

2001 TOPICAL GROUP ON PRECISION MEASUREMENT AND FUNDAMENTAL CONSTANTS ELECTION

Members of the APS Topical Group on Precision Measurement and Fundamental Constants:

This year, a Vice-Chair, a Secretary-Treasurer, and two Executive Committee Members-at-Large are to be elected. At the close of the 2001 Annual Meeting, the current Chair, Peter Mohr, will become Past-Chair, the Chair-Elect, Richard Deslattes, will advance to Chair, the Vice-Chair, Blayne Heckel, will advance to Chair-Elect, and two Members-at-Large, Ralph Conti and Steven Lamoreaux, will rotate off the Executive Committee. The new Secretary-Treasurer will serve for a three-year term. The following candidates were selected by the Nominating Committee, consisting of Siu-Au Lee (Chair), John Price, and Winthrop Smith. Please mark and sign the attached ballot and mail to:

Wayne Itano
National Institute of Standards and Technology
Mail Stop 847.10
325 Broadway
Boulder, CO 80305-3328

Ballots must be received by Friday, April 6, 2001 to be counted.

Candidate Biographies

VICE-CHAIR (ONE POSITION):

JAMES FALLER

Positions:

1996-present: Chief, Quantum Physics Division of NIST;
1973-present: Professor Adjoint, Department of Physics,
University of Colorado; 1972-present: NIST Senior Scientist
and Fellow of JILA.

Main Research Interests:

Research interests include geophysics, experimental relativity, fundamental constants, and precision measurement experiments designed to look for possible invalidations of accepted physical laws at some extreme of magnitude. Two examples of ongoing research are a new measurement of G in which one measures with exquisite accuracy the (small) deflection of a pair of freely hanging Fabry-Perot mirrors resulting from their being attracted by 500 kg of tungsten mass. Also a small, and rapid (3 measurements per second) free-fall absolute gravimeter is being developed. In this extremely portable new instrument, two co-rotating cams are used to effect all the necessary mechanical tasks, *i.e.*, dropping, catching, and returning to the start and by driving an appropriate auxiliary mass keeping the instrumental center of mass fixed—thus avoiding systematic recoil effects.

Other Activities and Awards:

Fellow of APS, OSA, AGU, and AAAS; Member IAU; Member AGU Public Information Committee; Chair, University of Colorado Institute Directors Council, 2000-present; Associate Chair of JILA, 1999-present; Chairman of JILA, 1995-1996; Member of National Science Foundation Advisory Panel for Physics, 1976-1979; APS Joseph F. Keithley Award, 2001; Federal Laboratory Consortium Technology Transfer Award, 1992; Department of Commerce Gold Medal, 1990; NASA Exceptional Scientific Achievement Medal, 1973; NASA Group Achievement Award, 1973; Alfred P. Sloan Fellowship, 1972-1973; National Bureau of Standards Precision Measurement Award, 1970; Arnold O. Beckman Award of the ISA, 1970.

TIMOTHY CHUPP

Positions:

Professor, Physics Department, University of Michigan 1994-present; Associate Professor, 1991-1994; Assistant and Associate Professor, Harvard University 1985-1991; Post-Doc, Instructor and Assistant Professor, Princeton University, 1983-1985; PhD, University of Washington, 1983.

Main Research Interests:

My field is precision measurement. This means symmetry tests of fundamental interactions, the physics of spin, and

polarization techniques applied to the following: (1) Tests of the underlying principles of relativity, quantum mechanics and quantum information that exploit coherence and control in NMR experiments with laser polarized noble gases. (2) Time reversal and parity symmetry violation studies of elementary particle interactions including measurement of electric dipole moments of heavy stable and rare atoms and spin correlations in the interactions and decay of spin polarized neutrons. (3) The development of measurement techniques using laser polarized ^{129}Xe in biophysics, neuroscience and medicine, NMR and MRI of laser polarized ^{129}Xe in biological molecules and in vivo. (4) The growth of true interdisciplinary research areas of research at the interfaces of traditional disciplines such as medicine, neuroscience, and physics or measurement science, quantum information, and electrical engineering.

Other Activities and Awards:

APS Fellow, Nominating Committee Member, 1993 I.I. Rabi Prize, Sloan Fellowship, Presidential Young Investigator, University of Michigan Faculty Recognition Award. NIST Precision Measurement Grant Reviewer, NSF and NASA Review Panels, Organizing Committees of Conferences in US, Japan and Europe. My commitments to outreach include development of non-science major courses "Inward Bound" and "Physics of the Mind and Body," Saturday Morning Physics Public Lectures "Nuclear Magnets," alumni lectures, Intel International Science Fair Judge and Awards Presenter (Optics), and Ann Arbor Public Schools Science Advisory Committee.

SECRETARY-TREASURER (ONE POSITION)

DAVID SHINER

Positions:

Associate Professor of Physics, University of North Texas (2000-present); Asst. Prof. (1994-2000); Assoc. Research Physicist and Lecturer, Yale University (1989-1994); Ph.D., University of Michigan (1988).

Main Research Interests:

(1) Developing and using precise laser and electro-optic technology to test theoretical advances in the helium atom. (2) Determining an "atomic physics" value of the fine structure constant alpha using helium fine structure. (3) Tests of few-body nuclear theory through precise measurement of nuclear charge radii.

Other Activities:

Member APS-TGPMFC, APS-DAMOP, APS-DNP, OSA.

ALVIN J. SANDERS

Positions:

Department of Physics and Astronomy, University of Tennessee, Asst. Prof., 1988-present; Oak Ridge National Laboratory, Res. Assoc., 1995-present; Tennessee Valley Authority, Planner and Economist, 1980-1987; Office of State Planning, Commonwealth of Massachusetts, Planner and Chief Planner, 1974-1979; Quality of Environment Program, The Rockefeller Foundation, Program Associate, 1971-1973; Ph.D., Tufts University, 1972 (Decay Properties of Cascade Hyperons).

Main Research Interests:

Gravitation and diffraction. Al Sanders is the P.I. of Project SEE (Satellite Energy Exchange), a next-generation NASA-funded project to probe the nature of gravitation (*Class. & Quantum Grav.* **17** (2000), 2331-2346 and previous citations therein). Project SEE involves making precise observations of the orbits of two test bodies in low-Earth orbit and then fitting the resulting data to alternative models of gravitation. The test bodies will be free-floating within a drag-free capsule having ultra-low internal gravity (zero in principle) and very precise control of temperature, jerk rate, etc. The experimental results are expected to give the most accurate measurements to date of the gravitational constant G and of G -dot, and the most stringent tests to date of the inverse-square-law at distances of both a few meters and the radius of the Earth. Three patents have been granted to Al for spin-offs from the SEE capsule design (for nanogravity laboratory, jerk-free stationkeeping thrust, and Fresnel-diffraction-based micron-accuracy absolute ranging), and a fourth patent is pending (for rapid Fresnel diffraction analysis for use in micron-accuracy absolute ranging).

Other Activities and Awards:

Editorial board of Gravitation and Cosmology; committee which prepared the Roadmap for the NASA Fundamental Physics in Microgravity program (1998); organizing committee for Asia-Pacific International Conference on Gravitation (Moscow, September, 2001); faculty of Erice summer school in gravitation (1998 & 2001).

EXECUTIVE COMMITTEE MEMBER-AT-LARGE (TWO POSITIONS):

LUIS OROZCO

Positions:

Associate Professor, SUNY Stony Brook, 1997-present; Assistant Professor, SUNY Stony Brook, 1991-96; Postdoctoral Associate, Harvard University, 1987-90; Ph D., University of Texas at Austin; 1987.

Main Research Interests:

Precision spectroscopy in trapped atoms, parity non-conservation in francium, quantum optics, cavity QED.

Other Activities and Awards:

APS Fellow, Guggenheim Fellow, DAMOP program committee (1998-2000), QELS program committee (2000-2001).

HO JUNG PAIK

Positions:

Professor, University of Maryland, 1989; Associate Professor, University of Maryland, 1983; Assistant Professor, University of Maryland, 1978; Ph.D., Stanford University, 1974.

Main Research Interests:

(1) Detection of gravitational waves. I developed the original superconducting transducer with SQUID readout and am collaborating with LSU on Allegro. (2) Null tests of Newton's law of gravity. Our superconducting gravity gradiometer experiment set the best limit at 1 m. Our proposal for a millimeter-scale experiment is pending. (3) Search for spin-mass interaction. We are conducting a superconducting accelerometer experiment with an aim of approaching the axion limit. (4) Precision measurement of G with a laboratory planetary system. We have proposed a cryogenic experiment with expected resolution of 1 ppm.

Other Activities and Awards:

Member APS TG/PMFC and Gravitation, review panels for NASA Astrophysics and Dutch Science Foundation (1997-1998), Science Teams for GEOID and STEP missions (1992-1997), Science Coordinating Committee for NASA Gravitation Program (1988-1993), NASA Committee on Gravitation Physics and Astronomy (1989-1991), Sloan Fellowship (1981-1983).

STEVEN ROLSTON

Positions:

Staff Physicist, Atomic Physics Division, NIST (1988-present), Post-Doctoral Research Associate, Harvard University (1987-1988), University of Washington (1986-1987), Ph.D. State University of New York at Stony Brook (1986).

Main Research Interests:

Quantum computing with atoms trapped in optical lattices development of a system to study atoms trapped in the sites

of an optical lattice as potential qubits for quantum information processing systems. Bose-Einstein condensation, with focus on the development of atom optical tools for manipulation of matter waves: Recent research has included development of an atom laser, Bragg scattering of matter waves off light gratings, four-wave mixing of matter waves, and creation of dark solitons in a BEC. Ultracold neutral plasmas: By photoionizing a laser-cooled sample of xenon atoms, we have formed the coldest neutral plasma ever created. Current research includes observation of plasma oscillations, and the formation of Rydberg atoms through recombination. Neutral atom frequency standards: Investigation of laser cooling techniques such as Raman cooling for future implementation in ground and space-based neutral atom atomic clocks.

Other Activities and Awards:

APS Fellow; Member APS DAMOP, DLS, TG/PMFC; Department of Commerce Silver Medal (1996); Chair, 2001 Atomic Physics Gordon Research Conference; Vice-Chair, 1999 Atomic Physics Gordon Research Conference; Chair, Lasers in Physics Subcommittee, ILS 2000; Chair, DAMOP Publications Committee 1997.

DAVID A. CHURCH

Positions:

Professor of Physics since 1984; Associate Professor, 1981; Assistant Professor, 1975, Texas A&M University; Physicist, Lawrence Berkeley Lab 1972-75; Postdoctoral Associate at University of Arizona 1971-72, University of Mainz 1969-71, University of Bonn 1969. Ph. D. in Physics, University of Washington, 1969.

Main Research Interests:

Ion confinement in Penning, Paul, and Kingdon traps; capturing and cooling highly-charged ions to an ordered state by elastic collisions with laser-cooled Be ions; studies of strongly-coupled plasma properties; lifetimes of ion levels decaying by allowed and forbidden transitions; laser-microwave spectroscopy of ground state fine- and hyperfine-structure, and g -factor of the bound electron of highly-charged ions; quantum information research; and low-energy electron transfer collisions of highly-charged ions.

Other Activities and Awards:

Fellow and life member, APS (1986); member APS-DAMOP, APS-TG/PMFC, APS-DLS; Recipient, NBS Precision Measurement Grant (1981-84); Associated Western Universities Fellow, (1992-94); former member, NSF review panel on laboratory instrumentation, DOE Nevada EPSCoR site review panel; present or former research collaborations at LBL, LLNL, JPL, ANL, BNL, ORNL, SSRL, University of Tennessee, University of Nevada at Reno.