

The American Physical Society

Division of Electron and Atomic Physics

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1972 I

TO MEMBERS OF THE DEAP from Francis Pichanick

Arrangements For the Washington Meeting

(a) Executive Committee

The committee has a meeting scheduled for 8 p.m. on Sunday April 23. Members are welcome to communicate to me any matters they wish brought to the attention of the committee. Since my last letter two members of the committee have been added under one-year appointments by the chairman. They are Keith Jefferts (Bell Laboratories) and Howard Shugart (UC Berkeley).

(b) Program Committee

A meeting is scheduled for noon on April 25. The agenda will be symposia and invited speakers for the Annual Meeting at Stanford Research Institute, Nov. 29 - Dec. 1, 1972. Suggestions for topics and speakers from the membership will be most welcome; write to the program committee chairman, King Walters, at the above address. Topics already suggested include: Interstellar molecules/kinetics; e^- scattering/resonances near threshold; polarized electrons and atoms/new techniques; laser interactions with atoms/strong-field effects; plasma diagnostics in spectroscopy and scattering; positronium and muonium; picosecond spectroscopy; beam and beam-foil experiments in rf spectroscopy; angular correlations in ESCA (diatomic molecules); spin-exchange cross-sections at thermal energies; pseudopotential methods; atoms in very strong magnetic fields; Landau-Zener/semi-classical approaches (limits of utility); synchrotron UV; surface physics.

(c) Symposia to be presented in Washington

(i) Fundamental Constants and Precision Measurements - organized by Peter Bender, JILA.

1. "The Speed of Light: Progress in the Measurement of the Frequency of the Methane Stabilized He-Ne Laser."
K. M. EVENSON, NBS Boulder.
The Synthesis of infrared frequencies to 88 THz has recently been accomplished.¹ The frequency of a cw helium-neon laser tuned to the methane absorption line at 3.39 μm was measured at the National Bureau of Standards and found to be 88.376245 (55) THz. A second round of experiments to increase the accuracy of this measurement is now well under way. The laser frequency can be combined with the value of the wavelength to obtain a new value of c . The wavelength is being determined by Barger and Hall at JILA and NBS, where the experimental part of the measurement has been completed and systematic errors are now being analyzed. It is also being determined by Giacomo at the BIPM. The accuracy of the frequency measurement should be good to a few parts in 10^9 , and the wavelength measurement should be good to the limits of the present length standard (about 1 part in 10^8). Thus, the value of c obtained from these measurements will be a definitive value. Progress in this series of measurements will be described.

¹K. M. Evenson, G.W. Day, J.S. Wells, and L.O. Mullen, Appl. Phys. Letters, Feb. 1, 1972.

2. "New High-Accuracy Gravimeters and Their Geophysical Application."

W. A. PROTHERO, JR., UC San Diego

The problem of measuring ground displacement will be defined in terms of geophysical parameters as well as scientific relevance, from the speaker's viewpoint. The Block-Moore quartz torsion fiber accelerometer and the Prothero-Goodkind superconducting gravimeter will be discussed, evaluated, and compared to conventional instruments. Data will be presented. Future applications to earthquake prediction, underground explosion monitoring, a test of general relativity using earth tide amplitudes and studies of the earth's crust and upper mantle will be discussed.

3. "Saturation Spectroscopy with Tunable Dye Lasers."

T.W. HANSCH, Stanford University.

The development of tunable dye lasers with a bandwidth in the MHz range has opened the way to the study of visible atomic spectral lines via a sensitive and convenient technique of saturation spectroscopy eliminating Doppler-broadening by spectral hole burning. Problems and methods of obtaining ultranarrowband emission from repetitively pulsed dye lasers are discussed. The hyperfine structure of alkali resonance lines has been resolved. These experiments permitted a time resolved observation of velocity changing elastic collision with buffer gas atoms. It has also been possible to resolve single fine structure components of visible Balmer lines of atomic hydrogen and to observe the Lamb shift directly in the optical absorption spectrum. The implication for a new precision determination of the Rydberg constant are discussed.

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†NATO Postdoctoral Fellow.

(ii) The Physics of Planetary Atmospheres - organized by Neal Lane, Rice University.

1. "Evolution of the Planetary Atmospheres."

M.B. MCELROY, Harvard University.

2. "Comparative Aeronomy of Planetary Atmospheres."

T. DONAHUE, University of Pittsburgh.

3. "Atmospheric Oxygen: Can it Change?"

J.G.C. WALKER, Yale University.

Estimation of the sources and sinks of atmospheric oxygen yields rates that are large enough, compared to the atmospheric reservoir, to cause substantial changes in five million years. The fossil record indicates that atmospheric oxygen has been relatively constant in amount during a period of time larger by two orders of magnitude. Some negative feedback mechanism must therefore control the amount of oxygen in the atmosphere. It appears that the controlling process is the oxidation of organic detritus in ocean sediments.

(d) Presentation of the 1972 Davisson-Germer Prize

The 1972 Davisson-Germer Prize, donated by Bell Laboratories, has been awarded to Erwin W. Mueller of Pennsylvania State University. The prize will be presented during the Washington meeting with the citation "For the invention of the field ion microscope and its application to the study of surfaces at the atomic level." The division expresses its congratulations to Prof. Mueller and its appreciation to the prize committee which was chaired by Ron Geballe.

News of the Division

(a) Deadline For the 1972 Annual Meeting

Mailing delays for the Bulletin have resulted in the deadline date for contributed paper being put forward to September 8. Many people are returning to their institutions from their summer locations at this time, and such people should think in terms of submitting their abstracts before leaving for the summer. Abstracts can be sent at any time to King Walters at the above address.

(b) Bederson Report

You should all have received copies of the report of the National Academy of Sciences Committee on Atoms and Molecules, chaired by Ben Bederson. We hope that this report will have a significant impact on national support for research in our field. Please see that your copy receives a wide circulation at your institution or corporation, to department heads, deans, research directors and vice-presidents. It should be of interest to chemists, engineers, astronomers, life scientists and environmentalists, and may be of interest to your local congressmen. We are grateful to Ben and his committee for their fine presentation.

(c) Symposium on Chemisorption

The DEAP is co-sponsoring a symposium on Chemisorption at the APS meeting in Atlantic City March 27-30, 1972. This has been organized by Thor Rhodin.

(d) 1973 Annual Meeting

The Physics Department at Yale will be our hosts for our 1973 Annual Meeting December 5-7.