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14. ABSTRACT Support was provided for The 12th US-Japan Seminar on many body quantum systems which was held in Madison, Wisconsin from September 20 to 24, 2015 at the Monona Terrace Convention Center. Support was used for travel costs of US based participants and facility fees.					
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Report Title

Final Report: 12th US-Japan Seminar: Many Body Quantum Systems from Quantum Gases to Metrology and Information Processing

ABSTRACT

Support was provided for The 12th US-Japan Seminar on many body quantum systems which was held in Madison, Wisconsin from September 20 to 24, 2015 at the Monona Terrace Convention Center. Support was used for travel costs of US based participants and facility fees.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

<u>Received</u>	<u>Paper</u>
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TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

<u>Received</u>	<u>Paper</u>
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TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

TOTAL:

Patents Submitted

Patents Awarded

Awards

None

Graduate Students

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Post Doctorates

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Faculty Supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Under Graduate students supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: 0.00

Names of Personnel receiving masters degrees

NAME

Total Number:

Names of personnel receiving PHDs

NAME

Total Number:

Names of other research staff

NAME

PERCENT SUPPORTED

FTE Equivalent:

Total Number:

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

The meeting was organized by Mark Saffman UW-Madison, Cheng Chin University of Chicago and Hidetoshi Katori University of Tokyo. The meeting was the 12th in a series of US-Japan meetings that has been held every few years. Recent previous meetings were 2013 in Nara Japan, 2006 in Breckenridge Colorado, 2003 in Yatsugatake, Japan, 2000 in Newport, Rhode Island. The 2015 meeting comprised 33 invited talks and a poster session. There were about 60 registered participants with the majority from the US, followed by Japan and Europe.

A wide range of topics within the general framework of quantum physics were covered. Talks included quantum information, quantum degenerate gases, laser cooling of molecules, optical clocks, quantum optomechanics, and quantum nanophotonics. A copy of the meeting poster and program have been uploaded.

The meeting provided excellent opportunities for in depth scientific discussions. The discussions served to strengthen existing scientific interactions and open new possibilities for fruitful collaboration with Japanese researchers. We are grateful to the ARO for the support provided which contributed to a successful meeting with a high scientific level.

Technology Transfer

Not applicable

12th US-Japan Seminar
Many body quantum systems from quantum gases
to metrology and information processing

September 2015, Madison, Wisconsin

The 12th US-Japan seminar will be held from September 20-24, 2015 in Madison, Wisconsin. Focus topics include Bose-Einstein condensates, Fermi gases, cold molecules, precision measurements, quantum optics, quantum information and quantum computation.

www.physics.wisc.edu/USJapan2015

Invited Speakers:

M. Aspelmeyer, Vienna	A. Furusawa, Tokyo	C. Monroe, Maryland	Y. Takahashi, Kyoto
D. Awschalom, Chicago	G. Gabrielse, Cambridge	T. Mukaiyama, Tokyo	J. Thompson, Boulder
R. Blatt, Innsbruck	R. Hulet, Houston	K. Nakagawa, Tokyo	M. Ueda, Tokyo
C. Chin, Chicago	S. Inouye, Osaka	B. Odom, Evanston	M. Vengalattore, Ithaca
I. Danshita, Kyoto	H. Katori, Tokyo	K. Ohmori, Okazaki	V. Vuletic, Cambridge
D. DeMille, New Haven	H. J. Kimble, Pasadena	A. Rauschenbeutel, Vienna	Y. Yamamoto, Stanford/Tokyo
A. Derevianko, Reno	M. Kozuma, Tokyo	M. Saffman, Madison	J. Ye, Boulder
J. Doyle, Cambridge	M. Lukin, Cambridge	J. Simon, Chicago	K. Yoshioka, Tokyo
			T. Zelevinsky, New York

Sponsored by:

Photon Science Center, The University of Tokyo

Institute for Photon Science and Technology, The University of Tokyo

MRSEC, University of Chicago

Physics Frontier Center, JILA

Joint Quantum Institute, U. Maryland/NIST

Department of Physics, University of Wisconsin

Center for Ultracold Atoms, Harvard/MIT

Army Research Office

M Squared Lasers

Air Force Office of Scientific Research

Schedule of Presentations

	Sept. 20 Sunday	21 Monday	22 Tuesday	23 Wednesday	24 Thursday
8:45		Lukin	Kimble	Blatt	Doyle
9:25		Mukaiyama	Thompson	Furusawa	Takahashi
10:05		COFFEE	COFFEE	COFFEE	COFFEE
10:30		Demille	Vuletic	Aspelmeyer	Zelevinsky
11:10		Simon	Odom	Yoshioka	Nakagawa
11:50	excursion	LUNCH	LUNCH	LUNCH	Saffman
2:00	start time	Gabrielse	Katori	Monroe	end 12:30 pm
2:40	about	Chin	Derevianko	Vengalatorre	
3:20	12 noon	Kozuma	Ohmori	Rauschenbeutel	
4:00		COFFEE	COFFEE	COFFEE	
4:30		Ueda	Yamamoto	Hulet	
5:10		Danshita	Awschalom	Inouye	
5:50			Ye		
evening	reception 6-9 pm	posters 7-9 pm		banquet at WID	

12th US-Japan Seminar

Schedule of Talks

	21 Monday	22 Tuesday	23 Wednesday	24 Thursday
8:40	Welcome			
8:45	Takahashi	Kimble	Blatt	Doyle
	Ultracold ytterbium atoms in an optical lattice: flat band and topological physics	Quantum Matter Built from Single Atoms and Photons in Photonic Crystals	Quantum Information Science with Trapped Ca ⁺ Ions	The ACME search for the electron EDM: a TeV probe for new particles
9:25	Mukaiyama	Thompson	Furusawa	Lukin
	Investigation of ultracold atom-ion collisions	Overcoming Quantum and Thermal Limits for Precision Measurements	Hybrid quantum information processing	Quantum optics with nanophotonic systems
10:05	COFFEE	COFFEE	COFFEE	COFFEE
10:30	Demille	Awschalom	Aspelmeyer	Danshita
	Laser cooling and magneto-optical trapping of a diatomic molecule	Quantum control of single spins in diamond and silicon carbide	Quantum controlling levitated nano- and microspheres in optical cavities	Bound states of Higgs modes in a relativistic superfluid
11:10	Simon	Odom	Yoshioka	Nakagawa
	Topological Photonics with Twisted Resonators and Braided Circuits	Adding trapped molecules to the quantum toolkit	The quest for Bose-Einstein condensation of excitons in a bulk semiconductor at 100 mK	Manipulation of ultra cold atoms for quantum technologies: from atomic interferometers to quantum simulators
11:50				Saffman
	LUNCH	LUNCH	LUNCH	Quantum logic with Rydberg atoms
2:00	Gabrielse	Katori	Monroe	end 12:30 pm
	TBD	Frequency ratios of optical lattice clocks at the 17th decimal place	TBD	
2:40	Chin	Derevianko	Vengalatorre	
	Scale Invariance and Universality in Ultracold Gases	Dark matter search as a motivation for Heisenberg-limited atomic clockwork	Measurement induced localization in an ultracold lattice gas	
3:20	Ohmori	Vuletic	Rauschenbeutel	
	Direct observation of ultrafast many-body electron dynamics in a strongly-correlated ultracold Rydberg gas	Nanofriction with ion chains: Superlubricity and Aubry transition	Chiral interaction of light and matter in confined geometries	
4:00	COFFEE	COFFEE	COFFEE	
4:30	Ueda	Yamamoto	Hulet	
	Entanglement pre-thermalization in a Bose gas	Coherent Ising machines based on network of optical parametric oscillators	Quantum Magnetism with Ultracold Atoms	
5:10	Zelevinsky	Ye	Inouye	
	High-precision spectroscopy with two-body quantum systems	Low entropy quantum gas of polar molecules	New limit on the variation of the electron-to-proton mass ratio using ultracold molecules	