

PUBLICATIONS

- L. C. Aamodt and J. C. Murphy, "Thermal Effects in Photothermal Spectroscopy and Photothermal Imaging," *J. Appl. Phys.* **54**, 581-591 (1983).
- M. H. Acuna and J. K. Alexander (NASA), R. A. Brown (Space Telescope Scientific Inst.), T. W. Hill (Rice Univ.), S. M. Krimigis and L. J. Lanzerotti (APL), and G. L. Siscoe (Univ. Calif.), "Physics of the Jovian and Saturnian Magnetospheres," *Space Sci. Rev.* **34**, 1-24 (1983).
- R. H. Andreo, "Closure Hypotheses from the Method of Smoothing for Coherent Wave Propagation in Discrete Random Media," *Opt. Lett.* **8**, 82-84 (1983).
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- G. L. Dugger, D. Richards, E. J. Francis, L. L. Perini, and W. H. Avery (APL) and P. J. Ritzcoven (DOE), "OTEC Energy Products and GEOTEC Plants," in *Solar Engineering*, W. D. Turner, ed., American Society of Mechanical Engineers, New York, pp. 409-419 (1982).
- R. W. Flower and A. Patz, "Retinopathy of Prematurity and the Role of Oxygen," in *Oxygen and Living Processes: An Interdisciplinary Approach*, D. L. Gilbert, ed., Springer-Verlag, pp. 368-374 (1981).
- J. A. Frantz, D. M. Sunday, and C. R. Thompson, "An Interface to Distribute Hospital Registration Data," in *Proc. 6th Symp. on Computer Applications in Medical Care*, pp. 920-922 (1982).
- M. H. Friedman, O. J. Deters, F. F. Mark, and C. B. Barger (APL) and G. M. Hutchins (JHMI), "Arterial Geometry Affects Hemodynamics," *Atherosclerosis* **46**, 225-231 (1983).
- M. Fristrom, "Comments on Quenching Mechanisms in the Microprobe Sampling of Flames," *Combust. Flame* **50**, 239-242 (1983).
- W. J. Geckle and M. M. Feen, "Evaluation of the Ionospheric Refraction Correction Algorithm for Single-Frequency Doppler Navigation Using TRANET-II Data," in *IEEE Position Location and Navigation Symp. Record*, pp. 13-21 (1982).
- J. Goldhirsh, "A Parameter Review and Assessment of Attenuation and Backscatter Properties Associated with Dust Storms over Desert Regions in the Frequency Range of 1 to 10 GHz," *IEEE Trans. Antennas Propag.* **AP-30**, 1121-1127 (1982).
- J. Goldhirsh and J. R. Rowland, "A Tutorial Assessment of Atmospheric Height Uncertainties for High-Precision Satellite Altimeter Missions to Monitor Ocean Currents," *IEEE Trans. Geosci. Remote Sensing* **GE-20**, 418-434 (1982).
- J. L. Green (NASA), N. A. Saflekos (Boston College), D. A. Gurnett (Univ. Iowa), and T. A. Potemra (APL), "A Correlation Between Auroral Kilometric Radiation and Field-Aligned Currents," *J. Geophys. Res.* **87**, 10463-10467 (1982).
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- L. W. Hall, Jr., D. T. Burton, and P. R. Abell, "Thermal Responses of Atlantic Silversides (*Menidia menidia*) Acclimated to Constant and Asymmetric Fluctuating Temperatures," *Arch. Hydrobiol.* **94**, 318-325 (1982).
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- J. R. Kuttler and V. G. Sigillito, "Frequencies of Limacons and Cardioids That Have Applications to Waveguides and Mitral Values," *J. Sound Vib.* **84**, 603-605 (1982).
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- C.-I. Meng, "Case Studies of the Storm Time Variation of the Polar Cusp," *J. Geophys. Res.* **88**, 137-149 (1983).
- T.S. Margulies, "Risk Analysis of Li-qualified Natural Gas Transport," *Johns Hopkins APL Tech. Dig.* **3**, 325-341 (1982).
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- L. Monchick, "Boundary Conditions and Reversibility in Diffusion Controlled Reactions," *J. Chem. Phys.* **78**, 1808-1814 (1983).
- R. R. Newton, "The Authenticity of Ptolemy's Star Data - II," *Q. J. R. Astron. Soc.* **24**, 27-35 (1983).
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- S. M. Krimigis, "Hot, Multicomponent Plasmas in the Magnetospheres of Jupiter and Saturn: Results from Voyager," Astronomy Seminar, Univ. Hawaii (12 Nov 1982).
- B. H. Mauk and C.-I. Meng, "The Modeling of Geostationary Particle Features Using the 'Injection Boundary' Approach," Univ. New Hampshire Seminar, Durham (7 Oct 1982).
- C.-I. Meng (APL) and R. R. Babcock and R. E. Huffman (Air Force Geophysics Lab.), "Ultraviolet Imaging for Auroral Zone Remote Sensing," 21st AIAA Aerospace Sciences Meeting, Reno (10-13 Jan 1983).
- T. O. Poehler, "Optical Switching and Memory of Organometallic Charge Transfer Materials," Martin Marietta Seminar, Baltimore (7 Jan 1983).
- R. S. Potember, "Optical Switching in Organic Semi-conductor Complexes," International Conf. on the Physics and Chemistry of Synthetic and Organic Metals, Les Arcs, France (15 Dec 1982).

The following papers were presented at the Nobel Symp., Kiruna Geophysical Institute, Sweden (22-26 Mar 1982):

- R. A. Greenwald, "Significance of Scatter Radar Studies of E- and F-Region Irregularities at High Latitudes;"
- T. A. Potemra, "Birkeland Currents: Present Understanding and Major Remaining Questions."

The following papers were presented at the Saturn Workshop, Univ. Arizona, Tucson (11-15 May 1982):

- J. F. Carbary and S. M. Krimigis, "Charged Particle Periodicity in the Saturnian Magnetosphere;"
- S. M. Krimigis (APL) and T. P. Armstrong (Univ. Kansas), "Two-Component Proton Spectra in the Inner Saturnian Magnetosphere."

The following papers were presented at the 1982 Spring AGU Meeting, Philadelphia (31 May - 4 Jun 1982):

- K. B. Baker and R. A. Greenwald, "Improved Correlations between STARE and GEOS-2 Electric Fields Using a Dynamic Modification of Magnetic Field Models;"
- J. F. Carbary, E. P. Keath, and S. M. Krimigis, "Microsignatures of Saturn's Satellites;"
- H. W. Dodson, E. R. Hedeman, and E. C. Roelof, "Difference in Electromagnetic Spectra of Large H_{α} Flares in Solar Magnetic Fields of Different Orientations;"

- R. E. Gold and E. C. Roelof, "The Evolution of Solar Wind Velocity at Fixed Heliographic Longitude;"
- E. P. Keath, J. F. Carbary, S. M. Krimigis, and E. C. Roelof, "Low Energy Charged Particle Anisotropies in the Saturnian Magnetosphere;"
- S. M. Krimigis (APL) and T. P. Armstrong (Univ. Kansas), "Observations of Low Energy Ions Inside the Orbit of Mimas by Voyager-2;"
- A. T. Y. Lui and S. M. Krimigis, "Plasma Heating Events in the Geomagneto-tail;"
- B. H. Mauk and C.-I. Meng, "Characterization of Near Geostationary Particle Signatures Based on the 'Injection Boundary' Model;"
- C.-I. Meng, "Storm Time Variation of the Polar Cusp;"
- D. G. Mitchell, J. F. Carbary, and P. F. Bythrow, "Zonal Wind Generation of Saturnian Spokes;"
- E. C. Roelof and D. G. Mitchell, "Detection at $\sim 35 R_c$ of Neutral Atoms ($E > 50$ keV): Charge Exchange of Ring Current Ions?;"
- T. R. Sanderson (European Space R&D Center) and E. C. Roelof (APL), "Wave-Particle Interactions at ISEE-3: 32-62 keV Upstream Ions and 0.03 Hz Waves;"
- L. J. Zanetti and T. A. Potemra (APL), W. Baumjohann (European Space R&D Center), and P. F. Bythrow (APL), "Inferred Ionospheric Currents and Electric Fields form the MAGSAT Satellite."

The following papers were presented at the 1982 Fall AGU Meeting, San Francisco (7-15 Dec 1982).

- K. B. Baker and R. A. Greenwald, "Preliminary Analysis of HF-Radar Signals Backscattered from Very High Latitude F-Region Irregularities;"
- P. F. Bythrow and T. A. Potemra, "Dawn-Dusk Birkeland Currents, Their Latitudinal Location as a Function of the Interplanetary Medium;"
- M. Candidi (National Research Council, Italy) and C.-I. Meng (APL), "The Polar Cusp Electrons, Geomagnetic Activity and the IMF;"
- J. F. Carbary and S. M. Krimigis (APL) and R. P. Lepping (NASA), "Events in the Interplanetary Medium Near Saturn;"
- M. J. Engebretson (Augsburg College), L. J. Cahill, Jr. (Univ. Minn.), T. A. Potemra and L. J. Zanetti (APL), R. L. Arnoldy (Univ. New Hampshire), and S. B. Mende and T. J. Rosenberg (Univ. Maryland), "The Relationship between Irregular Magnetic Pulsations and Field-Aligned Currents;"
- R. E. Gold and E. C. Roelof, "Fluctuations in the Coronal Emission of Solar Wind at Fixed Longitudes;"
- R. A. Greenwald (APL), J. P. Villain (Univ. Toulon, France), and K. B. Baker (APL), "An AF Radar for Studying E- and F-Region Irregularities in the Auroral Zone and Polar Cap;"

PRESENTATIONS

- L. W. Ehrlich, "The Ad-Hoc SOR Method," Elliptic Problem Solvers Meeting, Naval Postgraduate School, Monterey (11 Jan 1983).
- J. A. Giannini, J. S. Hansen, and L. W. Hart, "Experimental Measurements of Temporal Phase Shifts during Solitary Wave-Wave Interactions," 35th Annual Meeting, American Physical Soc. Division of Fluid Dynamics, New Brunswick, N.J. (1982).
- R. A. Greenwald, "High Latitude HF Radar Studies" Air Force Geophysics Lab. Seminar, Hanscom AFB, Mass. (15 Apr 1982).
- R. A. Greenwald, "New Tools for Magnetospheric Research," URSI International Symp. on Radio Probing of the High Latitude Ionosphere and Atmosphere, Fairbanks (9-13 Aug 1982).
- R. J. Klauda, "Overview of Major Ichthyoplankton Programs Conducted in the Hudson River System," 7th Annual Larval Fish Conf., Colorado State Univ., Ft. Collins (17-19 Jan 1983).
- S. M. Krimigis, "Hot Ion Plasma and Electron Resonances in Saturn's Magnetosphere: Results from Voyager," Seminar, Applied Physics and Information Science, Univ. Calif., La Jolla (15 Nov 1982).

- S. M. Krimigis, J. F. Carbary, and E. P. Keath (APL) and T. P. Armstrong (Univ. Kansas), "Energetic Electron Spectra in Saturn's Magnetosphere;"
- A. T. Y. Lui and C.-I. Meng, "Magnetic Field Signatures of the Neutral Sheet in the Earth's Magnetotail;"
- K. Makita (Takushoku Univ., Japan) and C.-I. Meng (APL), "The Average Electron Precipitation Pattern During Extremely Quiet Times and Its Dependence on the Magnetospheric Substorm;"
- B. H. Mauk and C.-I. Meng, "Dynamical Particle 'Injections' as the Source of Geostationary, Quiet-Time Particle Spatial Boundaries;"
- D. G. Mitchell and E. C. Roelof (APL) and S. J. Bame (Los Alamos National Lab.), "Solar Wind Iron Abundance Variations at Solar Wind Speeds $> 600 \text{ km s}^{-1}$, 1972-1976;"
- E. C. Roelof and D. G. Mitchell, "Energetic Neutral Atoms ($E > 50 \text{ keV}$) from the Ring Current: Simultaneous Measurements by IMP-7 and -8 at $\sim 35 R_E$;"
- D. Venkatesan (Univ. Calgary) and R. B. Decker, S. M. Krimigis, and E. C. Roelof (APL), "Radial Gradient of Cosmic Ray Intensity from a Comparative Study of Voyager 1 and 2 and IMP-8 Data during 1977/day 268 to 1981/day 129;"
- F. Yasuhara (Chyukyo Univ., Japan), R. A. Greenwald (APL), and S.-I. Akasofu (Univ. Alaska), "On the Rotation of the Polar Cap Potential Pattern and Associated Polar Phenomena;"
- L. J. Zanetti, P. F. Bythrow, T. A. Potemra, K. Makita, and C.-I. Meng, "Ground State of the Earth's Magnetosphere."

The following papers were presented at the 5th International Symp. on Solar Terrestrial Physics, Ottawa (17-21 May 1982):

- P. F. Bythrow and T. A. Potemra, "The Response of Birkeland Currents Observed Near the Dawn-Dusk Meridian to Variations in the IMF;"
- H. W. Dodson, E. R. Hedeman, and E. C. Roelof, "Large-Scale Solar Magnetic Fields at the Site of Flares, the Greatness of Flares, and Solar-Terrestrial Disturbances;"
- R. A. Greenwald, "Electric Fields in the Ionosphere and Magnetosphere;"
- T. A. Potemra (APL) and W. Baumjohann (Max-Planck Inst., Extraterrestrial Phys.), "On the Relationship of Birkeland and Ionospheric Currents;"
- E. C. Roelof (APL) and T. R. Sanderson (European Space R&D Center), "Wave Particle Interactions at ISEE-3: 35-62 keV Ions and 0.01 Hz Waves;"
- T. R. Sanderson, R. Reinhard, and K. P. Wenzel (European Space R&D Center), and E. C. Roelof and R. J. Smith (APL), "Ions (32-56 keV) and Waves ($\sim 0.03 \text{ Hz}$) from the Earth's Bow Shock;"
- D. J. Williams, "Generation and Decay of the Magnetospheric Ring Current."

COLLOQUIA

- Jan 7, 1983 — "Television in the 90's: A Hazard to Our Health?," F. Breitenfeld, Jr., Maryland Center for Public Broadcasting.
- Jan 14 — "Physics in Two Dimensions," D. C. Licciardello, Princeton Univ.
- Jan 21 — "Thermal Collapse of the Recombined Universe," R. C. Henry, The Johns Hopkins Univ.
- Jan. 28 — "Laser Cooling of an Atomic Beam," W. D. Phillips, National Bureau of Standards.
- Feb 4 — "The World's Evolving Energy System," M. K. Hubbert, U.S. Geological Survey (Retired).
- Feb 18 — "Gallium Arsenide Integrated Circuits," K. J. Slegler, Naval Research Lab.
- Feb 25 — "The Analog and Digital Generation of Music," G. Wright and J. Knispel, Peabody Conservatory.
- Mar 4 — "The Design of Robot Brains," E. W. Kent, National Bureau of Standards.
- Mar 11 — "Magnetism, Minerals and Archaeology," J. M. D. Coey, Trinity College (Dublin).
- Mar 18 — "Computing Language as an Intellectual Tool: From Hieroglyphics to APL," D. B. McIntyre, Pomona College.
- Mar 25 — "Diabetes Mellitus under Control: A Challenge to the Patient and the Physician," A. Georgopoulos, The Johns Hopkins Univ.

THE AUTHORS



STAMATIOS M. KRIMIGIS received the Ph.D. in physics from the University of Iowa in 1965. He remained as research associate (1965-66) and assistant professor of physics (1966-68) before joining APL in 1968. He is currently chief scientist of the Space Department.

Dr. Krimigis' research interests include the sun, the interplanetary medium, and the magnetospheres of the earth and the planets. He has

been the principal investigator or co-investigator on several NASA spacecraft. Most recently he has served as the principal investigator of the Low Energy Charged Particle experiment on Voyagers 1 and 2, designed and built at APL, and has been awarded the NASA Medal for Exceptional Scientific Achievement.



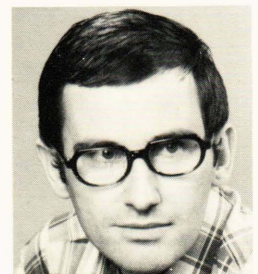
GERHARD HAERENDEL received his Ph.D. in physics from the University of Munich and has been director at the Max-Planck Institute for Extraterrestrial Physics since 1972. During 1964-1965, he spent 12 months at Caltech, with further extended U.S. visits following in 1968 (to the Lockheed Palo Alto Research Laboratory) and in 1972 (to the University of California, Berkeley). Dr. Haerendel's re-

search interests include the plasma physics of the earth's magnetosphere-ionosphere system. He has conducted numerous artificial plasma release experiments in the ionosphere and magnetosphere. He is presently council chairman of the European Incoherent Scatter Radar Facility.



RICHARD W. MCENTIRE first worked at APL as a summer employee in 1961 while he was an undergraduate. After receiving the Ph.D. degree in physics from the University of Minnesota, he returned to APL full time in 1972 as a member of the Space Department's Space Physics Group. He has worked in the development of instrumentation for balloons, rockets, and spacecraft.

Dr. McEntire's current research interests are in the dynamics of plasmas and energetic particles in planetary magnetospheres. He is presently program scientist at APL for the Energetic Particles Detector for the NASA Galileo Mission and the AMPTE program, and is lead investigator for the Medium Energy Particle Analyzer on the Charge Composition Explorer spacecraft.



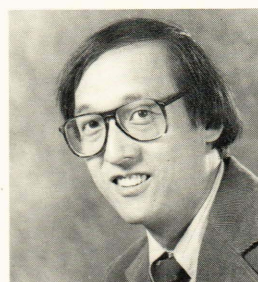
GÖTZ PASCHMANN received his Ph.D. in physics from the Technical University of Munich and since has been on the staff of the Max-Planck Institute for Extraterrestrial Physics, where he is head of the Magnetospheric Plasma Group. From 1968 to 1970, he spent 18 months as a visitor to the Lockheed Palo Alto Research Laboratory. He has also been a frequent visitor to the Los Alamos National Labo-

ratory. Dr. Paschmann has served as principal investigator of the Fast Plasma Experiment on ISEE-2. His research interests include plasma processes at magnetospheric boundaries. He is currently associate editor of the *Journal of Geophysical Research* and member of the editorial board of *Space Science Reviews*.



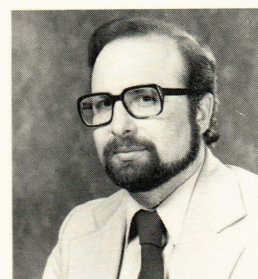
DUNCAN A. BRYANT received his Ph.D. from Imperial College, London. In 1960, with the support of a Resident Research Associateship from the National Academy of Sciences, he joined a team at the Goddard Space Flight Center investigating the propagation of solar flare particles through the interplanetary medium, and the elemental composition of cosmic rays. In 1963, at the Radio Research Station

(Slough, England), Dr. Bryant formed a group to explore the streams of charged particles that produce the aurora borealis. At the Rutherford Appleton Laboratory, he has continued his work, particularly on the pulsating aurora and the curtain-like auroral arcs formed by freshly accelerated electrons.



HARVEY W. KO was born in Philadelphia in 1944, and received the B.S.E.E. (1967) and Ph.D. (1973) degrees from Drexel University. During 1964-65, he designed communications trunk lines for the Bell Telephone Company. In 1966, he performed animal experiments and spectral analysis of pulsatile blood flow at the University of Pennsylvania Presbyterian Medical Center.

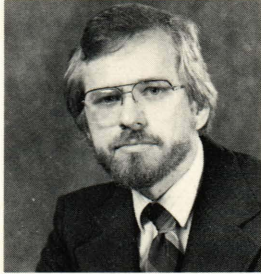
After joining APL in 1973, he investigated analytical and experimental aspects of ocean electromagnetics, including ELF wave propagation and magnetohydrodynamics. Since 1981, he has been examining radar wave propagation in coastal environments and advanced biomagnetic signal processing for encephalography. He is now on the Technical Staff of the Submarine Technology Division.



JAMES W. SARI was born in Buffalo in 1942, and received the Ph.D. degree in physics from the University of Maryland (1972). During 1972-77 he worked at the Cornell Aeronautical Laboratory. There he studied radar propagation in disturbed plasmas and was the principal investigator for studies of neutral beam propagation in the magnetosphere. During the summers he served as visiting professor at the

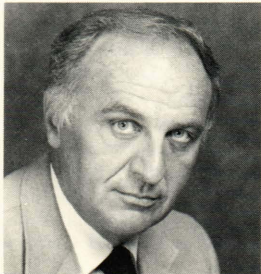
University of Maryland/Goddard Space Flight Center, investigating solar wind and cosmic-ray interactions.

Since joining the Submarine Technology Division of APL in 1977, Dr. Sari has conducted experimental and theoretical research on the geomagnetic field and ocean magnetohydrodynamics. Currently he is project scientist for the examination of radar propagation in the troposphere and is chief scientist for the active acoustic target strength test.



JOSEPH P. SKURA was born in Mineola, New York, in 1952. Before and after earning the M.S. degree in applied physics from Adelphi University (1976), he performed research in reverse eutrophication of lakes and in the combustion of coal-oil-water slurries for Union Carbide, the Department of Transportation, New England Power and Light, and NASA. Mr. Skura joined APL in 1978 as a member of

the Magnetics Group of the Submarine Technology Division. He has been involved in oceanographic research concerning extremely-low-frequency underwater magnetic fields and, since 1981, has been examining electromagnetic wave propagation in coastal environments.

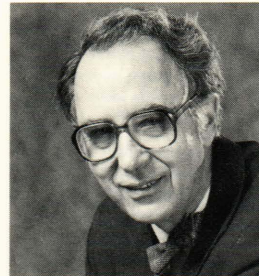


DAVID G. GRANT received the M.A. degree in applied mathematics in 1966 from the University of Maryland. He joined APL in 1959 and worked as an engineer on the Typhon weapons system. Mr. Grant later developed electro-optical signal processing techniques for advanced radar systems. He became associated part time with APL's biomedical engineering program in 1967 and was principal investigator

on a 3-D X-ray imaging system that received the IR-100 outstanding engineering development award in 1969.

Mr. Grant worked in the Submarine Technology Division before accepting an interdivisional appointment to the Johns Hopkins School of Medicine in 1975, as director of Radiation Therapy Physics. In 1978 he was appointed director of the Division of Clinical Engineering. He recently returned to full-time duties at APL in the Space Department, where he is program manager of the Space Telescope Alternate Fine Guidance Sensor Program.

Mr. Grant was appointed to the Principal Professional Staff in 1970 and holds the appointments of associate professor of biomedical engineering and assistant professor of oncology and radiology in the School of Medicine.



ROBERT M. FRISTROM was born in Portland, Ore. in 1922 and received the Ph.D. in Chemistry from Stanford University in 1948. He was a Research Fellow at Harvard from 1948-1951 and has held visiting professorships at Stanford and the Universities of Göttingen and California (Berkeley). In 1951, he joined APL where he is in the Chemical Physics Group of the Research Center. His interests at the

Laboratory have included propulsion, microwave spectroscopy, flames, fire, and chemical kinetics.

Among Dr. Fristrom's awards are the Parsons Fellowship of APL (1959), the Silver Medal of the Combustion Institute and the Hillebrand Award of the Chemical Society of Washington (both with A. A. Westenberg) (1966), and a Humboldt Foundation award (1973). He has served on several advisory committees to the National Academy of Sciences.