

Monday Morning January 8 2001

Plenary Session, Alexander L. Fetter, Chair

7:30 **Lev P. Pitaevskii**, *Univ. di Trento*, "Theory of two-photon Bragg scattering in trapped Bose-Einstein condensed gases"

8:00 **Robert Byer**, *Stanford, Laser Accelerators*

8:30 **Erich P. Ippen**, *MIT*, "Generating and controlling pulses shorter than 2 optical cycles"

B.E.C.

Quantum Computing and Searching

Femtosecond

Vitaly Kocharovsky, Chair

Gordon Chen, Chair

Erich P. Ippen, Chair

9:00 **Randy Hulet**, *Rice University*, "Probing the Dynamics of Bose-Einstein Condensation by Molecular Spectroscopy"

Mary Beth Ruskai, *University of Massachusetts, Lowell*, "Capacity of Quantum Channels"

Bill Barletta, *LBL*, "Femtosecond xray sources"

9:20 **Lorenz Wilhelm**, *M.I.T.*, "Growth and Decay of a Hydrogen Condensate"

Stephen Fenner, *Univ. of South Carolina*, "Quantum Search, Hamiltonians, and Intuition"

Wilhelm Becker, *Max Born Institut Berlin*, "Laser-induced nonsequential multiple ionization of atoms: a premium for cooperation"

9:40 **Christopher J. Pethick**, *NORDITA, Copenhagen*, "Macroscopic and microscopic properties of Bose-Einstein condensates"

Andreas Klappenecker, *Texas A&M University*, "Symplectic Geometries and Clifford Codes"

Jun Ye, *JILA*, "Sub-ten-femtosecond active synchronization between two passively mode-locked Ti:Sapphire oscillators"

— Break —

Plenary Session, Robert Byer, Chair

10:20 **Eric Jones**, *Sandia*, "National White Lighting Initiative: What's it all about?"

10:50 **Henry Van Driel**, *University of Toronto*, "Coherence Control of Semiconductors"

Coherent Control

Henry Van Driel, Chair

Quantum Information

Mikhail Lukin, Chair

Solid State Lighting

Weng Chow, Chair

11:20 **Moshe Shapiro**, *Weizmann*, "Symmetry Breaking and Chiral Purification by Coherent Control Techniques"

D. Averin, *SUNY Stony Brook*, "Linear quantum measurements with SET transistor"

Dennis Deppe, *UT Austin*, "Carrier Dynamics of In-GaAs/GaAs Quantum Dots for Low Power Microcavity Lasers and Light Emitters"

11:40 **Paul Brunner**, *University of Toronto*, "Coherently controlled nanoscale deposition on surfaces"

Nick Bigelow, *Rochester*, "Spin-squeezing in degenerate and non-degenerate atomic vapors: routes to many particle entanglement"

Kent Choquette, *University of Illinois*, "Vertical Cavity Lasers: New light in the information age."

12:00 **John Holzrichter**, *LLNL*, "Optical detection of Pathogens"

Anders Sorensen, *Aarhus Denmark*, "Many-particle entanglement from Bose-Einstein condensates"

M. D. Pashley, *Philips Research*, "Achieving White Light Quality Requirements with Solid State Lighting"

12:20 **David Tannor**, *Weizmann*, "Laser Cooling as a Paradigm for Control of Decoherence: A Theory of Purity Increasing Transformations"

Daniel Lidar, *University of Toronto*, "Decoherence-Free Quantum Computation"

Dan Botz, *University of Wisconsin*, "High-Power Al-free Coherent and Incoherent Diode Lasers"

12:40 **Eitan Geva**, *University of Michigan*, "On the performance of quantum heat engines"

A. Nurmikko, *Brown University*, "Vertical Cavity Blue and Near Ultraviolet Emitters"

Monday Evening January 8 2001

Plenary Session, Christopher J. Pethick, Chair

19:00 **Christophe Salomon**, *ENS, Paris*, "Sympathetic cooling of Lithium 6 fermions towards quantum degeneracy"

19:30 **I. Walmsley**, *University of Rochester, Quantum State Preparation and Measurement*

18:00 **Ed Fry**, *Texas A&M University*, "A Brillouin lidar for profiling temperature and sound speed in the ocean"

B.E.C.

Lev P. Pitaevskii, Chair

18:50 **Wolfgang Ketterle**, *MIT*, "Collective enhancement and suppression in Bose-Einstein condensates"

Ken Voss, *University of Miami*, "In-water spectral radiance distribution measurements"

Subhail Zuhairy, *Texas A&M University*, "Application of cavity QED to quantum computing"

19:10 **Vitaly Kocharovsky**, *Texas A&M University*, "Canonical Ensemble Quasiparticles and Particle-Number-Conserving Theory of BEC"

Robert Leathers, *NRL Washington*, "Analysis of a Point-Source Integrating Cavity Absorption Meter"

Andrew Funk, *University of Oregon*, "Non-classical states of the polarization of optical fields: generation and measurement"

19:30 **Juha Javanainen**, *University of Connecticut*, "How fast can you photoassociate a BEC?"

Linda Mullen, *Naval Air Warfare Center*, "Modulated Lidar Reveals Underwater Objects"

A. Cronin, *MIT*, "Decoherence rate due to multiple photon scattering in an atom interferometer"

19:50 **Kris Helmerston**, *NIST*, "Photo-association in a condensate"

Mike Contarino, *Naval Air Warfare Center*, "The "a" "b" "c"s of Lidar Measurement and Theory"

Luiz Davidovich, "Direct measurement of Wigner function: probing the quantum-classical transition"

20:10

Peter E. Nebolsine,

Ocean Physics

Ed Fry, Chair

Quantum State Preparation and Measurement

Subhail Zuhairy, Chair

Tuesday Morning January 9 2001

Plenary Session, George R. Welch, Chair

7:30 Vern Schlie, AFRL/DE, "Overview - HEL types, Uses, and Future"

8:00 Szymon Suckewer, Princeton University, "What is New in X-Ray Sources and Their Applications?"

8:30 Luigi Lugiato, Universit dell'Insubria, "Spatial entanglement, applications to quantum teleportation of optical images and quantum cryptography"

High Power Lasers

Vern Schlie, Chair

9:00 G. Manke, AFRL/DE, "Advanced COIL - Physics/chemistry; Uses"

New X-Ray Sources and Applications

Szymon Suckewer, Chair

Jorge Roeca, Colorado State University, "Recent Progress in the Development and Applications of Discharge Pumped Soft X-Ray Laser"

Magnetometry

Michael Fleischhauer, Chair

Dmitry Budker, UC Berkeley, "Nonlinear Faraday Rotation Magnetometry"

9:20 Bob Rice, Boeing-LEOS, "1 kW Yb:Yag Laser Demo"

Henry Kapteyn, JILA, "Applied Coherent Controlled Technique for X-Ray Generation"

George R. Welch, Texas A&M University, "Magnetometry in dense coherent media"

9:40 Todd Rutherford, Stanford, "Scaling Yb:YAG to 1-100 kW"

Robert Schoenlein, LBNL, "Generation and Applications of Femtosecond X-rays from the Advanced Light Source."

Andrey Matsko, Texas A&M University, "Radiation trapping in coherent media"

— Break —

Plenary Session, Wolfgang Ketterle, Chair

10:20 Alexander L. Fetter, Stanford, "Stability of a vortex in a dilute trapped Bose-Einstein condensate"

10:50 Peter Zory, University of Florida at Gainesville, "Designing interband and intersubband quantum well lasers."

High Power Lasers

Vern Schlie, Chair

11:20 Craig Denman, AFRL/DE, "High Power Fiber Laser Scaling"

Slow Light

Yuri Rostovtsev, Chair

Ulf Leonhardt, University of St Andrews, Scotland, "Slow light in moving media"

Quantum Well Lasers

Greg Dente, Chair

Greg Dente, GCD Assoc., "Quantum Theory of Superlattices: Applications to mid-IR Lasers"

11:40 Scott Fochs, LLNL, "Heat Capacity Nd:YAG High Power Laser - 100 KW"

Michael Fleischhauer, Univ. of Kaiserslautern, "Slow light and quantum memories for photons"

George Turner, MIT Lincoln Labs, "High Efficiency optically pumped mid-IR lasers with integrated absorbers"

12:00 Paul Banks, Gulf Atomic, "Ultrafast Laser - fs/TW"

V. Sudarshanam, MIT, "First Observation of Ultralow Group Velocity of Light in a Solid"

Luke Lester, CHTM, UNM, "Injection Efficiency and Phonon Bottleneck in Quantum dot lasers"

12:20 Ananth Dodabalapur, Lucent Tech, "Organic Semiconductor for Injection Laser"

Yuri Rostovtsev, Texas A&M University, "Frozen light by hot atoms"

Dave Gallant, Boeing, "Injection locking properties of angled grating semiconductor lasers"

12:40

Fann Le Kien, University of Electro Communications, Japan, "Slow light in a far-off-resonance Raman medium"

Benoit Deveaud, Ecole Polytechnique Federale de Lausanne, "Ultrafast dynamics of semiconductor nanostructures"

Tuesday Evening January 9 2001

Plenary Session, Andre Mysyrowicz, Chair

19:00 **Jakob Yngvason, Univ. of Vienna**, "The ground state of a dilute Bose gas: Facts, expectations and open questions"

19:30 **Mikhail Lukin, ITAMP**, "Trapping and storage of light in matter"

18:00 **Victor Klimov, Los Alamos National Labs**, "Multiparticle interactions and optical gain in nanocrystal quantum dots"

B.E.C., entanglement, and squeezing

J. Yngvason, Chair

18:50 **David Feder, NIST**, "Dark solitons and vortex rings in trapped Bose condensates"

19:10 **Michael G. Moore, ITAMP**, "Generating entangled atom-photon pairs from Bose-Einstein condensates"

19:30 **Robin Cole, University of Connecticut**, "Entanglement with Rydberg atoms"

19:50 **Mark Hillery, Hunter College, CUNY**, "Quantum Cryptography and Squeezed States"

20:10

Quantum Computing and Searching

Andreas Klappenecker, Chair

Jean-Luc A. Brylinski, Pennsylvania State University, "Invariant theory for n qubits"

Rancee Brylinski, Pennsylvania State University, "Invariant polynomial functions on systems of qubits"

Vladimir Shalaev, MMSU, "Plasmonic Nanomaterials"

Valy Vardeny, University of Utah, "Laser action in pi-conjugated polymer films and microcavities"

Hui Cao, Northwestern University, "Generation of coherent light from disordered nanostructures"

David Smith, UC San Diego, "Negative refractive index in structured metamaterials"

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Wednesday Morning January 10 2001

Plenary Session, Marlan Scully, Chair

7:30 **Joseph W. Haus**, *University of Dayton*, "Solitons in Lasers"

8:00 **James Gordon**, *Lucent Technologies*, *Solitons*

8:25 **Herman Haus**, *MIT*, *Solitons*

Solitons

Joe Haus, Chair

9:00 **Iidar Gabitov**, *LANL*, "Dispersion Managed Solitons"

Non-linear Optics

Robert W. Boyd, Chair

Gerard Mourou, *University of Michigan*, "Relativistic Nonlinear Optics in the Single-Cycle, Single Wavelength Regime"

New X-Ray Sources and Applications

Szymon Suckewer, Chair

Roger Falcone, *UC Berkeley*, "Coherent Phonon Observation by Time Resolved X-Ray Lasers"

9:20 **Herbert Winful**, *University of Michigan*, "Raman Gap Solitons"

Philip Sprangle, *NRL*, "Stable Laser Pulse Propagation in Plasma Channels for X-Ray Lasers"

9:40 **Alejandro Aceves**, *University of New Mexico*, "Recent progress on pulse propagation in nonlinear optical fiber gratings"

Robert Lucht, *Texas A&M University*, "Time-Dependent Numerical Simulation of Polarization Spectroscopy and Degenerate Four-Wave Mixing"

— Break —

Plenary Session, Herschel Pilloff, Chair

10:20 **Linn Mollenauer**, *Bell Labs*, *General Interest*

10:50 **Rufus L. Cone**, *Montana State University*, "Spectroscopy of Rare Earth Materials from 20 Hz to Hundreds of Electron Volts"

Coherence in Semiconductors

Susanne Yelin, Chair

11:20 **L. J. Sham**, *UC San Diego*, "Theory of ultrafast light manipulation of spin-excitations in nanodots for quantum computing"

Spectroscopy of Solids, with Applications

Rufus L. Cone, Chair

Charles W. Thiel, *Montana State University*, "Systematics of Rare Earth Crystal Band Structure by Photoemission for Design of Laser and Hole Burning Materials"

New X-Ray Sources and Applications

Roger Falcone, Chair

Mike Key, *LLNL*, "Hard X-Ray Emission with Petawatt Laser"

11:40 **Gian Salis**, *UCSB*, "Optical manipulation of nuclear spin by a two-dimensional electron gas"

Geoffrey J. Pryde, *Montana State University*, "Compact Laser Frequency Stabilization at 1.5m using Spectral Hole Burning"

David Attwood, *UC Berkeley*, "X-Ray and EUV Radiation for Microscopy and Lithography"

12:00 **Dave Bacon**, *UC Berkeley*, "Quantum Computing using only the Exchange Interaction"

W. R. Babbit, *Montana State University*, "Optical Coherent Transient Signal Correlators: Science and Applications"

Margaret Murnane, "Time-Resolved Observation of Ultrafast Soft X-Ray Pulses"

12:20 **Hyatt M. Gibbs**, *University of Arizona*, "Quantum Correlations in the Nonperturbative Regime of Semiconductor Microcavities"

Markus Pollnau, *Swiss Federal Institute of Technology*, "Spectroscopy of energy-transfer processes between rare-earth ions in glasses and crystals"

Jim Dunn, *Livermore*, talk on X-ray laser

12:40 **Charles Santori**, *Stanford*, "Triggered single photons and polarization-entangled photon pairs from a quantum dot"

Andrew J. Steckl, *University of Cincinnati*, "Excitation mechanisms in rare-earth-doped GaN electroluminescent structures"

Susanne Quabis, *Universitat Erlangen-Nurnberg*, "Focusing light to a tighter spot"

Wednesday Evening January 10 2001

Plenary Session, Boris Zeldovich, Chair

19:00 **Carlos Stroud**, *University of Rochester*, "Efficient Information Processing in Rydberg Atoms"

19:30 **Marian Scully**, *Texas A&M University*, "Quantum Heat Engines"

18:00 **Olga Kocharovskaya**, *Texas A&M University*, "Quantum Coherence Effects: Solids vs. Gases"

Coherence Effects

Olga Kocharovskaya, Chair

18:50 **Philip Hemmer**, *Civ AFRL/SNHC*, "Dark Resonances in Solids: Materials Issues and Applications"

19:10 **Kohzo Hakuta**, *University of Electro Communications, Japan*, "Parametric process using strongly driven Raman coherence in solid hydrogen"

19:30 **Alexei V. Sokolov**, *Stanford*, "Coherent Control of Multi-photon Ionization on a Few-Femtosecond Time Scale"

19:50 **Yifu Zhu**, *Florida International University*, "Observations of absorptive photon switching and suppression of two-photon absorption in cold atoms"

20:10

Spectroscopy of Solids, with Applications

Stefan Kroll, Chair

Aleksander Rebane, *Montana State University*, "Burning Persistent Spectral Holes By Two-Photon Absorption"

Kevin Repasky, *Montana State University*, "Frequency Chirped Diode Laser for Spectral Hole Burning Applications"

Uwe Happek, *The University of Georgia*, "Photoconductivity Studies of LiNbO₃"

Stefan Kroll, *Lunds Universitet*, "Implementation of quantum gates in rare-earth-ion-doped inorganic crystals"

Non-linear Optics

Robert Lucht, Chair

Steve Blair, *University of Utah*, "Optical microcavity biosensors"

Dick Slusher, *Lucent Technologies*, "Slow light in optical waveguide structures"

Langjie (Jay) Guo, *University of Michigan*, "Fabrication of Nanoscale Photonic Structures"

Frank Wise, *Cornell*, "Optical Spatiotemporal Solitons"

Thursday Morning January 11 2001

Plenary Session, Moshe Shapiro, Chair

7:30 **Seth Lloyd**, *MIT, Quantum Computing*

8:00 **H. Rabitz**, *Princeton*, “Control of Molecular Motion: The Molecule Knows Best”

‡ **Galina Khitrova**, *University of Arizona*, “Quantum Wells Coupled by Light”

Coherent Control

H. Rabitz, Chair

9:00 **Wendell T. Hill, III**, *University of Maryland*, “Hidden Correlation in Strong-Field Dissociative-Ionization: A Possible Route for Quantum Control”

9:20 **Roland Allen**, *Texas A&M University*, “Mechanisms for Laser Control of Chemical Reactions”

9:40 **Astrid Mueller**, *MPQ*, “Two Aspects of Ultrafast Photodynamics: Molecular Photoionization and Coherent Control of Molecular Fragmentation and Photochemical Reactions Involving Conical Intersections”.

Coherence Effects

Thomas W. Mossberg, Chair

Boris Zeldovich, *CREOL/UCF*, “Can the Inewidth be much narrower than transition probability?”

Alexey Belyanin, *Texas A&M University*, “Inversionless Lasing with self-generated driving fields”

Zameer Hasan, *Temple University*, “Thin Eu3+: CaS films for coherent control of electronic and nuclear states”

Quantum Computing

Seth Lloyd, Chair

K. Kompa

Goong Chen, *Texas A&M University*, “An Exponentially Fast Quantum Search Algorithm”

Todd Pittman, *Johns Hopkins University*, “Quantum logic using photon-exchange interactions: theory and experiment”

— Break —

Pulse Propagation

Chuck Bowden/Alex Gaeta, Chair

10:20 **Alex Gaeta**, *Cornell*, “Spatio-Temporal Collapse Dynamics of Light Pulses”

10:40 **Nesbet Akozbek**, *AMCOM*, “White-light continuum generation, filamentation and transverse ring formation during the propagation of ultra-short laser pulses propagating in air”

11:00 **Jerry Moloney**, *Tucson*,

“Fast” Light

Philip Hemmer, Chair

L. J. Wang, *NEC*, “Negative Group Velocity”

Philip Sprangle, *NRL*, “Comments on Superluminal Laser Pulse Propagation”

Michael Stenner, *Duke University*, “Quantum limits to superluminal pulse advancement”

Wigner Distribution

Leon Cohen, Chair

Letizia Lo Presti, “Application of the Wigner Distribution to non-linear systems”

Les Atlas, *University of Washington*, “Fault Analysis of Machines”

Patrick Loughlin, *University of Pittsburgh*, “Generalized Wigner Distribution Analysis of Human Balance”

Coherence Effects

Alexey Belyanin, Chair

11:20 **Jean-Claude Diels**, *University of New Mexico*, “Wimpy filaments in the UV sho more promise than their IR counterpart”

11:40 **Gadi Fibich**, *Tel Aviv University*, “Vectorial effects in self-focusing and in multiple filamentation”

Susanne Yelin, *ITAMP*, “Proof and potential of double dark resonances”

Gilbert Hoy, *Old Dominion University*, “The coherent-path model of resonant gamma-ray scattering: answers and questions”

Quantum Information

Mikhail Lukin, Chair

12:00 **Richard Chang**, *Yale*, “Recent Studies on the Interactions of fs-Laser Beam with Micron-sized Droplets”

12:20 **Gary Carter**, *UMBC*, “Dispersion-Managed Solitons at 10, 20, and 40 Gbs”

12:40 **Andre Mysyrowicz**, *Ecole Polytechnique, Paris*, “Self-guided propagation of femtosecond laser pulses in air”

Min Xiao, *University of Arkansas*, “Atomic Coherence Effects inside an Optical Cavity”

Michael Crenshaw, *AMCOM*, “On quantization of the field in dielectrics”

Mary Rowe, *NIST*, “Experimental Violation of Bell’s Inequalities with Efficient Detection”

Janos Bergou, *Hunter College, CUNY*, “The Correlated Emission Laser and the CEL Gyro”

Paolo Tombesi, *University of Camerino*, “Complete quantum teleportation exploiting EIT”

Thursday Evening January 11 2001

Plenary Session, Shi-Yao Zhu, Chair

19:00 **Willem L. Vos**, *Universiteit van Amsterdam*, "3D photonic crystals with internal light sources"

19:30 **Ron Walsworth**, *Harvard*, "Multidisciplinary applications of laser-polarized noble gas NMR"

18:00 **Robert W. Boyd**, *University of Rochester*, "Nonlinear Optical and Quantum Optical Imaging"

Photonic Bandgap

Willem L. Vos, Chair

18:50 **Shi-Yao Zhu**, *Hong Kong Baptist University*, "Spontaneous emission in anisotropic photonic crystals with an incomplete band gap"

19:10 **Thomas W. Mossberg**, *University of Oregon*, "Spontaneous Radiative Decay in a 1-D Photonic Bandgap: Experimental study in Er-doped Fiber Bragg Gratings"

19:30 **Chuck Bowden**, *US Army Aviation and Missile Command*, "Dispersive and Nonlinear Properties of Finite One Dimensional Photonic Band Gap Materials"

Quantum Imaging

Dmitry Strekalov, Chair

Alexander Sergienko, *Boston University*, "Hyperentanglement in femtosecond parametric down conversion"

John Clauser, *John Clauser & Assoc.*, "Refractive-Index Imaging and the Talbot effect with polychromatic x-rays"

Yanhua Shih, *UMBC*, "Quantum entanglement and Lithography"

Dmitry Strekalov, *JPL*, "Two-photon interferometry for high-resolution imaging"

Quantum Optics

Frank Narducci, Chair

Mathias Perrin, *Institute for Nonlinear Physics, Nice, France*, "On the collective interaction between radiation and atoms in the presence of recoil and collisions"

Frank Narducci, *ONR*, "Laser Cooling in a High Finesse Cavity"

Ben Varcoe, *MPQ*, "Recent progress on the micromaser"

Jeff Lundeen, *University of Toronto*, "Nonlinear optics with less than one photon"

19:50

20:10