical explanation. Others were intended to push the frontier of what can be computed, particularly in the realm of quantum many-body dynamics. Motivated partly by work of Ian Spielman and Dan Stamper-Kurn in this OLE team, we studied a number of interacting lattice Hamiltonians, including a proposed realization of the bosonic Laughlin state in a simple square lattice model. This work also showed that relatively few particles are required for the distinctive edge state features of the Laughlin state to be visible in the spectrum, and such edge excitations could be excited experimentally as a direct probe of topological order. Bose-Einstein condensates of spin-1 and spin-2 atoms were studied for comparison to experiments in Dan Stamper-Kurn’s lab and elsewhere. One question directly motivated by an experimental puzzle was about the role of long-range dipolar interactions and whether those could explain an unexpected failure of the experimental system to reach conventional equilibrium long after a “quench” (a sudden change of an applied field). The nature of the vortex lattice phase in spinor condensates was shown to be considerably richer than in a spinless BEC, including the existence of aperiodic structures loosely similar to quasicrystals. A number of papers were devoted to pushing the frontier of quantum-many body calculations, especially for low dimensional systems. These also provide a check on predictions of other methods such as quantum Monte Carlo, especially for fermionic systems where the “sign problem” makes Monte Carlo calculations difficult. Accomplishments include a widely used theory of how finite matrix size leads to “finite-entanglement” corrections to quantum critical points and a first understanding of one way in which localization by disorder differs in interacting systems from non-interacting ones. Perhaps the most substantial technical accomplishment was a considerable improvement in the ability to do fully quantum dynamical simulations of many interacting particles in one spatial dimension, which could provide theoretical comparisons for ion trap and other experiments as they scale up in size. This was demonstrated on a number of topical model Hamiltonians and led to clearer interpretations of some experiments on quasi-one-dimensional systems.

The JILA-Colorado team (PI Rey) investigated the use of fermionic alkaline-earth atoms (AEA) loaded in optical lattices as quantum simulators of condensed matter Hamiltonians which rely on the interplay between charge, spin and orbital degrees of freedom as well as Hamiltonians with no condensed matter analog. The two clock states are used as the atomic analogs of orbital degrees of freedom and the nuclear spins as the corresponding spin degrees of freedom. We pointed out an enlarged $SU(N)$ spin rotation symmetry in the nuclear spin degrees of freedom of the fermionic isotopes, where $N = 2I+1$ and I is the AEA nuclear spin; The research effort was split in two main thrusts. One was to carry out theoretical studies of new states of matter in quantum degenerated AEA gases. The other focused on optical lattice clocks. We took advantage of the exquisite measurement precision of modern optical clocks to investigate the non-equilibrium dynamics of spin-coupled many-body quantum systems. We also investigated how to use ultracold dipolar gases loaded in optical lattices as the building blocks to implement a quantum simulator.

Training Opportunities:

Results Dissemination:

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Honors and Awards: Michael Foss-Feig (graduate student of PI Rey): 2013 APS DAMOP Thesis Prize

Cheng Chin (PI): 2011 APS I. I. Rabi Prize

Jun Ye (PI): 2011 Election to the US National Academy of Sciences

Jun Ye (PI): 2011 US Department of Commerce Gold Medal

Ana Maria Rey (PI): 2014 APS Maria Goeppert Mayer Award

Ana Maria Rey (PI): 2014 MacArthur Fellowship

I. Spielman (PI): 2015 APS I. I. Rabi Prize

Christopher Monroe (PI): 2015 APS Arthur Schawlow Prize for Laser Science

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Technology Transfer:

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Project Contribution:

National Academy Member:

Participant Type: Graduate Student (research assistant)

Participant: Edward Marti

Person Months Worked:

Funding Support:

Project Contribution:

National Academy Member:

Participant Type: Postdoctoral (scholar, fellow or other postdoctoral position)

Participant: Mukund Vengalattore

Person Months Worked:

Funding Support:

Project Contribution:

National Academy Member:

Participant Type: Postdoctoral (scholar, fellow or other postdoctoral position)

Participant: Kater Murch

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Person Months Worked:

Project Contribution:
National Academy Member:

Funding Support:

Participant Type: Postdoctoral (scholar, fellow or other postdoctoral position)

Participant: Gyu-Boong Jo

Person Months Worked:

Project Contribution:
National Academy Member:

Funding Support:

Participant Type: Postdoctoral (scholar, fellow or other postdoctoral position)

Participant: Andrew MacRae

Person Months Worked:

Project Contribution:
National Academy Member:

Funding Support:

Participant Type: Postdoctoral (scholar, fellow or other postdoctoral position)

Participant: Kathy-Anne Soderberg

Person Months Worked:

Project Contribution:
National Academy Member:

Funding Support:

Participant Type: Postdoctoral (scholar, fellow or other postdoctoral position)

Participant: Li-Chung Ha

Person Months Worked:

Project Contribution:
National Academy Member:

Funding Support:

ARTICLES:

Publication Type: Journal Article

Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review Letters

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevLett.106.230402

Volume: 106 Issue: 23

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Date Submitted:

Date Published:

Publication Location:

Article Title: Sharp Phase Transitions in a Small Frustrated Network of Trapped Ion Spins

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/13/7/075019
Volume: 13 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Extracting density–density correlations from
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/nature09722
Volume: 470 Issue: 7333 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Observation of scale invariance and universality in two-dimensional Bose gases
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.106.100404
Volume: 106 Issue: 10 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Probing Non-Abelian Statistics of Majorana Fermions in Ultracold Atomic Superfluid
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.106.040505
Volume: 106 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Robust Quantum State Transfer in Random Unpolarized Spin Chains
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/13/7/075015
Volume: 13 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Equilibration and temperature distribution in a driven ion chain
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/13/3/033036
Volume: 13 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Dynamics of the Overhauser field under nuclear spin diffusion in a quantum dot
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: EPL (Europhysics Letters)
Publication Identifier Type: DOI Publication Identifier: 10.1209/0295-5075/94/50006
Volume: 94 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: An experimental proposal to test dynamic quantum non-locality with single-atom interferometry
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.105.245702
Volume: 105 Issue: 24 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Signature of Quantum Criticality in the Density Profiles of Cold Atom Systems
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/nature09887
Volume: 471 Issue: 7336 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spin-orbit-coupled Bose-Einstein condensates
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature Physics
Publication Identifier Type: DOI Publication Identifier: 10.1038/nphys1954
Volume: 7 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: A synthetic electric force acting on neutral atoms
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.025602
Volume: 84 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Realistic Rashba and Dresselhaus spin-orbit coupling for neutral atoms
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.83.140510
Volume: 83 Issue: 14 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Chiral Rashba spin textures in ultracold Fermi gases
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.107.180502
Volume: 107 Issue: 18 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Entanglement Detection in the Vicinity of Arbitrary Dicke States
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.84.064529
Volume: 84 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Ground-state phase diagram of spin-1/2 bosons in a two-dimensional optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.106.035301
Volume: 106 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Magnetism and Pairing of Two-Dimensional Trapped Fermions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.83.045108
Volume: 83 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Isentropic curves at magnetic phase transitions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: The European Physical Journal B
Publication Identifier Type: DOI Publication Identifier: 10.1140/epjb/e2011-10875-9
Volume: 79 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Hatano-Nelson model with a periodic potential
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.106.235301
Volume: 106 Issue: 23 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Lattice-Induced Resonances in One-Dimensional Bosonic Systems
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.106.250801
Volume: 106 Issue: 25 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Resolved Atomic Interaction Sidebands in an Optical Clock Transition
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Science
Publication Identifier Type: DOI Publication Identifier: 10.1126/science.1196442
Volume: 331 Issue: 6020 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Suppression of Collisional Shifts in a Strongly Interacting Lattice Clock
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature Physics
Publication Identifier Type: DOI Publication Identifier: 10.1038/nphys1939
Volume: 7 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Controlling the quantum stereodynamics of ultracold bimolecular reactions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.106.225301
Volume: 106 Issue: 22 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Universal Thermometry for Quantum Simulation
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/13/5/055003
Volume: 13 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Atom loss maximum in ultra-cold Fermi gases
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.83.063631
Volume: 83 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Momentum distribution and ordering in mixtures of ultracold light- and heavy-fermion atoms
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.83.020407
Volume: 83 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Bound states and $E_{\{8\}}$ symmetry effects in perturbed quantum Ising chains
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.83.045110
Volume: 83 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Entanglement spectrum of random-singlet quantum critical points
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Optics Express
Publication Identifier Type: DOI Publication Identifier: 10.1364/OE.19.010304
Volume: 19 Issue: 11 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Phase-coherent detection of an optical dipole force by Doppler velocimetry
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/473039a
Volume: 473 Issue: 7345 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Metrology: Filtering noise with a quantum probe
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review B

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevB.82.060412

Volume: 82

Issue: 6

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Quantum simulation and phase diagram of the transverse-field Ising model with three atomic spins

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review Letters

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevLett.105.090502

Volume: 105

Issue: 9

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Ultrafast Gates for Single Atomic Qubits

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: New Journal of Physics

Publication Identifier Type: DOI

Publication Identifier: 10.1088/1367-2630/13/4/045011

Volume: 13

Issue: 4

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Exploring quantum criticality based on ultracold atoms in optical lattices

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review Letters

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevLett.105.265703

Volume: 105

Issue: 26

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Date Submitted:

Date Published:

Publication Location:

Article Title: Temperature-Driven Structural Phase Transition for Trapped Ions and a Proposal for its Experimental Detection

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.81.060301
Volume: 81 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Improving noise threshold for optical quantum computing with the EPR photon source
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.82.053607
Volume: 82 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Supersolid and charge-density-wave states from anisotropic interaction in an optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.105.255302
Volume: 105 Issue: 25 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Realistic Time-Reversal Invariant Topological Insulators with Neutral Atoms
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.105.110401
Volume: 105 Issue: 11 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Phases of a Two-Dimensional Bose Gas in an Optical Lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Journal of Low Temperature Physics
Publication Identifier Type: DOI Publication Identifier: 10.1007/s10909-010-0207-2
Volume: 161 Issue: First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spontaneous Vortex Lattices in Quasi 2D Dipolar Spinor Condensates
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.82.063602
Volume: 82 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Phase diagram of spin-1/2 bosons in a one-dimensional optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.82.184412
Volume: 82 Issue: 18 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spin polarization and exchange coupling of Cu and Mn atoms in paramagnetic CuMn diluted alloys induced by a Co layer
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.82.053624
Volume: 82 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Heavy fermions in an optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/12/8/085011
Volume: 12 Issue: 8 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spin squeezing of high-spin, spatially extended quantum fields
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature Nanotechnology
Publication Identifier Type: DOI Publication Identifier: 10.1038/nnano.2010.165
Volume: 5 Issue: 9 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Ultrasensitive detection of force and displacement using trapped ions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.105.200401
Volume: 105 Issue: 20 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Decoherence due to Elastic Rayleigh Scattering
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: EPL (Europhysics Letters)
Publication Identifier Type: DOI Publication Identifier: 10.1209/0295-5075/86/60004
Volume: 86 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Large-scale quantum computation in an anharmonic linear ion trap
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.103.120502
Volume: 103 Issue: 12 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Entanglement and Tunable Spin-Spin Couplings between Trapped Ions Using Multiple Transverse Modes
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.104.140501
Volume: 104 Issue: 14 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Entanglement of Atomic Qubits Using an Optical Frequency Comb
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Reviews of Modern Physics
Publication Identifier Type: DOI Publication Identifier: 10.1103/RevModPhys.82.1209
Volume: 82 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Colloquium: Quantum networks with trapped ions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/nature09071
Volume: 465 Issue: 7298 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Quantum simulation of frustrated Ising spins with trapped ions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Science

Publication Identifier Type: DOI

Publication Identifier: 10.1126/science.1232296

Volume: 340 Issue: 6132

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Emergence and Frustration of Magnetism with Variable-Range Interactions in a Quantum Simulator

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review Letters

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevLett.110.203001

Volume: 110 Issue: 20

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Ultrafast Spin-Motion Entanglement and Interferometry with a Single Atom

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review A

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevA.88.012334

Volume: 88 Issue: 1

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Experimental performance of a quantum simulator: Optimizing adiabatic evolution and identifying many-body ground states

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Applied Physics B

Publication Identifier Type: DOI

Publication Identifier: 10.1007/s00340-013-5717-6

Volume: 114 Issue:

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Quantum control of qubits and atomic motion using ultrafast laser pulses

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.111.100506
Volume: 111 Issue: 10 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Quantum Catalysis of Magnetic Phase Transitions in a Quantum Simulator
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Journal of Applied Physics
Publication Identifier Type: DOI Publication Identifier: 10.1063/1.4752404
Volume: 112 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Stability analysis of ion motion in asymmetric planar ion traps
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.109.205305
Volume: 109 Issue: 20 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Adiabatic Loading of One-Dimensional SU(N) Alkaline-Earth-Atom Fermions in Optical Lattices
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.109.230501
Volume: 109 Issue: 23 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Steady-State Many-Body Entanglement of Hot Reactive Fermions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.87.035110
Volume: 87 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Universality class of quantum criticality in the two-dimensional Hubbard model at intermediate temperatures ($t^2/U \gg T$)
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.110.033001
Volume: 110 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Self-Trapping in an Array of Coupled 1D Bose Gases
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.110.075301
Volume: 110 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Far-from-Equilibrium Quantum Magnetism with Ultracold Polar Molecules
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.87.081106
Volume: 87 Issue: 8 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Topological phases in ultracold polar-molecule quantum magnets
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.87.042101
Volume: 87 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Nonequilibrium dynamics of arbitrary-range Ising models with decoherence: An exact analytic solution
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Molecular Physics
Publication Identifier Type: DOI Publication Identifier: 10.1080/00268976.2013.800604
Volume: 111 Issue: First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Kitaev honeycomb and other exotic spin models with polar molecules
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.88.023419
Volume: 88 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Self-trapping dynamics in a two-dimensional optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Science
Publication Identifier Type: DOI Publication Identifier: 10.1126/science.1236929
Volume: 341 Issue: 6146 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: A Quantum Many-Body Spin System in an Optical Lattice Clock
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.052724
Volume: 84 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Cold-collision-shift cancellation and inelastic scattering in a Yb optical lattice clock
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.052716
Volume: 84 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Inelastic collisions and density-dependent excitation suppression in a ^{87}Sr optical lattice clock
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.053619
Volume: 84 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Phase diagram of the bosonic Kondo-Hubbard model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.053604
Volume: 84 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Superposition states of ultracold bosons in rotating rings with a realistic potential barrier
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.043601
Volume: 84 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: SU(N) magnetism in chains of ultracold alkaline-earth-metal atoms: Mott transitions and quantum correlations
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.107.145303
Volume: 107 Issue: 14 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Relaxation of Fermionic Excitations in a Strongly Attractive Fermi Gas in an Optical Lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.033638
Volume: 84 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Resonantly enhanced tunneling and transport of ultracold atoms on tilted optical lattices
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.033619
Volume: 84 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Quantum magnetism with polar alkali-metal dimers
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.107.115301
Volume: 107 Issue: 11 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Tunable Superfluidity and Quantum Magnetism with Ultracold Polar Molecules
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.033608
Volume: 84 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spectroscopy of dipolar fermions in layered two-dimensional and three-dimensional lattices
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.107.103902
Volume: 107 Issue: 10 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: p-Wave Cold Collisions in an Optical Lattice Clock
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.82.125437
Volume: 82 Issue: 12 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Double quantum dots in carbon nanotubes
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review Letters

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevLett.102.136401

Volume: 102 Issue: 13

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Date Submitted:

Date Published:

Publication Location:

Article Title: Theoretical Description of Time-Resolved Photoemission Spectroscopy: Application to Pump-Probe Experiments

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review Letters

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevLett.103.116402

Volume: 103 Issue: 11

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Date Submitted:

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Publication Location:

Article Title: Appearance of "Fragile" Fermi Liquids in Finite-Width Mott Insulators Sandwiched between Metallic Leads

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review A

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevA.79.053631

Volume: 79 Issue: 5

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Date Submitted:

Date Published:

Publication Location:

Article Title: Strong-coupling expansion for the momentum distribution of the Bose-Hubbard model with benchmarking against exact numerical results

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published

Journal: Physical Review A

Publication Identifier Type: DOI

Publication Identifier: 10.1103/PhysRevA.85.019913

Volume: 85 Issue: 1

First Page #:

Date Submitted:

Date Published:

Publication Location:

Article Title: Erratum: Strong-coupling expansion for the momentum distribution of the Bose-Hubbard model with benchmarking against exact numerical results [Phys. Rev. A 79, 053631 (2009)]

Authors:

Keywords:

Abstract:

Distribution Statement: 1-Approved for public release; distribution is unlimited.

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Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.79.053634
Volume: 79 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Strong-coupling perturbation theory for the extended Bose-Hubbard model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.80.063610
Volume: 80 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Momentum distribution of the insulating phases of the extended Bose-Hubbard model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.81.011605
Volume: 81 Issue: 1 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Improving the efficiency of ultracold dipolar molecule formation by first loading onto an optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.82.039901
Volume: 82 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Erratum: Improving the efficiency of ultracold dipolar molecule formation by first loading onto an optical lattice [Phys. Rev. A 81, 011605 (2010)]
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.80.053623
Volume: 80 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Dynamical mean-field theory for light-fermion–heavy-boson mixtures on optical lattices
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/484461a
Volume: 484 Issue: 7395 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Quantum physics: Simulating magnetism
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.108.213003
Volume: 108 Issue: 21 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spectroscopy and Thermometry of Drumhead Modes in a Mesoscopic Trapped-Ion Crystal Using Entanglement
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.86.032329
Volume: 86 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Intrinsic phonon effects on analog quantum simulators with ultracold trapped ions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.87.013422
Volume: 87 Issue: 1 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Phonon-mediated quantum spin simulator employing a planar ionic crystal in a Penning trap
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.88.043434
Volume: 88 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Effect of defects on phonons and the effective spin-spin interactions of an ultracold Penning-trap quantum simulator
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/15/8/083007
Volume: 15 Issue: 8 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Relaxation timescales and decay of correlations in a long-range interacting quantum simulator
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/nature10981
Volume: 484 Issue: 7395 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Engineered two-dimensional Ising interactions in a trapped-ion quantum simulator with hundreds of spins
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.103.040501
Volume: 103 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Optimized Noise Filtration through Dynamical Decoupling
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.110.265303
Volume: 110 Issue: 26 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Competing Supersolid and Haldane Insulator Phases in the Extended One-Dimensional Bosonic Hubbard Model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.88.195121
Volume: 88 Issue: 19 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Discriminating antiferromagnetic signatures in systems of ultracold fermions by tunable geometric frustration
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.87.195142
Volume: 87 Issue: 19 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Phase stability in the two-dimensional anisotropic boson Hubbard Hamiltonian
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.87.125141
Volume: 87 Issue: 12 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Magnetic transition in a correlated band insulator
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.86.195117
Volume: 86 Issue: 19 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Density of states and magnetic correlations at a metal-Mott insulator interface
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.86.023630
Volume: 86 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Pairing in a two-dimensional Fermi gas with population imbalance
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.85.061602
Volume: 85 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Universal probes for antiferromagnetic correlations and entropy in cold fermions on optical lattices
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.85.075418
Volume: 85 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Optimized confinement of fermions in two dimensions
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.021607
Volume: 84 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Response to dynamical modulation of the optical lattice for fermions in the Hubbard model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.107.086401
Volume: 107 Issue: 8 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Fermions in 3D Optical Lattices: Cooling Protocol to Obtain Antiferromagnetism
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.84.054302
Volume: 84 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Finite-temperature study of bosons in a two-dimensional optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

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Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.82.013614
Volume: 82 Issue: 1 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Finite-temperature quantum Monte Carlo study of the one-dimensional polarized Fermi gas
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.82.184421
Volume: 82 Issue: 18 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Monte Carlo study of the two-dimensional vector Blume-Capel model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.104.066406
Volume: 104 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Fermions in 2D Optical Lattices: Temperature and Entropy Scales for Observing Antiferromagnetism and Superfluidity
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.81.033609
Volume: 81 Issue: 3 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Isentropes of spin-1 bosons in an optical lattice
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.80.245118
Volume: 80 Issue: 24 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Attractive Hubbard model on a honeycomb lattice: Quantum Monte Carlo study
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review B
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevB.80.075116
Volume: 80 Issue: 7 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Quantum Monte Carlo study of the two-dimensional fermion Hubbard model
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.102.226402
Volume: 102 Issue: 22 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Determinant Quantum Monte Carlo Study of the Orbitally Selective Mott Transition
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.79.053605
Volume: 79 Issue: 5 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: State diagrams for harmonically trapped bosons in optical lattices
Authors:
Keywords:
Abstract:
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Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.100.116405
Volume: 100 Issue: 11 First Page #:
Date Submitted: Date Published:
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Article Title: Exact Numerical Study of Pair Formation with Imbalanced Fermion Populations
Authors:
Keywords:
Abstract:
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Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/16/1/013004
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Article Title: Pairing correlations in the two-layer attractive Hubbard model
Authors:
Keywords:
Abstract:
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Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/15/2/023023
Volume: 15 Issue: 2 First Page #:
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Publication Location:
Article Title: Gapless inhomogeneous superfluid phase with spin-dependent disorder
Authors:
Keywords:
Abstract:
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Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.86.063636
Volume: 86 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Loop-structure stability of a double-well-lattice Bose-Einstein condensate
Authors:
Keywords:
Abstract:
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Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.110.125301
Volume: 110 Issue: 12 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Wannier Permanent Wave Functions for Featureless Bosonic Mott Insulators on the 1×3 -Filled Kagome Lattice
Authors:
Keywords:
Abstract:
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Journal: Reviews of Modern Physics
Publication Identifier Type: DOI Publication Identifier: 10.1103/RevModPhys.85.1191
Volume: 85 Issue: 3 First Page #:
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Publication Location:
Article Title: Spinor Bose gases: Symmetries, magnetism, and quantum dynamics
Authors:
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Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.108.045305
Volume: 108 Issue: 4 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Ultracold Atoms in a Tunable Optical Kagome Lattice
Authors:
Keywords:
Abstract:
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.84.063625
Volume: 84 Issue: 6 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Long-time-scale dynamics of spin textures in a degenerate $F=1$ ^{87}Rb spinor Bose gas
Authors:
Keywords:
Abstract:
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Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.81.053612
Volume: 81 **Issue:** 5 **First Page #:**
Date Submitted: **Date Published:**
Publication Location:
Article Title: Periodic spin textures in a degenerate $F=1$ ^{87}Rb spinor Bose gas
Authors:
Keywords:
Abstract:
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.80.023622
Volume: 80 **Issue:** 2 **First Page #:**
Date Submitted: **Date Published:**
Publication Location:
Article Title: Theory of domain formation in inhomogeneous ferromagnetic dipolar condensates within the truncated Wigner approximation
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support:

Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.79.043631
Volume: 79 **Issue:** 4 **First Page #:**
Date Submitted: **Date Published:**
Publication Location:
Article Title: Amplification of fluctuations in a spinor Bose-Einstein condensate
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.100.180404
Volume: 100 **Issue:** 18 **First Page #:**
Date Submitted: **Date Published:**
Publication Location:
Article Title: Dynamical Instability of the XY Spiral State of Ferromagnetic Condensates
Authors:
Keywords:
Abstract:
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Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.100.170403
Volume: 100 Issue: 17 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Spontaneously Modulated Spin Textures in a Dipolar Spinor Bose-Einstein Condensate
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Journal: Physics
Publication Identifier Type: DOI Publication Identifier: 10.1103/Physics.2.80
Volume: 2 Issue: First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Shifting entropy elsewhere
Authors:
Keywords:
Abstract:
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Journal: Science
Publication Identifier Type: DOI Publication Identifier: 10.1126/science.1237557
Volume: 341 Issue: 6151 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: From Cosmology to Cold Atoms: Observation of Sakharov Oscillations in a Quenched Atomic Superfluid
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.110.145302
Volume: 110 Issue: 14 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Strongly Interacting Two-Dimensional Bose Gases
Authors:
Keywords:
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Journal: Science
Publication Identifier Type: DOI Publication Identifier: 10.1126/science.1217990
Volume: 335 Issue: 6072 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Observation of Quantum Criticality with Ultracold Atoms in Optical Lattices
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Reviews of Modern Physics
Publication Identifier Type: DOI Publication Identifier: 10.1103/RevModPhys.82.1225
Volume: 82 Issue: 2 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Feshbach resonances in ultracold gases
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/4641289a
Volume: 464 Issue: 7293 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Quantum physics: Atoms in checkerboard order
Authors:
Keywords:
Abstract:
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review Letters
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevLett.104.160403
Volume: 104 Issue: 16 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Slow Mass Transport and Statistical Evolution of an Atomic Gas across the Superfluid–Mott-Insulator Transition
Authors:
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Journal: Review of Scientific Instruments
Publication Identifier Type: DOI Publication Identifier: 10.1063/1.3274813
Volume: 81 Issue: 1 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Optical lattices for atom-based quantum microscopy
Authors:
Keywords:
Abstract:
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Nature
Publication Identifier Type: DOI Publication Identifier: 10.1038/nature08244
Volume: 460 Issue: 7258 First Page #:
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Publication Location:
Article Title: In situ observation of incompressible Mott-insulating domains in ultracold atomic gases
Authors:
Keywords:
Abstract:
Distribution Statement: 1-Approved for public release; distribution is unlimited.
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: New Journal of Physics
Publication Identifier Type: DOI Publication Identifier: 10.1088/1367-2630/11/5/055022
Volume: 11 Issue: 5 First Page #:
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Article Title: Ultracold molecules: vehicles to scalable quantum information processing
Authors:
Keywords:
Abstract:
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Publication Type: Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
Journal: Physical Review A
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevA.79.013622
Volume: 79 Issue: 1 First Page #:
Date Submitted: Date Published:
Publication Location:
Article Title: Determination of atomic scattering lengths from measurements of molecular binding energies near Feshbach resonances
Authors:
Keywords:
Abstract:
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Publication Identifier Type: DOI **Publication Identifier:** 10.1103/PhysRevA.78.011604
Volume: 78 **Issue:** 1 **First Page #:**
Date Submitted: **Date Published:**
Publication Location:
Article Title: Accelerating evaporative cooling of atoms into Bose-Einstein condensation in optical traps
Authors:
Keywords:
Abstract:
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