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(Follow instructions on the back.)

1. FEDERAL AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH REPORT IS SUBMITTED Office of Naval Research			2. FEDERAL GRAN IDENTIFYING N N00014-01-1-0102	UMBER	OMB Approved No. 80-R0180		
3. RECIPIENT ORGANIZATION (Name and complete address, including ZIP code)		4. EMPLOYER IDENTIFICATION NUMBER 050300482					
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10. STATUS OF FUNDS					······	<u></u>	
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b. Total outlays this report period							31,502
c. Less: Program income credits							0.00
d. Net outlays this report period (Lir	e a minus line c)						31,502
e. Net outlays to date (Line a plus lin	ne d)						31,502
f. Less: Non-Federal share of outlay							26,502
g. Total Federal share of outlays (Lin	ne e minus line f)		·····				5,000
h. Total unliquidated obligations	<u></u>			,,		•	0.00
i. Less: Non-Federal share of unliqu	lidated obligations s	shown on	line h				0.00
j. Federal share of unliquidated obligations (Line h minus line I)						0.00	
k. Total Federal share of outlays and unliquidated obligations (Line			ne g plus j)				5,000
I. Total cumulative amount of Federal funds authorized				5,000			
m. Unobligated balance of Federal fu	nds (Line l minus li	ne k)		- <u> </u>			0.00
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12. REMARKS (Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.)							
2001 Quantum Control of Atomic & Molecular Motion							
13. CERTIFICATION	SIGNATURE OF	AUTHO	RIZED CERTIFYING	DATE REPORT	I SUBMITTED		
I certify to the best of my knowledge and belief that this report is correct		jer un	November 9, 2001				
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#### 2001 GORDON RESEARCH CONFERENCE

### on Quantum Control of Atomic & Molecular Motion

#### FINAL PROGRESS REPORT

ONR N00014-01-1-0102

The Gordon Research Conference (GRC) on Quantum Control of Atomic & Molecular Motion was held at Mount Holyoke, South Hadley, MA, July 29-August 3, 2001. The conference was well attended with 119 participants (list enclosed). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both US and foreign scientists, senior researchers, young investigators, and students.

In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. In addition to these formal interactions, "free time" was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field (program enclosed).

I want to personally thank you for your support of this Conference. As you know, in the interest of promoting the presentation of unpublished and frontier-breaking research, Gordon Research Conferences does not permit publication of meeting proceedings. If you wish any further details, please feel free to contact me. Thank you.

Moshe Shapiro Conference Chair

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# **Quantum Control Of Atomic & Molecular Motion**

July 29 - August 3, 2001 Mount Holyoke College

<u>Moshe Shapiro,</u> Chair <u>Klaas Bergmann</u>, Vice-Chair

Sunday	
19:30-19:45	General Perspectives
	Peter Lambropoulos, FORTH, Greece
19:45-20:35	Stuart Rice U. of Chicago, USA "Optical Control of Molecular Dynamics: Problems and Prospects"
20:35-20:45	
20:45-21:35	Anton Zeilinger, U. of Vienna, Austria "Information and Quantum Mechanics"
21:35-21:45	Discussion
Monday	
8:40-8:55	Group photo
9:00-9:15	Phase Control
	Karl Kompa, MPI, Garching, Germany
9:15-9:55	Paul Brumer, U. of Toronto, Canada "Controlled Chiral Purification and Controlled Quantum Chaotic Diffusion"
9:55-10:05	
10:05-10:45	Stephen Leone, NIST and U. of Colorado, USA "Wave Packet Phase Control, Evolutionary Algorithms, and Quantum Information"
10:45-10:55	Discussion
	Coffee break
11:15-11:55	Robert Gordon, U. of Illinois at Chicago, USA "Using Coherent Phase Control to Probe Structure in the Continuum"
11:55-12:05	
12:05-12:25	Robert Levis, Wayne State U., Detroit, USA Hot Topic I: "Strong Field Control of Chemical Dissociation and Rearrangement"
12:25-12:30	Discussion
16:30-18:00	Poster session I Klaas Bergmann, Kaiserslautern U., Germany
19:30-19:45	Optimal Control
	Herschel Rabitz, Princeton U., USA
19:45-20:25	Yaron Silberberg, Weizmann Inst., Israel "Femtosecond control of multiphoton transitions"
20:25-20:30	Discussion
20:30-21:10	<b>Tobias Brixner</b> , U. of Wiirzburg, Germany "Quantum control in the liquid phase by adaptive femtosecond. pulse shaping"
21:10-21:15	
21:15-21:55	Yuichi Fujimura, Tohuko U., Japan "Optimal control of selective preparation of enantiomers from their racemate"

21:5	5-22	00 [	Discu	ssion
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Tuesday	
9:00-9:15	Quantum Information
	Carlos Stroud, U. of Rochester, USA
9:15-9:55	Gershon Kurizki, Weizmann Inst., Israel "Decoherence and Entanglement: Control of intra- and inter- molecular processes
	Discussion
10:05-10:45	Ian Walmsley, U. of Rochester, USA "Decoherence and learning control for information processing in the quantum regime"
10:45-10:55	Discussion
	Coffee break
11:15-11:55	<b>Eugene Polzik</b> , U. of Arhus, Denmark "Entanglement and Quantum Communication with Spin Polarized Atomic Samples"
11:55-12:05	Discussion
12:05-12:25	Daniel Lidar, U. of Toronto, Canada Hot Topic II: "Decoherence-Free Quantum Computation"
12:25-12:30	
	Meeting of the nomination committee
19:30-19:45	Light Manipulation and Manipulation with Light
	Bretislav Friedrich, Harvard, USA
19:45-20:25	Alexei Sokolov, Stanford U., USA "Femtosecond Light Source for P hase- Controlled Multiphoton Ionization"
20:25-20:30	
20:30-21:10	Michael Fleischhauer, Kaiserslautern U., Germany "Coherent control of light pulses. Quantum memories for photons"
	Mikhail Lukin, Harvard, USA "Coherent trapping of photon states in matter: experiments & applications for quantum processing"
21:10-21:15	Discussion
Wednesday	
9:00-9:15	Control in the condensed phase
	Philip Bucksbaum, U. of Michigan, Ann-Arbor, USA
9:15-9:55	Ronnie Kosloff, Hebrew U., Israel "Impulsive Control of Ground Surface Dynamics"
9:55-10:05	Discussion
10:05-10:45	Robert Coalson, U. of Pittsburgh, USA "Laser Control of Electron Transmission through Molecular Wires"
10:45-10:55	Discussion
10:55-11:15	Coffee break
11:15-11:55	Milena Grifoni, U. of Delft, The Netherlands "Control of tunneling in nonadiabatic quantum ratchets"
11:55-12:05	Discussion
12:05-12:25	Jon Marangos, Imperial College, UK Hot Topic III: "High Order Harmonic Generation in Aligned Molecules"
12:25-12:30	Discussion
16:30-18:00	Poster session II Klaas Bergmann, Kaiserslautern U., Germany
19:30-19:45	Strong Field Control
	Paul Corkum, NRC, Ottawa, Canada

19:45-20:25	Tamar Seideman, NRC, Ottawa, Canada "Spatially controlled ro-translational wavepackets"
20:25-20:30	Discussion
20:30-21:10	Henrik Stapelfeldt, U. of Arhus, Denmark "Control of chemical reactions by laser aligned molecules"
21:10-21:15	Discussion
21:15-21:55	Andre Bandrauk, U. de Sherbrooke, Canada "Controlling Electron- Nuclear Dynamics with Short Intense Laser Pulses: From Super-Computer Simulations to Applications"
21:55-22:00	Discussion
Thursday	
9:00-9:15	Laser Cooling and BEC Dynamics
	David Tannor, Weizmann inst., Israel
9:15-9:55	Amichay Vardi , ITAMP, Harvard, USA & James Anglin, MIT, USA "Quantum atom optics: Bose-Einstein condensates beyond Gross-Pitaevskii
9:55-10:05	Discussion
10:05-10:45	Pierre Pillet, Lab. Aime Coton, France "Control of a Pair of Colliding Atoms Through Photoassociation and Formation of Ultracold Molecules"
10:45-10:55	Discussion
10:55-11:15	Coffee break
11:15-11:55	Gerard Meijer, FOM, Nieuwegein, The Netherlands "Deceleration and trapping of neutral dipolar molecules"
11:55-12:05	Discussion
12:05-12:25	Stefan Vajda, Freie U. Berlin, Germany Hot Topic IV: "Fragmentation Control of Small Alkaline Clusters: What Can We Learn From the Optimized Pulse Shapes"
12:25-12:30	Discussion
14:00-14:30	Business Meeting
19:30-19:45	Control in the Solid Phase
	Henry van-Driel, U. of Toronto, Canada
19:45-20:25	Walter Potz, U. of Gratz, Austria "Coherent Control Schemes in Semiconductor Nanostructures"
20:25-20:30	Discussion
20:30-21:10	V. Ara Apkarian, U.C. Irvine, USA "Preparation, manipulation, and interrogation of molecular coherences OR reset, process, and readout of quantum registers using four-wave mixing"
21:10-21:15	Discussion

- 21:15-21:55 Keith Nelson, MIT, USA "Polaritonics: Coherent control over collective modes that move at light-like speeds"
- 21:55-22:00 Discussion





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## QUANTUM CONTROL OF LIGHT AND MATTER

Mount Holyoke College, South Hadley, MA (29-Jul-01) - (03-Aug-01)

NOTE: Receipt of Application does not guarantee acceptance to a Conference. Applications are reviewed by the Conference Chair. If the Chair approves your application, you become Accepted, and a registration packet will be mailed immediately. Please allow 3-5 days for your registration to reach you by mail once your name appears. When your registration packet has been received back in our office, you become Registered.

Only those who have been Accepted or Registered will have their names listed below. Names of people who have only applied and have yet to be accepted will NOT appear.

Name HAKIMA ABOU - RACHID VARDI AMICHAY ZOHAR AMITAY JAMES ANGLIN ARA APKARIAN ANDRE D BANDRAUK VICTOR S BATISTA KLAAS BERGMANN ZSOLT BIHARY TOBIAS BRIXNER PHILIP H BUCKSBAUM THANDI M BUTHELEZI MARTA CASTILLEJO SZCZEPAN CHELKOWSKI ROB D COALSON MATTHEW G COMSTOCK CHARLES CONOVER PAUL CORKUM BEATRICE DE BEAUVOIR REGINA DE VIVIE-RIEDLE MUSTAFA DEMIRPLAK DAVID R ERMER MICHAEL FLEISCHHAUER JAMES M FRASER TIM FREEGARDE BRETISLAV FRIEDRICH EINAT FRISHMAN YUICHI FUJIMURA SUKETU R GANDHI EITAN GEVA DAVID R GLENN JIANGBIN GONG LETICIA GONZALEZ **ROBERT J GORDON MILENA GRIFONI** GERBER G GUSTAV THOMAS HALFMANN HANNO HAMMER HEEKYUNG HAN RACHEL HASBANI NICK HAY KUNIHITO HOKI MARKKU JÄÄSKELÄINEN SEOGJOO JANG GEDIMINAS JUZELIUNAS MICHAEL A KARAVITIS FRANK KECK ANI KHACHATRIAN **TEODORA V KIROVA** 

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