

Fiscal Year:	FY 2014	Task Last Updated: FY 07/25/2014	
PI Name:	Bigelow, Nicholas Ph.D.		
Project Title:	Consortium for Ultracold Atoms in Space		
Division Name:	Physical Sciences		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	FUNDAMENTAL PHYSICS--Fundamental physics		
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	14627-0171	Congressional District:	25
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	2013 Fundamental Physics NNN13ZTT002N (Cold Atom Laboratory--CAL)
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No. of PhD Candidates:		No. of Master' Degrees:	
No. of Master's Candidates:		No. of Bachelor's Degrees:	
No. of Bachelor's Candidates:		Monitoring Center:	NASA JPL
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Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Pritchard, David Ph.D. (Massachusetts Institute of Technology) Stamper-Kurn, Dan Ph.D. (University of California, Berkeley) Vuletic, Vladan Ph.D. (Massachusetts Institute of Technology) Kasevich, Mark Ph.D. (Stanford University) Ketterle, Wolfgang Ph.D. (Massachusetts Institute of Technology) Lukin, Mikhail Ph.D. (Harvard) Mueller, Holger Ph.D. (University of California, Berkeley) Phillips, William Ph.D. (University of Maryland) Ye, Jun Ph.D. (University of Colorado)		
Grant/Contract No.:	JPL 1504801		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	<p>Consortium for Ultracold Atoms in Space (CUAS)</p> <p>We request support for the formation and operation a research consortium of senior people, all pioneers in Bose-Einstein condensation, atom optics, atom interferometry, and related areas, with connections to NASA's former program on fundamental research in microgravity. The Consortium's work will be described in the context of four Tasks.</p> <p>Task 1: Advanced Clocks in Space and Time Transfer</p> <p>Task 2: Maturing and Advancing Atom Interferometer Technology for Space</p> <p>Task 3: Precision Atom Interferometric Measurement in Space</p> <p>Task 4: Strategies for the Frontier of Ultracold Atoms in Space.</p> <p>The Consortium is: N. P. Bigelow, M. Kasevick, W. Ketterle, M. Lukin, H. Müller, W. D. Phillips, D. Pritchard, D. Stamper-Kurn, V. Vuletic and J. Ye.</p> <p>We have established a cooperation with German Scientists: C. Braxmaier, W. Ertmer, C. Lämmerzahl, A. Peters, E. M. Rasel, and W. P. Schleich. In forming this Consortium, we have several aims: (1) to, in one consolidated move, provide NASA with a community of talented and respected researchers who are committed to developing well thought out, highly impactful precision, quantum gas and atomic physics space experiments; (2) to support several first-class experimental efforts with significant potential to impact NASA interests and specifically to impact future flight experiments or indeed to become flight definition experiments; and (3) to provide intellectually compelling strategies that will impact future generations of flight experiments, aboard ISS and beyond. We believe that by forming this consortium we will be able to provide NASA with a far larger return than could be expected from a series of individual projects. In part this is because of the natural synergies among the interests and expertise of the Consortium members. In part this is because the membership has explicitly agreed to meet regularly in person and via teleconference in order to create and refine ideas beyond the work described here, and to challenge each other to advance only the most excellent projects for support by NASA.</p> <p>The interests and expertise of the Consortium represent two of the four Thrusts identified in a recent NRC report and the current NRA: (1) Precision Measurement of Fundamental Forces and Symmetries and (2) Quantum Gasses. In the present proposal we choose to focus on two specific areas: ultra-performance clocks and clock networks and atom interferometers (including those using degenerate quantum gasses). We have developed a cooperation plan with leading German expert scientists involved with DLR sponsored work in Bremen who are collaborators on this proposal.</p> <p>Berkeley and Stanford will be leads on Tasks 2 and 3.</p> <p>MIT, U.C./JILA and Harvard will be leads on Task 1.</p> <p>U. Md., Rochester and MIT will be leads on Task 4.</p> <p>Members of the Consortium can and often will contribute to all four tasks with priorities being set by the lead institutions.</p>
	Rationale for HRP Directed Research:
	Research Impact/Earth Benefits:
	Task Progress: New project for FY2014.
	Bibliography Type: Description: (Last Updated: 01/05/2023)