Monday Morning January 5 2004

Plenary Session, George R. Welch, Chair

7:25 **George R. Welch**, *Texas A&M University*, Welcoming Remarks

7:30 **Herschel A. Rabitz**, *Princeton University*, "Controlling Quantum Phenomena: Why Does it Appear to be so Easy to Achieve?"

8:00 **Charles Munnerlyn**, *Visx Inc.*, "Improving Laser Vision Correction"

8:30 **Winthrop Smith**, *University of Connecticut*, "The kinetics of trapped atomic/molecular ion cooling by ultracold atoms, using a hybrid Paul trap/MOT"

	Femtosecond Spectroscopic Techniques Kevin Lehmann, Chair	*Novel Optics* Charles Munnerlyn, Chair	*Quantum Information* M. Suhail Zubairy, Chair
9:10	**Manjusha Mehendale**, *Princeton University*, "Towards FAST CARS: CARS Spectroscopy of Bacterial Spores"	**Josef Bille**, *University of Heidelberg*, "Femtosecond Laser Surgery"	**Mark Hillery**, *Hunter College, CUNY*, "Quantum walks and scattering theory"
9:30	**John Reintjes**, *Naval Research Laboratory*, "Femtosecond CARS in DPA Solutions: Temporal Dynamics"	**John Holzrichter**, *UC Davis and LLNL*, "Optical and Microwave Interferometry for Human Speech Characterization"	**Janos Bergou**, *Hunter College, CUNY*, "Optimum strategies for the discrimination of quantum states"
9:50	**Guy Beadie**, *Naval Research Laboratory*, "Femtosecond CARS in DPA Solutions: Spectral Dynamics"	**Christopher Fang-Yen**, *Massachusetts Institute of Technology*, "Nonclassical photon statistics in the Cavity QED Microlaser"	**Hwang Lee**, *NASA Jet Propulsion Laboratory*, "Non-photon number-discriminating detectors"

— Break —

Plenary Session, H. Jeff Kimble, Chair

10:30 **Warren Warren**, *Princeton University*, "Breasts and Brains, Similarities and Differences: Exploiting Unconventional Molecular Coherences to Improve Imaging"

11:00 **Heiner Linke**, *University of Oregon*, "Brownian Motors from Biology to Quantum Electronics"

	Novel Spectroscopic Techniques Warren Warren, Chair	*Quantum Ratchets* Heiner Linke, Chair	*Sympathetic Cooling* Winthrop Smith, Chair
11:40	**Szymon Suckewer**, *Princeton University*, "Towards Ultraintense Ultrashort Laser Pulses via Raman Backscattering in Plasma and Prospect for X-Ray Lasers"	**Franco Nori**, *RIKEN and University of Michigan*, "Controlling the Motion of Particles in Mixtures and the Motion of Magnetic flux Quanta in Superconductors"	**Michael Drewsen**, *University of Aarhus*, "Sympathetically cooled molecular ions in a linear Paul trap"
12:00	**Kevin Lehmann**, *Princeton University*, "Spectroscopy and Dynamics in superfluid helium nanodroplets"	**Wolfgang Porod**, *Notre Dame*, "Reversibility, Mawell's Demon, and Computation"	**Deep Gupta**, *University of California at Berkeley*, "Sympathetic Cooling in Atom Traps: Road to Fermi Degeneracy and Bose-Einstein Condensation of Molecules"
12:20	**Alexei Sokolov**, *Texas A&M University*, "Prospective sub-cycle field shaping by molecular modulation, and its potential applications"	**Ken Segall**, *Massachusetts Institute of Technology*, "Josephson Junctions for Quantum Ratchets"	**Randall G. Hulet**, *Rice University*, "Conversion of an Atomic Fermi Gas to a Molecular Bose Gas"
12:40	**Wolfgang Wagner**, *Rutgers University*, "Femtosecond phase cycled 2D spectroscopy"	**Charles Reichhardt**, *Los Alamos National Laboratory*, "Ratchet Superconducting Vortex Cellular Automata"	**Juha Javanainen**, *University of Connecticut*, "Modeling coherent association of fermionic atoms into molecules –or– Half of a fermion in an optical lattice

13:00

Monday Evening January 5 2004

Plenary Session, Phillip Szuromi, Chair

19:00 **Sergey Bezrukov**, *National Institutes of Health,* "Information and Noise in Ion Channel Signals"

19:30 **Theo Nieuwenhuizen**, *University of Amsterdam,* "Quantum thermodynamics: thermodynamics at the nanoscale"

20:00 **H. Jeff Kimble**, *California Institute of Technology,* "A One-Atom Laser in the Regime of Strong Coupling"

— Break —

	Solid-state Nonlinear Optics Nan Yu, Chair	*Quantum Thermodynamics and the Second Law* Theo Nieuwenhuizen, Chair	*Sensing and Information* Yanhua Shih, Chair
20:50	**Lute Maleki**, *Jet Propulsion Laboratory,* "Nonlinear optics with whispering gallery mode crystal resonators"	**Andrew Jordan**, *University of Geneva, Switzerland,* "Energy fluctuations, persistent current and entanglement in the ground state of a system coupled to a bath"	**Laszlo B. Kish**, *Texas A&M University,* "Fluctuation-Enhanced Sensing"
21:10	**Elena Kuznetsova**, *Texas A&M University,* "Possibility to suppress excited state absorption in solid-state lasers"	**Christopher Jarzynski**, *Los Alamos National Laboratory,* "Quantal foundations of far-from-equilibrium work identities"	**Peter Heszler**, *Uppsala University, Sweden,* "Performance of Spatial Quantum Optical Fourier Transformation in the Entanglement and Non-entanglement Limit"
21:30	**Min Xiao**, *University of Arkansas,* "Modified Optical Properties of Semiconductor Quantum Dots by Photonic Structures"	**Alan E. Hill**, *Texas A&M University and Plasmatronics,* "The Quantum Otto Mobile: its Experimental Verification and Application to Directed Energy"	**Robert Lucht**, *Purdue University,* "Electronic-Resonance-Enhanced Coherent Anti-Stokes Raman Scattering for Molecular Detection: Experiments and Theory"
21:50	**C.-K. (Ken) Shih**, *University of Texas at Austin,* "Rabi oscillation damping in self-assembled semiconductor quantum dot"	**M. Howard Lee**, *University of Georgia,* "Some special low temperature statistical thermodynamics: Fermi-Bose equivalence in 2d and pseudo BEC"	**Edward S. Fry**, *Texas A&M University,* "Light Scattering at an Angle of Zero Degrees using Four-Wave Mixing"
22:10			

Tuesday Morning January 6 2004

Plenary Session, Marlan O. Scully, Chair

7:30 **Award Lamb Medal**, "The presentation of the 2002 Willis E. Lamb medal for Laser Science and Quantum Optics to Stuart Rice, Karl Kompa, and Lu Sham"

8:00 **Tamar Seideman**, *Northwestern University*, "Dynamics in Quantum Electronics: From Nanochemistry to New Forms of Molecular Machines"

	Nano-photonics Andrew Steckl, Chair	*Quantum Optics* Janos Bergou, Chair	*Current-Driven Dynamics in Molecular-Scale Electronics* Tamar Seideman, Chair
8:40	**Joe Haus**, *University of Dayton*, "Nonlinear and Quantum Optics in Photonic Band Gap Structures"	**Kohzo Hakuta**, *The University of Electro-Communications, Japan*, "Manipulating Atoms Using Evanescent Fields around a Thin Optical Fiber"	**Mark C. Hersam**, *Northwestern University*, "Probing Charge Transport through Individual Molecules on Degenerately Doped Silicon Surfaces"
9:00	**Steve Blair**, *University of Utah*, "Light transmission through nanostructured metal films"	**Mark Raizen**, *University of Texas at Austin*, "Quantum Engineering of Atomic Number States"	**Gérald Dujardin**, *Université Paris Sud*, "Electronic control of an individual bistable molecule"
9:20	**Ildar Gabitov**, *University of Arizona*, "Ultrashort optical pulses in active medium with embedded metallic nanoparticles"	**Masayuki Katsuragawa**, *University of Electro-Communications, Japan*, "Frequency modulation of light using three correlated Raman coherences"	**Karina Morgenstern**, *Freie Universität Berlin*, "Local investigation of electron induced processes in water-metal systems"
9:40	**David D. Smith**, *NASA Marshall Space Flight Center*, "Coherence effects in coupled resonators"	**Wolfgang Schleich**, *University of Ulm, Germany*, "Fresnel representation of the Wigner function"	**Xiaoyang Zhu**, *University of Minnesota*, "Understanding molecular electronics from femtosecond spectroscopy"

— Break —

Plenary Session, Herschel A. Rabitz, Chair

10:20 **Karl L. Kompa**, *Max-Planck Institut für Quantenoptik*, "Getting ahead of IVR – entering a new age of laser chemistry"

10:50 **Stuart A. Rice**, *University of Chicago*, "Variations on Adiabatic Transfer With Applications to Product Selection in a Reaction"

11:20 **Lu J. Sham**, *University of California, San Diego*, "Progress in optical control of semiconductor systems for quantum information"

	Nano-photonics Joseph W. Haus, Chair	*Semiconductor Nonlinear Optics* Lu J. Sham, Chair	*Molecular Spectroscopy* Kishore T. Kapale, Chair
12:00	**Marc Baldo**, *Massachusetts Institute of Technology*, "High efficiency phosphorescence from metal-organic complexes"	**Martin Wegener**, *University of Karlsruhe*, "Extreme Nonlinear Optics In Semiconductors"	**Kazuhiko Misawa**, *Tokyo University of Agriculture and Technology*, "Chirp dependent fluorescence from cyanine dye molecules"
12:20	**Andrew Steckl**, *University of Cincinnati*, "Nature's Photonic Nanostructures - Photoemission from rare earths and hybrid inorganic/organic materials"	**Martino Poggio**, *University of California at Santa Barbara*, "Local Manipulation of Nuclear Spin in a Semiconductor Quantum Well"	**Roland E. Allen**, *Texas A&M University*, "The Intricate Dance of of Electrons and Nuclei in a Photochemical Reaction"
12:40	**Ted Sargent**, *University of Toronto*, "Electroluminescence from Quantum Dot Crystals"	**Rolf Binder**, *University of Arizona*, "Many-particle theory of all-optical polarization switching in semiconductor quantum wells"	**Yusheng Dou**, *Texas A&M University*, "Detailed dynamics of photoisomerization of stilbene"
13:00			

Tuesday Evening January 6 2004

Plenary Session, Szymon Suckewer, Chair

19:00 **Birgitta Whaley**, *University of California at Berkeley,* "Optimally Efficient Control of Quantum Circuits"

19:30 **Art Smirl**, *University of Iowa*, "Putting a new spin on quantum interference: Independent control of spin and charge"

20:00 **Eric Forsythe**, *Army Research Laboratory,* "Molecular-Based Devices for Photon Emitting Applications: Advantages and Challenges"

— Break —

	Slow light, superluminal light, and their applications Robert W. Boyd, Chair	*Spin Coherence* Art Smirl, Chair	*Quantum Information* Mark Hillery, Chair
20:50	**Daniel J. Gauthier**, *Duke University,* "The information velocity in fast- and slow-light media"	**John Mamin**, *IBM Almaden Research Center,* "Magnetic resonance force microscopy and the quest for single spin detection"	**Lorenza Viola**, *Los Alamos National Laboratory,* "Advances in Decoherence Control"
21:10	**Lijun Wang**, *NEC,* "Quantum fluctuation, causality, and Abraham force"	**Alexei Tyryshkin**, *Princeton University,* "Spin Decoherence Times of Trapped and Conduction Electrons in Silicon-Based Structures"	**Hoi-Kwong Lo**, *University of Toronto,* "Security of quantum key distribution with imperfect devices"
21:30	**George R. Welch**, *Texas A&M University,* "Buffer-gas induced absorption resonances and large negative pulse delay times in Rb vapor"	**Bill Rippard**, *NIST Boulder,* "Coherent Microwave Oscillations in Spin Momentum Transfer Device"	**Deborah Jackson**, *NASA Jet Propulsion Laboratory,* "What are the Physical Limitations on Achieving Perfect Quantum Efficiencies?"
21:50	**Andrey Matsko**, *Jet Propulsion Laboratory,* "EIT in resonator chains: similarities and differences with atomic media"	**Frank Narducci**, *Naval Air Systems Command,* ""Measurement of Ground State Recovery Times"	**Raymond Beausoleil**, *HP Laboratories,* "Applications of Electromagnetically Induced Transparency to Quantum Information Processing"
22:10			

Wednesday Morning January 7 2004

Plenary Session, John (Jay) Lowell, Chair

7:30 **David Attwood**, *University of California at Berkeley,* "Imaging at 20 nm Spatial Resolution: Soft X-Ray Microscopy and EUV Lithography"

8:00 **Robert Boyd**, *University of Rochester,* "Slow and Fast Light in Room Temperature Solids"

	Slow light, superluminal light, and their applications Daniel J. Gauthier, Chair	*Semiconductor Optoelectroncs* Alexey Belyanin, Chair	*EUV and Xray* David Attwood, Chair
8:40	**Kurt E. Oughstun**, *University of Vermont,* "Accuracy of the Group Velocity Description and the Question of Superluminal Pulse Velocities"	**Scott Crooker**, *Los Alamos National Laboratory,* "Engineered Energy Flows in Nanocrystal Quantum Dot Assemblies"	**Ernie Glover**, *LBL,* "Picosecond Metal-Insulator Transitions in An Expanding Metallic Fluid: Kinetics of Particle Formation"
9:00	**Dmitry Strekalov**, *Jet Propulsion Laboratory,* "Influence of inhomogeneous broadening on group velocity in coherently pumped atomic vapor"	**Kenji Ikushima**, *University of Tokyo, Japan,* "Quantum dot photon detectors, novel THz scanning microscopes, and their application"	**Justin Peatross**, *Brigham Young University,* "Phase Matching of High Harmonic Generation"
9:20	**Vladimir M. Shalaev**, *Purdue University,* "Plasmonic Nanoantennae for Manipulating Light, Sensing Molecules, and Nanomanufacturing"	**Nikolai Kalugin**, *Texas A&M University,* "Sensitive tunable THz detector based on a quantum Hall device"	**Henry Kapteyn**, *JILA,* "Coherent Control and Chemical Sensing"
9:50	**John Howell**, *University of Rochester,* "Pixel entanglement: position-momentum quantum information processing"	**Jacek Szczytko**, *Ecole Polytechnique Federale de Lausanne, Switzerland,* "Direct measure of exciton formation in quantum wells from interband luminescence"	**Margaret Murnane**, *JILA,* "Multiphoton Photonics"

— Break —

Plenary Session, Frank Narducci, Chair

10:20 **Eric Mazur**, *Harvard University,* "Femtosecond Micromachining"

10:50 **Hailin Wang**, *University of Oregon,* "Electromagnetically induced transparency from spin coherence in semiconductors"

	Femtosecond Micromachining Eric Mazur, Chair	*Recent developments in EIT from A (atoms) to Z (zemiconductors)* Hailin Wang, Chair	*Optical Communications* Leon Cohen, Chair
11:30	**Richard Haight**, *IBM T.J. Watson Research Center,* "High Resolution Material Ablation and Deposition with Femtosecond Lasers"	**Connie Chang-Hasnain**, *University of California at Berkeley,* "EIT and all-optical buffers"	**Markus Pollnau**, *Swiss Federal Institute of Technology,* "Ti:sapphire waveguide emitters as light sources for interferometry"
11:50	**Minoru Obara**, *Keio University, Japan,* "Surface microstructuring and photonic device fabrication in transparent materials with temporally tailored ultrashort laser"	**Weng Chow**, *Sandia National Laboratory,* "Coherent effects and dephasing in semiconductor quantum dots"	**Jacob Khurgin**, *Johns Hopkins University,* "Comparative analysis of optical buffers and nonlinear switches for high bit rate systems"
12:10	**Andy Weiner**, *Purdue University,* "Femtosecond Pulse Shaping: Laser Machining and Frequency Conversion"	**Philip Hemmer**, *Texas A&M University,* "Applications of EIT in doped solids"	**Martin Richardson**, *University of Central Florida,* "Defying diffraction - High intensity femtosecond laser propagation through the atmosphere"
12:30	**Stefan Nolte**, *Friedrich-Schiller-University Jena,* "Ultrafast laser processing: New options for 3D photonic structures"	**Andrew Charman**, *University of California at Berkeley and LBNL,* "EIT in Magnetized Plasmas: Quantum Treatments and Atomic Analogies"	**Eric Van Stryland**, *University of Central Florida,* "Nondegenerate Two-Photon Absorption Spectroscopy"
12:50	**Peter R. Herman**, *University of Toronto,* "Advanced lasers for writing 3-D optical circuits and biophotonic chips"		

Wednesday Evening January 7 2004

Plenary Session, Margaret Murnane, Chair

19:00 **Peter D. Keefe**, *Keefe & Associates*, "Principles of Intellectual Property for Scientists"

19:30 **Yurii Vlasov**, *IBM Watson Research Center,* "Silicon photonic crystals - thrust toward ultradense optical integration"

20:00 **Nikolay Zheludev**, *University of Southampon, UK*, "Assault on Time Reversal in Chiral Flatland"

— Break —

	Nano-optics Vladimir M. Shalaev, Chair	*The Quantum/Classical Interface* Edward S. Fry, Chair	*Intellectual Property* Peter D. Keefe, Chair
20:50	**Naomi Halas**, *Rice University,* "Tunable Plasmonic Nanostructures: fundamental components for nano-optics"	**Leon Cohen**, *City University of New York (Hunter College),* "Joint representations for arbitrary variables"	**William D. Blackman**, *Carrier, Blackman & Associates, P.C.*, "Patent Strategy"
21:10	**Evgenii Narimanov**, *Princeton University,* "Light in asymmetric resonant cavities: chaos, tunneling and localization"	**Lorenzo Galleani**, *Politecnico di Torino, Italy,* "The phase space of non-stationary noise"	**Donald J. Ersler**, *Donald J. Ersler, S.C.,* "Obtaining a Patent"
21:30	**Mikhail A. Noginov**, *Norfolk State University,* "Emission control in scattering and composite media"	**David H. Hughes**, *Air Force Research Laboratory,* "Moment density characterization of FDTD generated electromagnetic pulses in linear and nonlinear dispersive media"	**Lawrence J. Goffney, Jr.**, *Patent Litigation Consultant,* "Intellectual Property: Trends and Concerns for the Scientific Community"
21:50	**Peter Nordlander**, *Rice University,* "Plasmon hybridization in nanostructures"	**Michael Steiner**, *Naval Research Laboratory,* "Matter-based Measurement Theory"	**Participants** "Intellectual Property Workshop"
22:10			

Thursday Morning January 8 2004

Plenary Session, Kohzo Hakuta, Chair

7:30 **Szymon Suckewer**, *Princeton University*, "Tutorial on Prospect for X-Ray Lasers via Raman Backscattering in Plasma"

8:00 **Steve Cundiff**, *JILA*, "Femtosecond spectroscopy of semiconductors"

	Quantum Informatics Philip Hemmer, Chair	*Solid State Lasers* Weng W. Chow, Chair	*Quantum Optics* Andrey Matsko, Chair
8:40	**James Franson**, *Johns Hopkins University*, "Linear Optics Quantum Computing"	**Kent Choquette**, *University of Illnois*, "Photonic Crystal Vertical Cavity Lasers"	**Howard Brandt**, *Army Research Laboratory*, "Finite vacuum energy density in quantum field theory"
9:00	**Barry Sanders**, *University of Calgary*, "Sharing quantum secrets: theory and experiment"	**Diana Huffaker**, *University of New Mexico*, "Atomic Structure of Self-Assembled and Patterned Quantum Dots"	**Vitaly Kocharovsky**, *Texas A&M University*, "Nonadiabatic mechanisms of radiation from atoms in cavity QED"
9:20	**James Chou**, *California Institute of Technology*, "Generation of Nonclassical Photon Pairs for Scalable Quantum Communication with Atomic Ensembles"	**Ravi Jain**, *University of New Mexico*, "Recent Advances in Fiber Lasers and Applications"	**Paul Voss**, *Northwestern University*, "Experimental and theoretical work on twin-photon production via four-wave-mixing in optical fiber"

— Break —

Plenary Session,

10:10 **Bob Doering**, *Texas Instruments*, "Introduction to the Limits of CMOS Technology and Prospects for Post-CMOS"

10:40 **Marlan O. Scully**, *Texas A&M University and Princeton University*, "Femtosecond Adaptive Spectroscopic Techniques"

	Quantum Entanglement James Franson, Chair	*Gamma-ray Optics* Yuri Rostovtsev, Chair	*Semiconductors* Bob Doering, Chair
11:20	**Yanhua Shih**, *UMBC*, "Beyond the Heisenberg uncertainty"	**Olga Kocharovskaya**, *Texas A&M University*, "Laser manipulation of nuclear transitions: theory"	**Tom Theis**, *IBM*, "Carbon Nanotube Transistors: What We've Learned about Molecular Electronics"
11:40	**Ashok Muthukrishnan**, *Texas A&M University*, "Making unallowed two-atom transitions allowed using entangled photons"	**Silviu Olariu**, *Texas A&M University*, "Laser manipulation of nuclear transitions: experiment"	**Mark Lundstrom**, *Purdue University*, "Physics of the Ultimate Transistor"
12:00	**M. Suhail Zubairy**, *Texas A&M University*, "Quantum disentanglement eraser"	**Ercan Alp**, *Argonne National Laboratory*, "Anomalous isotopic dependence of thermal expansion coefficient of Ge measured by X-ray Normal Incidence Diffraction"	**Christoph Wasshuber**, *Texas Instruments*, "Single-Electron Transistors: Are they any good?
12:20	**Selim M. Shahriar**, *Northwestern University*, "Generation of Motional Entanglement via Single-Photon Controlled Single-Atom Interferometry"	**Jos Odeurs**, *Katholieke Universiteit Leuven*, "Aspects of Electromagnetically Induced Transparency with Nuclear Radiation"	**Mark I. Stockman**, *Georgia State University*, "Metal/semiconductor nanosystems: Spaser and other phenomena"
12:40	**Ryan Bennink**, *University of Rochester*, "Quantum Imaging and EPR: Violation of the continuous-variable EPR bound by a factor of 100"	**Gilbert Hoy**, *Old Dominion University*, "Stimulated Emission of Gamma-Radiation: A Proposed Experiment"	

Thursday Evening January 8 2004

Plenary Session, Vladimir A. Sautenkov, Chair

19:00 **Mark Byrd**, *Harvard University*, "Strategies for Preserving Quantum Information"

19:30 **Mikhail D. Lukin**, *Harvard University*, "Stationary pulses of light in an atomic medium"

— Break —

	Quantum Error Correction Mark Byrd, Chair	*CPT* Mikhail D. Lukin, Chair	*Solid State Optoelectroncs* Vitaly Kocharovsky, Chair
20:20	**Gavin Brennen**, *NIST Gaithersburg*, "Maintaining a robust quantum computer register in periodic systems with Bose-Hubbard dynamics"	**Yuri Rostovtsev**, *Texas A&M University*, "Radiation trapping under the presence of coherent drive"	**Junichiro Kono**, *Rice University*, "Ultrafast Optical Processes in Ferromagnetic Semiconductors"
20:40	**Charlene Ahn**, *California Institute of Technology*, "Protecting quantum states through feedback control"	**Vladimir A. Sautenkov**, *Texas A&M University*, "Electromagnetically induced magnetochiral anisotropy in rubidium vapor"	**Cory Hill**, *NASA Jet Propulsion Laboratory*, "Recent developments in Sb-based mid-IR interband cascade lasers"
21:00	**Frank Gaitan**, *Southern Illinois University*, "Controlling Qubit Transitions during Non-Adiabatic Rapid Passage with Application to Quantum Computing"	**Roman Kolesov**, *Texas A&M University*, "Diagnostics of Magnitude and Direction of the Magnetic Field in Plasmas by means of CPT"	**Alexey Belyanin**, *Texas A&M University*, "Highly efficient nonlinear light generation in quantum cascade lasers"
21:20	**Andrew Scott**, *University of New Mexico*, "Multipartite entanglement and quantum-error-correcting codes"	**Justin Nash**, *Naval Air Systems Command*, "Nonlinear Polarization Rotation in Ultra Cold Sodium"	
21:40			