Graduate Study in Physics and Astronomy

Professor Dwight Nicholson
Chair of Department

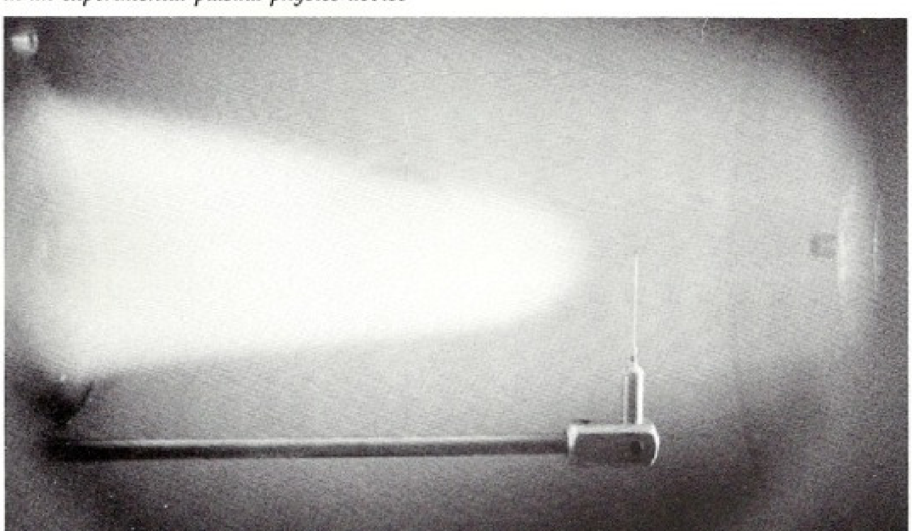
Van Allen Hall from the southwest

Faculty and Research Staff

Professor Christoph Goertz

CARLSON, Richard R., Ph.D., Chicago, 1951.
Professor. Experimental low-energy nuclear physics.
CARPENTER, Raymon T., Ph.D., Northwestern, 1962.
Professor. Experimental plasma physics.
D'ANGELO, Nicola, Ph.D., Rome, 1953.
Professor. Experimental plasma physics, experimental space physics.
FIX, John D., Ph.D., Indiana, 1969.
Professor. Astrophysics.
FRANK, Louis A., Ph.D., Iowa, 1964.
Professor. Experimental space physics.
GOERTZ, Christoph K., Ph.D., Rhodes, 1972.
Professor. Theoretical space physics.
GOREE, John A., Ph.D., Princeton, 1985.
Assistant Professor. Experimental plasma physics.
GURNETT, Donald A., Ph.D., Iowa, 1965.
Professor. Experimental space physics.

Neutral atoms glow after being struck by electrons in an experimental plasma physics device



KLEIBER, Paul D., Ph.D., Colorado, 1981.
Assistant Professor. Atomic, molecular, and laser physics.
KLINK, William H., Ph.D., Johns Hopkins, 1964.
Professor. Elementary particle physics, mathematical physics.
KNORR, Georg E., Ph.D., Munich, 1963.
Professor. Theoretical plasma physics.
LONNGREN, Karl E., Ph.D., Wisconsin, 1964.
Professor (also Electrical and Computer Engineering). Experimental plasma physics.
MALLIK, Usha, Ph.D., New York, City University, 1978.
Associate Professor. Experimental elementary particle physics.
McCLIMENT, Edward R., Ph.D., Illinois, 1962.
Professor. Elementary particle physics.
MERLINO, Robert L., Ph.D., Maryland, 1980.
Associate Professor. Experimental plasma physics.
MUTEL, Robert L., Ph.D., Colorado, 1975.
Professor. Radio astronomy.
NEFF, John S., Ph.D., Wisconsin, 1961.
Professor. Observational optical astronomy.
NELSON, Edward B., Ph.D., Columbia, 1949.
Professor Emeritus.
NEWSOM, Charles R., Ph.D., Texas, 1980.
Assistant Professor. Experimental elementary particle physics.
NICHOLSON, Dwight R., Ph.D., California, Berkeley, 1975.
Professor and Chair. Theoretical plasma physics.
NORBECK, Edwin, Ph.D., Chicago, 1956.
Professor. Experimental nuclear physics.

ONEL, Yasar, Ph.D., London University, 1975.
Associate Professor.
Experimental elementary particle physics.
PAYNE, Gerald L., Ph.D., California, San Diego, 1967.
Professor. Theoretical nuclear physics, theoretical plasma physics.
POLYZOU, Wayne N., Ph.D., Maryland, 1979.
Associate Professor. Theoretical nuclear physics.
SCHWEITZER, John W., Ph.D., Cincinnati, 1966.
Professor. Theoretical solid-state physics.
SPANGLER, Steven R., Ph.D., Iowa, 1975.
Professor. Astrophysics, extragalactic radio astronomy.
STWALLEY, William C., Ph.D., Harvard, 1969.
Professor (also Chemistry). Quantum optics, low-temperature physics, atomic and molecular physics, laser physics.
VAN ALLEN, James A., Ph.D., Iowa, 1939.
Professor Emeritus.
Experimental space physics, astrophysics.

Research Scientists

Kent L. Ackerson, Ph.D., Iowa, 1972.
Space plasma physics.
Roger R. Anderson, Ph.D., Iowa, 1976.
Interplanetary and magnetospheric plasma waves.
Wynne Calvert, Ph.D., Colorado, 1962.
Space plasma waves.
John D. Craven, Ph.D., Iowa, 1969.
Auroral and magnetospheric physics.
Timothy E. Eastman, Ph.D., Alaska, 1979.
Space plasma physics.
Crockett L. Grabbe, Ph.D., California Institute of Technology, 1977.
Theoretical plasma physics.
William S. Kurth, Ph.D., Iowa, 1979.
Interplanetary and magnetospheric plasma waves.
Robert R. Shaw, Ph.D., Iowa, 1975.
Space physics.

Associate Research Scientists

Cheryl Y. Huang, Ph.D., Iowa, 1981.
Space physics.
Mary M. Mellott (Hoppe), Ph.D., Washington (St. Louis), 1975.
Space plasma physics.
Bruce A. Randall, Ph.D., Iowa, 1972.
Magnetospheric physics.
James P. Sheerin, Ph.D., Michigan, 1980.
Theoretical plasma physics.

Assistant Research Scientists

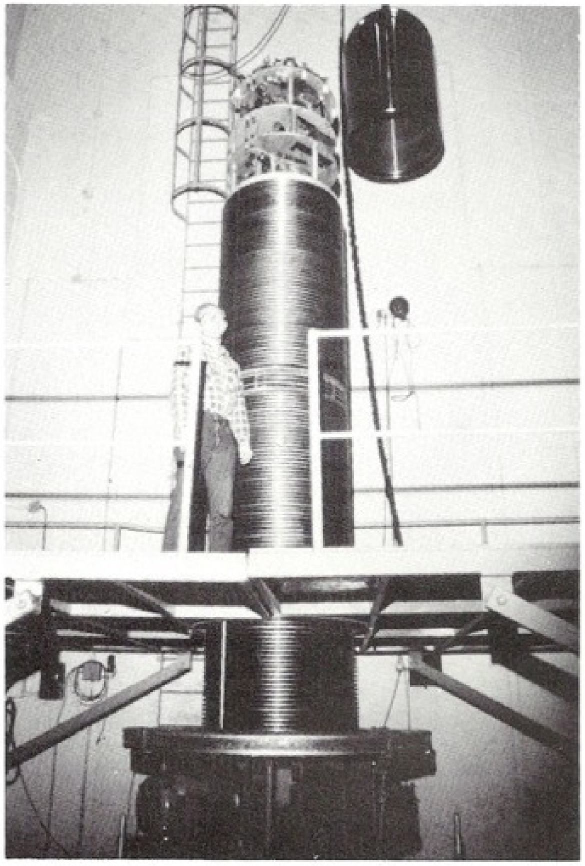
Paul J. Hansen, Ph.D., Iowa, 1983.
Theoretical plasma physics.
Marjatta Lyyra, Ph.D., Stockholm, Sweden, 1979.
Laser spectroscopy.
Ken-Ichi Nishikawa, Ph.D., Nagoya, Japan, 1981.
Theoretical space plasma physics.
Karlheinz Strobl, Ph.D., Innsbruck, Austria, 1986.
Laser spectroscopy.

Research Investigators

Iver Cairns, Ph.D., Sydney, Australia, 1986.
Theoretical astrophysics.
William M. Farrell, Ph.D., Iowa, 1987.
Space plasma physics.
Terrence E. Sheridan, Ph.D., Dartmouth, 1987.
Experimental plasma physics.
Ebraahim Moghaddam-Taaheri, Ph.D., Maryland, 1986.
Space plasma physics.

Professor Gerald Payne and a postdoctoral researcher

Advanced Degrees

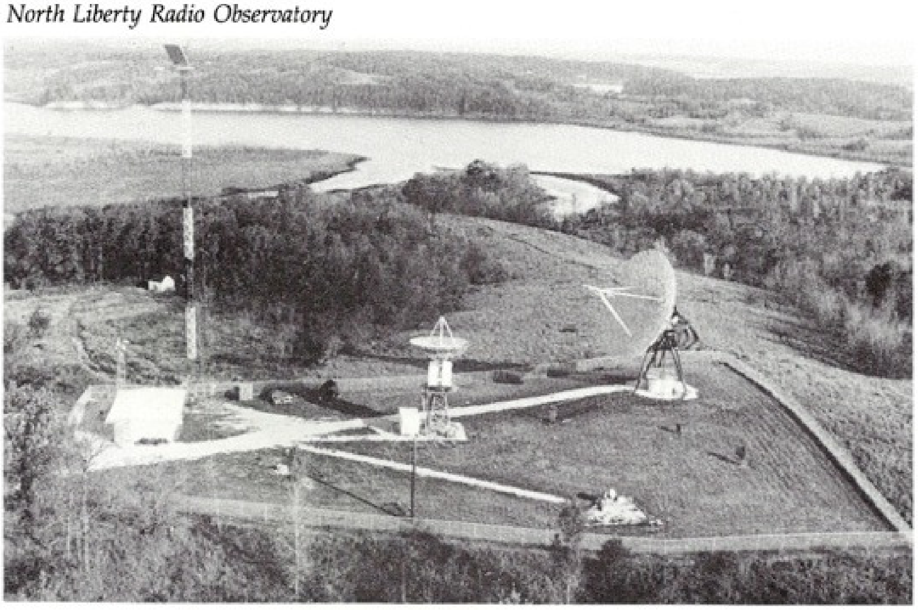


Inside the six-million-volt Van de Graaff accelerator

Two advanced degrees are offered in physics: the Master of Science, with thesis or with critical essay; and the Doctor of Philosophy with a research dissertation. One advanced degree is offered in astronomy: the Master of Science with thesis or with critical essay. A student who wishes to pursue a program in astronomy beyond the M.S. level may qualify for a Doctor of Philosophy degree in physics with specialization and a dissertation in astronomy or astrophysics. An interdepartmental (Ph.D.) program is available in applied mathematical science.

Each graduate student has an individual faculty adviser who oversees the student's academic work and thesis or dissertation research. A typical Ph.D. program requires five years of graduate work.

North Liberty Radio Observatory



Facilities

Facilities for graduate study in physics and astronomy are located in the 195,000-square-foot Van Allen Hall. This completely air-conditioned building houses an excellent open-stack library, machine shops, laboratories, offices, storerooms, auditoria, darkrooms, classrooms, lecture halls, and seminar rooms. A desk and private study area are provided for each graduate student.

The laboratories are well equipped and the central machine shop is staffed with skilled instrument makers and machinists. There are several electronics and machine shops for the use of advanced students and the research staff.

An IBM 4381 computer, five Prime 9955 processors, VAX 11/780, and the associated facilities of the Weeg Computing Center are available for research use by students and staff. The department itself has two DEC VAX 11/780 computers and numerous microcomputers dedicated to specific research programs. More than 20 time-sharing terminals and extensive auxiliary apparatus are provided for student use.

Several networks permit access to supercomputers at the National Magnetic Fusion Energy Computing Center in Livermore, California; the National Center for Atmospheric Research in Boulder, Colorado; the National Center for Supercomputing Applications in Champaign, Illinois; and the Los Alamos National Laboratory in Los Alamos, New Mexico. In addition, a direct link to the Stanford Linear Accelerator Center (SLAC) IBM 3081 is available to the particle physics group.

Major research facilities in physics and astronomy are

(a) A comprehensive array of low-energy particle accelerators, electronic test equipment, and environmental test chambers and clean rooms, and an optics laboratory for the development, calibration, and proof testing of instruments for space flight.

(b) A computer-assisted design (CAD) facility.

(c) A 6-MV Van de Graaff accelerator in a nuclear physics laboratory adjoining Van Allen Hall.

(d) A fully equipped high-energy physics laboratory used for design, construction, and testing of detectors to be used in experiments at Fermilab and other large facilities around the world.

(e) Twenty-four-inch and 12-inch Cassegrain telescopes at the Riverside Astronomical Observatory 10 miles south of Iowa City.

(f) Sixty-foot and 28-foot radio telescopes located at the North Liberty Radio Observatory 12 miles north of Iowa City (part of the national Very Long Baseline Interferometry network). This facility will soon become the site of one element in the new Very Long Baseline Array (VLBA) network.

(g) A solid-state laboratory with facilities for magnetic susceptibility, resistivity, Hall effect, and specific heat measurements at low temperatures and facilities for the preparation of experimental materials.

(h) Several plasma physics laboratories including a 6-kG Q-machine facility and a variety of multidipole plasma devices and associated computer-based diagnostic equipment used for basic plasma physics research, laboratory simulation of space plasma physics phenomena, and applications to plasma processing of materials.

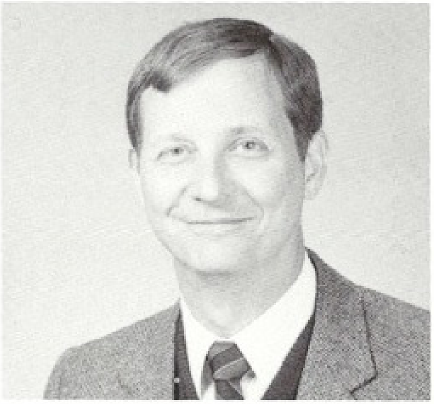
(i) An acoustics laboratory for study of the physics of musical instruments.

(j) The Iowa Laser Facility (physically located in the Chemistry-Botany Building) which contains a wide variety of modern laser instrumentation. Several monochromators (with lengths to 3.4 meters), high-vacuum molecular beam systems, and low-temperature equipment (including a 110-kG super-conducting magnet and a helium dilution refrigerator capable of 0.012 K) are also located in the laboratory.

Advanced astronomy students also conduct research at the National Astronomy and Ionosphere Center at Arecibo, Puerto Rico; the Very Large Array radio telescope near Socorro, New Mexico; the Very Long Baseline Interferometry Network; Haystack Observatory at Westford, Massachusetts; Kitt Peak National Observatory, near Tucson, Arizona; the Infrared Telescope Facility, Mauna Kea, Hawaii; and the International Ultraviolet Explorer, Goddard Space Flight Center, Greenbelt, Maryland.

Arrangements are available for student research in nuclear physics at the Argonne National Laboratory in Argonne, Illinois; in elementary particle physics at the Fermi National Accelerator Laboratory in Batavia, Illinois; the Los Alamos Meson Physics Facility in Los Alamos, New Mexico; the Stanford Linear Accelerator Center in Palo Alto, California; and the Center for European Nuclear Research in Geneva, Switzerland; in space plasma physics at the Los Alamos National Laboratory in Los Alamos, New Mexico; and in ionospheric plasma physics at the National Astronomy and Ionosphere Center near Arecibo, Puerto Rico.

Research



Professor John Fix

Currently active areas of research include the following:

Experimental:

- Acoustics of Musical Instruments
- Astronomy (Optical and Radio)
- Atomic, Molecular, and Laser Physics
- Auroral Physics
- Cosmic Rays
- Elementary Particle Physics
- Nuclear Physics
- Low-Temperature Physics
- Magnetospheric Physics
- Planetary Physics
- Plasma Physics
- Solid-State Physics
- Space Plasma Physics

Theoretical:

- Astrophysics
- Atomic, Molecular, and Laser Physics
- Elementary Particle Physics
- Nuclear Physics
- Plasma Physics
- Solid-State Physics
- Space Plasma Physics

Research in physics and astronomy is supported by state funds and by the Air Force Office of Scientific Research, the Department of Energy, the National Aeronautics and Space Administration, the National Science Foundation, and the Office of Naval Research. Separately budgeted research expenditures were over $7 million during 1987.

Acoustics

The acoustics facility includes a reverberant recording room, tape recorders, and a real-time spectrum analyzer for the study of musical sounds. The emphasis is on the physics of plucked string instruments. The equipment has uses in other applications for interdisciplinary studies. The research in musical acoustics is a joint undertaking with the School of Music.

Astronomy and Astrophysics

Research programs in optical and infrared astronomy are carried out at The University of Iowa Observatory near Riverside and at several national observatories. The observatory is equipped for both photometric and spectrophotometric observations. Current research programs include spectrophotometry of comets, novae, binary stars, and stars with unusual energy distributions. Work on surface photometry of comets and emission nebulae is also in progress. Work carried out at national facilities includes photometry, spatial interferometry, and spectroscopy of cool stars.

Radio astronomy observations are carried out at the North Liberty Radio Observatory (NLRO) near Iowa City as well as at several national observatories. The principal research instrument at the North Liberty Radio Observatory is a 60-foot telescope used for both continuum and spectral line observations at centimetric wavelengths. Current research programs at the NLRO include studies of 18-cm OH emission from stellar masers, searches for new OH sources, and very long baseline interferometric observations of both OH stellar masers and extragalactic continuum sources. NLRO is one of the observatories in the national Very Long Baseline Interferometry (VLBI) network, and it will be one of the sites for the new Very Long Baseline Array (VLBA). Work at national observatories includes spatial mapping of extragalactic, stellar, and solar system objects; observations of molecular clouds; spectroscopy; and a variety of VLBI investigations.

Theoretical astrophysics study includes the gas and dust in the circumstellar envelopes of evolved stars. Topics of current interest include computer simulations of the hydrodynamics and radiative transfer in circumstellar mass flows, the scattering properties of circumstellar dust shells, and models of OH masers near the cool stars. The scattering properties of interstellar medium and magnetospheric models of cool stars are also of considerable interest. Other theoretical work involves study of plasma physics topics of astrophysical importance, particularly the characteristics of nonlinear plasma waves, including shocks and solitons, and their interaction with charged particles. The goal of this research is to better understand physical processes in radio sources and the interstellar medium.

Atomic, Molecular, and Laser Physics

High-vacuum atomic and molecular beam systems are used for the study of collision dynamics in simple molecular systems. Conventional and laser high-resolution spectroscopic studies complementary to these collision dynamics studies are being carried out simultaneously. In several instances, these molecular systems include either actual or potential laser transitions of considerable promise.

Theoretical work in atomic and molecular physics is concerned primarily with determination of atomic and molecular interactions, especially potential energy curves of diatomic molecules. Also of interest are radiative transition probabilities and lifetimes, elastic and inelastic scattering cross sections, corrections to the Born-Oppenheimer separation of electronic and nuclear motion, and the dependence of atomic cluster properties on atomic size.

Lasers are used to probe atomic and molecular processes through high-resolution spectroscopy and various laser pump-probe techniques. Primary emphasis is on the study of excited-state collision dynamics; in many cases these excited-state interactions are important for the development of new laser sources. Similar laser pump-probe techniques are being applied to the study of the kinetics and dynamics of cluster or particulate nucleation and condensation.

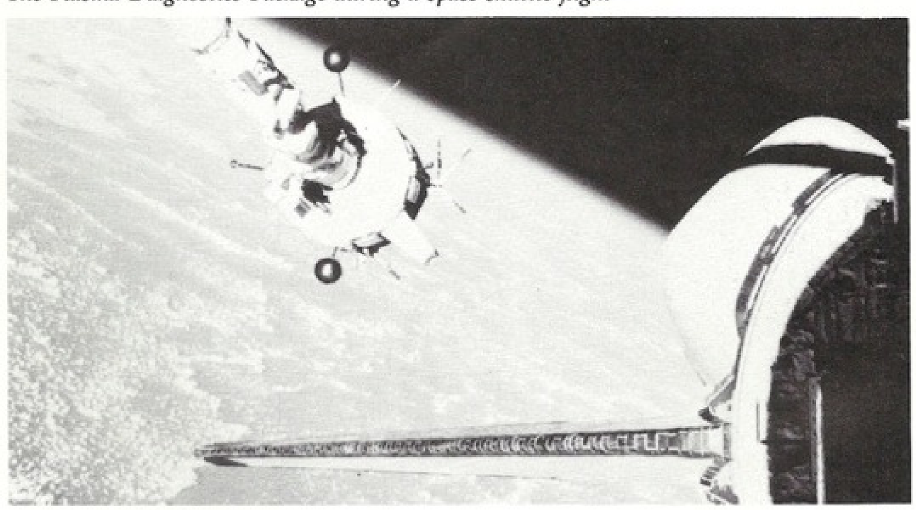
Intense laser fields can appreciably modify the dynamics of atomic and molecular interactions. Detailed studies of nonlinear phenomena in this important strong radiation field-atom coupling limit are also currently under way.

Elementary Particle Physics

Research in high-energy experimental particle physics is currently being carried out at Fermi National Accelerator Laboratory (FNAL), at the Stanford Linear Collider (SLAC), and at the Center for European Nuclear Research (CERN). At present, there are four professors collaborating with a large array of national and international institutions.

Professor Louis Frank

The Plasma Diagnostics Package during a space shuttle flight



Research at Fermilab: An experiment to study the nonleptonic radiative decay modes of hyperons is in progress. This will answer important questions about the weak interactions. A major component of the hardware for this experiment is a state-of-the-art silicon microstrip detection system designed and built at The University of Iowa. A new proposal to study the production and decay of strange charmed particles using a hyperon beam is under way. (Recent experiments indicate that this is an efficient way to produce and study charmed strange particles.)

Two closely related experiments deal with direct and critical tests of quantum chromodynamics (QCD). The first studies the γ-p interaction and hopes to provide information on the QCD compton effect and quark-gluon fusion. It will extract information on the gluon structure function of the proton. The second experiment will study proton and antiproton spin physics at the highest energies to date. QCD predictions have already been seriously challenged by measurements of spin effects and it is possible that this experiment will provide decisive tests of QCD.

Research at CERN: Two experiments are presently under way at CERN. The first, the JETSET experiment, will search for gluonic matter and other exotic phenomena. The discovery of glueballs and exotics is essential for the survival of QCD-inspired models as well as a clear understanding of the confinement mechanism in QCD. The apparatus planned will provide a compact large-acceptance detector using advanced technology as a model detector for the giant supercollider. A second experiment (spin-splitter) will provide proof of principle for a method of creating high-intensity polarized antiproton beams.

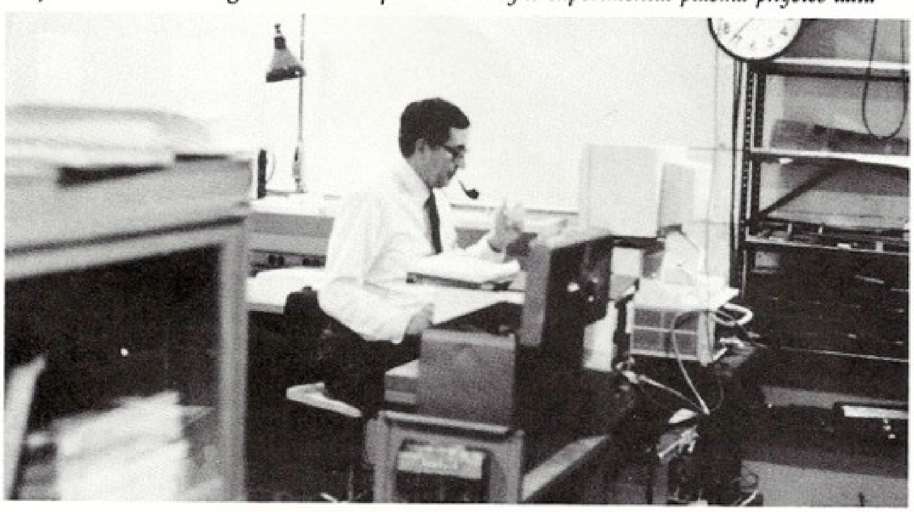
Research at SLAC: The electron-positron collider, SPEAR, at SLAC is known as the "Charm factory." The MARK III experiment at SPEAR explores the charm quark region to study both the strong and the weak interactions. The strong interaction includes glueball and quark spectroscopy and the weak interaction probes the various aspects of the Standard Model. A high-speed computer link from The University of Iowa to the SLAC IBM computer facilitates the analysis of the large volume of data already accumulated by the experiment. The data samples will provide several thesis opportunities.

Nuclear Physics

A versatile 6-MV Van de Graaff accelerator is used to study nuclear reactions induced by all stable isotopes of hydrogen, helium, lithium, and beryllium. A unique design allows energies up to 14 MeV for triply charged ions. Special emphasis is given to the study of lithium-ion reactions where three or more particles are produced. The ion beams are also used for measuring the chemical and physical structure of semiconductor materials. The laboratory also conducts nuclear experiments using higher-energy beams at national accelerator facilities.

Theoretical research in nuclear and intermediate energy physics is directed at understanding the in-

Professor Nicola D'Angelo uses a computer to analyze experimental plasma physics data



teractions between the elementary constituents of the nucleus. Areas of current research include relativistic quark models of the nucleus, few-nucleon models of the nucleus, lepton-nuclear interactions, and symmetry properties of scattering amplitudes. The numerical calculations for this research are done either on the departmental VAX or supercomputers located at the national laboratories. We are engaged in research collaborations with scientists at both Argonne National Laboratory and Los Alamos National Laboratory.

Plasma Physics

Research in plasma physics includes the study of basic plasma properties and the applications of basic plasma phenomena to thermonuclear fusion plasmas, space plasmas, astrophysical plasmas, and plasmas for microfabrication processing.

One emphasis is on experiments designed to simulate, in the laboratory, various plasma processes occurring in the ionosphere; this work is being funded by the Office of Naval Research. Some topics under investigation are electrostatic ion cyclotron waves and their relation to ion beam and conic formation in the auroral zone, double layers, and ionospheric instabilities. Several plasma devices are available for these studies including a Q-machine, a coaxial double plasma device, and several multidipole plasma devices. In addition, devices are available for studying plasma phenomena associated with the properties of cusp confinement. Experimental study of the properties of solitons is funded through the National Science Foundation. Experimental research on high-power radio waves in ionospheric plasma is performed at the National Astronomy and Ionosphere Center near Arecibo, Puerto Rico.

Another experimental emphasis is in the applied area of plasma processing. Plasma etching and sputtering for microcircuit fabrication are under investigation. Experiments are often conducted with radio frequency discharges in a computer-automated laboratory. Tunable dye lasers are employed for laser-induced fluorescence diagnostics of plasmas.

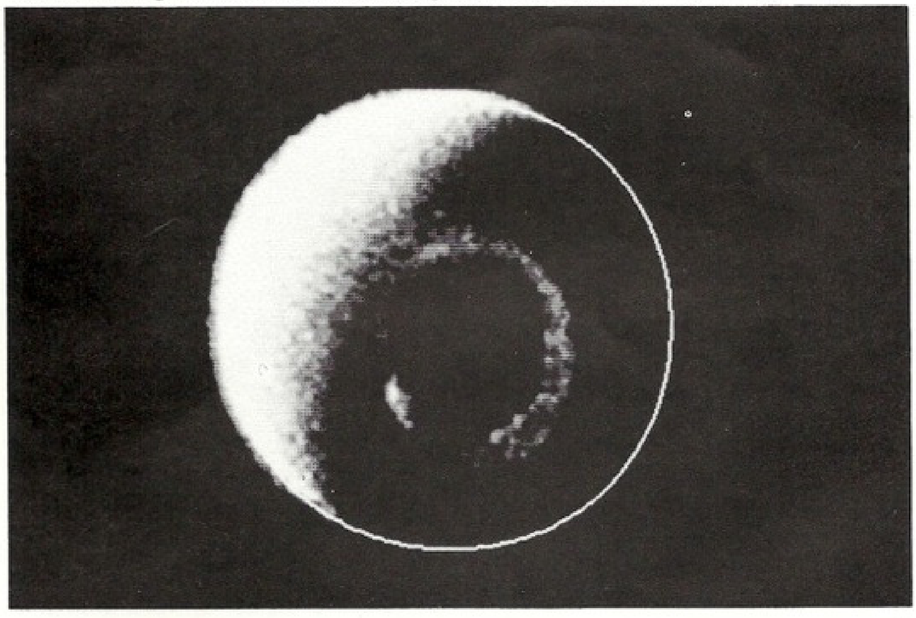
Theoretical plasma physics uses a combination of analytic and numerical techniques. Two kinds of numerical techniques are used: the nonlinear partial differential fluid equations, which describe a plasma, are integrated numerically; and Newton's laws of motion together with Maxwell's equations are solved for systems of 1,000 to 1,000,000 particles. The work concentrates on the study of equilibrium, stability, solitons, nonlinear waves, stochasticity, chaos, and turbulence in laboratory plasmas, fusion plasmas, ionospheric plasmas, magnetospheric plasmas, space plasmas, and astrophysical plasmas. The numerical work is performed on the campus computers as well as via telephone on supercomputers in Colorado and Illinois.

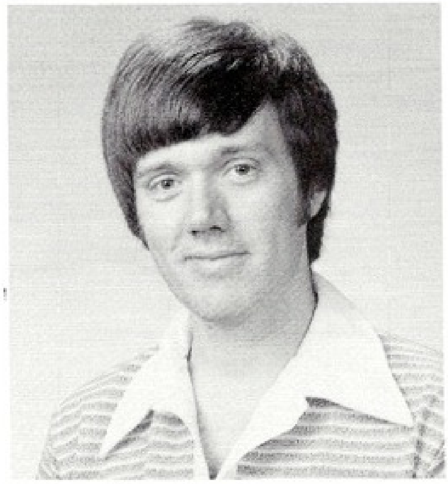
Solid-State Physics

Experiments on fundamental thermal, electrical, and magnetic properties of materials are included in the experimental solid-state program. Currently studies are focused on the high transition temperature copper oxide-based superconductors and related materials. Studies of the rare-earth barium copper oxide compounds involve various substitutions for the rare-earth and alkaline-earth components. Preparation methods are investigated and measurements are made of the electrical conductivity and magnetic susceptibility. Experimental work is also concerned with the preparation of related compounds in a search for new classes of high temperature superconducting ceramics.

Theoretical work in solid-state physics is concerned with the application of various many-body

The northern lights as seen in ultraviolet light from the Dynamics Explorer spacecraft





Professor Steven Spangler

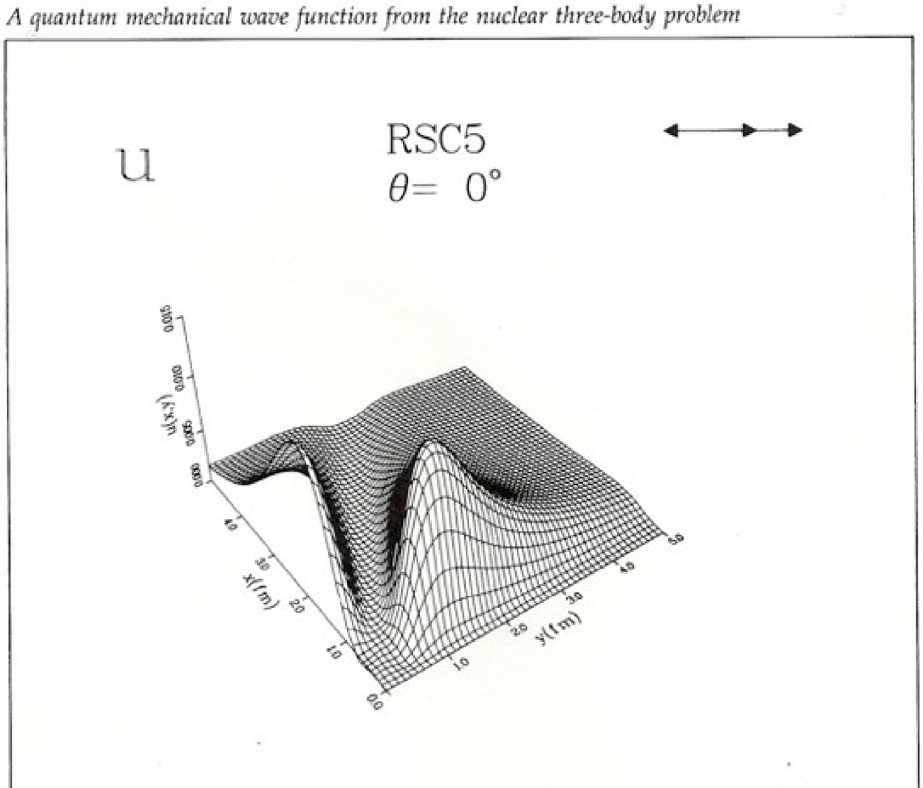
approaches to the theory of the electronic and magnetic properties of condensed matter. Areas of special current interest include valence instabilities in rare-earth compounds and related narrow-band phenomena and nonlinear effects in quasi-one-dimensional models of condensed matter.

Space Physics

A major program of experimental and theoretical space physics is conducted as a regular part of the graduate work of the department. Extensive facilities and an engineering and technical staff are available for the design, construction, and testing of equipment for flight in rockets, space craft, and the space shuttle and the computerized decoding and analysis of data. Emphasis is on comprehensive observational and theoretical study of (*a*) the magnetospheres of Earth, Jupiter, Saturn, and Uranus, (*b*) the interplanetary medium, including the propagation of energetic particles therein, and (*c*) the galactic cosmic radiation. The space physics group has currently active instruments on IMP-8; Pioneers 10 and 11 now at over 38 AU and 20 AU, respectively, from the sun; International Sun-Earth Explorers 1, 2, and 3; Dynamics Explorer 1; and Voyagers 1 and 2. The Plasma Diagnostics Package (PDP), a comprehensive set of plasma-wave and particle detectors, has flown twice on the space shuttle. Two major instruments have been completed for the Galileo (Jupiter Orbiter) mission (1989 launch). Four instruments are being defined for the International Solar Terrestrial Physics mission. Surveys of the energetic charged particle, plasma, and plasma-wave environment of Saturn were made by Pioneer 11 in September 1979, Voyager 1 in November 1980, and Voyager 2 in August 1981. Voyager 2 encountered Uranus in 1986 and will encounter Neptune in 1989.

Space plasma physics deals mainly with the magnetohydrodynamics, wave-particle interactions, transport, and acceleration of charged particles in planetary magnetospheres. In situ measurements by the various instruments described above enable the research teams to utilize the planetary magnetospheres as natural laboratories for plasma physics. These laboratories provide some unique conditions that are either difficult or impossible to simulate in a man-made laboratory. Due to the complex conditions present in the magnetospheres, this field is still very much in a mode of discovery. As a leading institution in this field, we participate in this sense of discovery in both our observational and theoretical work.

A quantum mechanical wave function from the nuclear three-body problem



Recent Recipients of the Ph.D. Degree

(Name, Current Employment, Thesis Title)

1983

Paul J. Hansen, The University of Iowa, Iowa City, Iowa
"Studies in Weak Turbulence"

Robert L. Tokar, Los Alamos National Laboratory, Los Alamos, New Mexico
"Whistler Mode Turbulence at Earth's Bow Shock: Generation via Electron Beams and Ray Path Integrated Amplification"

1984

David J. Doiron, Clemson University, Clemson, South Carolina
"Radio Emission in RS CVn Binary Stars"

Stephen A. Fuselier, Los Alamos National Laboratory, Los Alamos, New Mexico
"The Downshift of Electron Plasma Oscillations in the Electron Foreshock Region"

Mark W. Hodges, Owens Valley Radio Observatory, Big Pine, California
"VLBI Observations of Compact Double Radio Sources"

Nojan Omidi, University of Maryland, College Park, Maryland
"Generation of Auroral Kilometric and Z-Mode Radiation by the Cyclotron Maser Instability"

Guo-Zheng Sun, Laboratory for Plasma and Fusion Energy Studies, University of Maryland, College Park, Maryland
"Statistical Theory of Cubic Langmuir Turbulence"

Daniel R. Weimer, Regis College Research Center, Weston, Massachusetts
"Auroral Zone Electric Fields from DE-1 and -2 at Magnetic Conjunctions"

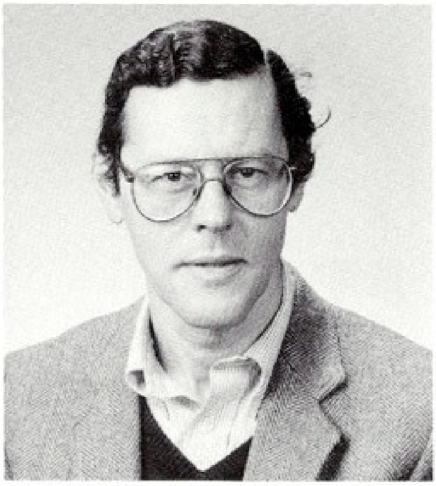
1985

Chia-Rong Chen, The University of Iowa, Iowa City, Iowa
"Effects of the Three-Nucleon Forces on the Trinucleon System"

Michael L. Cobb, Steward Observatory, University of Arizona, Tucson, Arizona
"Infrared Photometry and High-Resolution Imaging of OH/IR Stars"

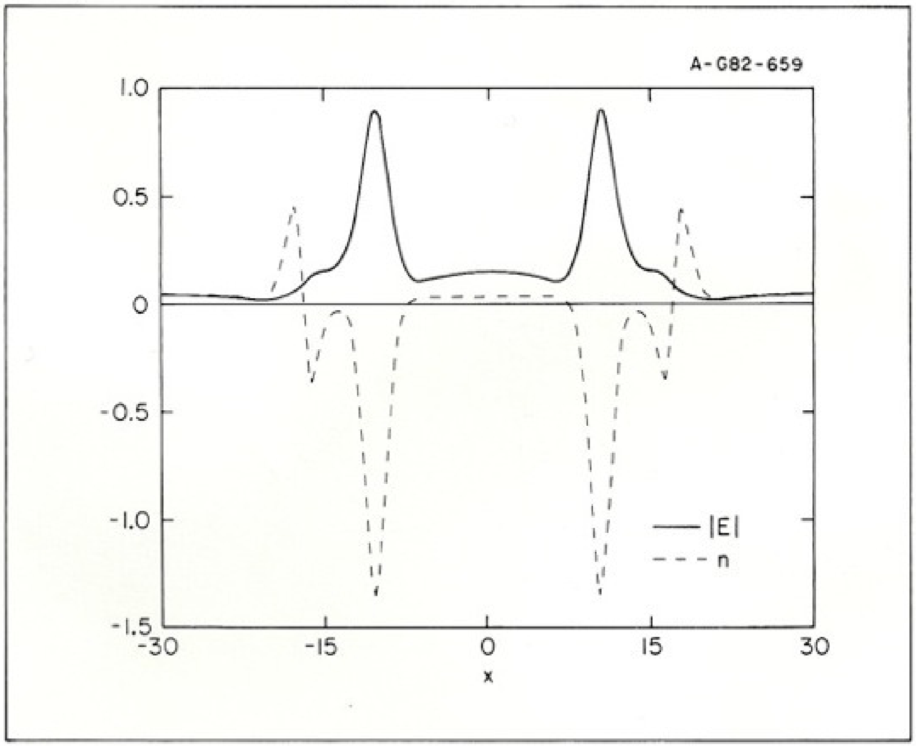
Ralph A. Gaume, University of Michigan, Ann Arbor, Michigan
"A Study of the Ground State Hydroxyl Maser Emissions Associated with Eleven Regions of Star Formation"

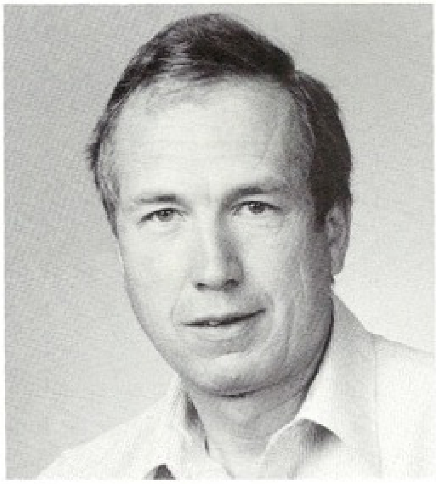
Richard L. Rairden, Lockheed, Palo Alto, California
"Geocoronal Imaging with Dynamics Explorer"



Professor William Klink

Numerical solution for the electric field and the density in two plasma solitons which have just collided





Professor Donald Gurnett

1986

Mark M. Baumback, Naval Research Laboratory, Washington, D.C.
"Properties of Auroral Kilometric Radiation from an Interferometer Analysis of the ISEE-1 and -2 Plasma Wave Data"

Robert A. Bosch, University of Michigan, Ann Arbor, Michigan
"Plasma Confinement in a Spindle Cusp Magnetic Field"

Steven L. Cartier, McDonnell-Douglas, St. Louis, Missouri
"Properties of Electrostatic Ion-Cyclotron Waves in a Non-uniform Magnetic Field and Their Association with Strong, Magnetized Double Layers"

Professor William Stwalley studies laser-induced plasmas and metal vapors with a microprocessor-controlled Nd:YAG/Dye laser

Hong-Young Chang, Lehigh University, Bethlehem, Pennsylvania
"On the Excitation and Propagation of Ion Acoustic Solitons in Non-Ideal Plasmas"

Ti-Ze Ma, Utah State University, Logan, Utah
"Electrostatic Waves Generated by Gases Interacting with Flowing Plasmas"

Mei-Mei Shen, Dartmouth College, Hanover, New Hampshire
"Numerical Studies of Strong Langmuir Turbulence Models"

1987

William M. Farrell, The University of Iowa, Iowa City, Iowa
"An Analysis of the Whistler-Mode Radiation from the Spacelab-2 Electron Beam"

Ping-Lin Chung, Argonne National Laboratory, Argonne, Illinois
"Relativistic Calculations of Deuteron Form Factors"

1988 (Partial)

Dirk Morris, The University of Iowa, Iowa City, Iowa
"Radio Emission from RS CVn Binaries and Similar Systems"

John T. Steinberg, Massachusetts Institute of Technology, Cambridge, Massachusetts
"Quasi-Static Electric Field Measurements Made with the Plasma Diagnostics Package in Free Flight during Spacelab-2"

Alan C. Tribble, The University of Iowa, Iowa City, Iowa
"The Large Scale Wake Structure of the Shuttle Orbiter: Plasma Density, Temperature, and Turbulence"

Recent Publications

1. J. A. VAN ALLEN. Space Science, Space Technology, and the Space Station. *Scien. Amer.* 254 (1986):32-39.

2. R. A. BOSCH and R. L. MERLINO. Sudden Jumps, Hysteresis, and Negative Resistance in an Argon Plasma Discharge. Part I. Discharge with No Magnetic Field. *Contrib. Plasma Phys.* 26 (1986):1-12.

3. R. A. BOSCH and R. L. MERLINO. Sudden Jumps, Hysteresis, and Negative Resistance in an Argon Plasma Discharge. Part II. Discharges in a Magnetic Field. *Contrib. Plasma Phys.* 26 (1986):13-17.

4. M. M. MELLOTT, W. CALVERT, R. L. HUFF, D. A. GURNETT, and S. D. SHAWHAN. Correction, to 'De-1 Observations of AKR in the Ordinary and Extraordinary Wave Modes.' *Geophys. Res. Lett.* 13 (1986):84.

5. S. RAYCHAUDHURI, J. HILL, H. Y. CHANG, E. K. TSIKIS, and K. E. LONNGREN. An Experiment on the Plasma Expansion into a Wake. *Phys. Fluids* 29 (1986):289-93.

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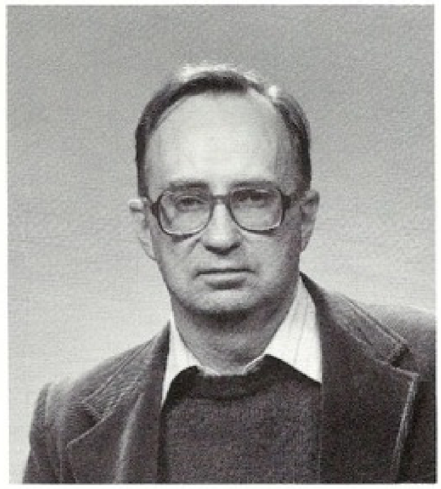

Professor John Schweitzer

Riverside Astronomical Observatory

Professor Usha Mallik

Van Allen Hall from the southeast

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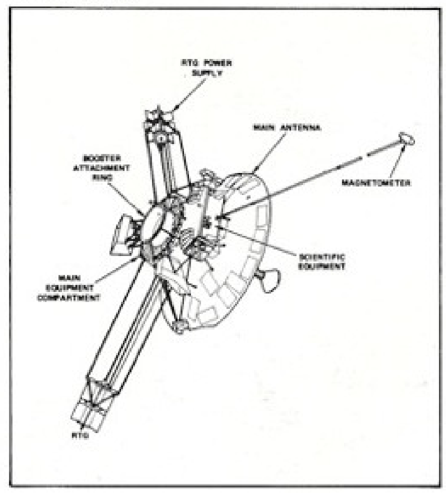
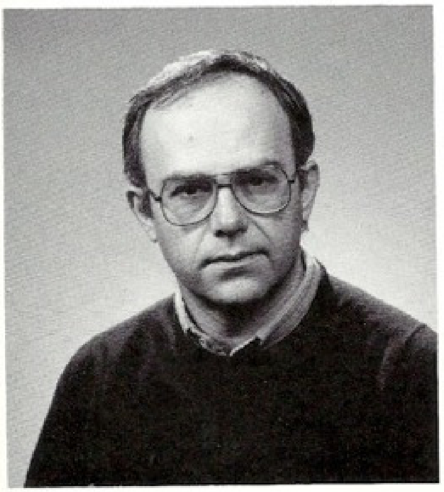
Professor Georg Knorr

Simplified drawing of the Pioneer 10/Pioneer 11 spacecraft





Professor Yasar Onel

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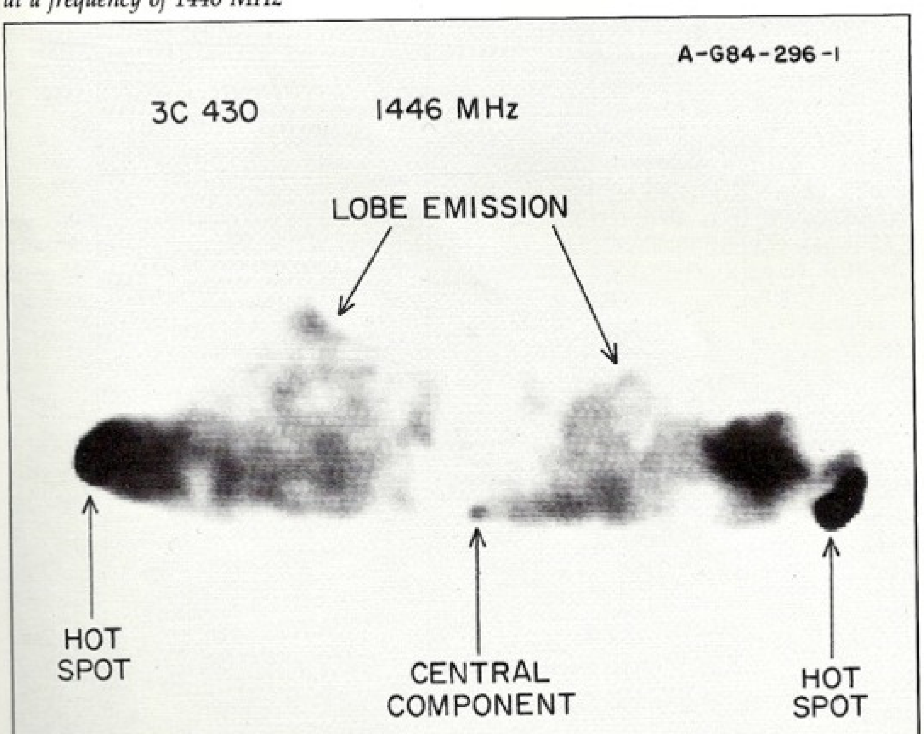
Radio image of the radio galaxy 3C 430, made with the Very Large Array at a frequency of 1446 MHz



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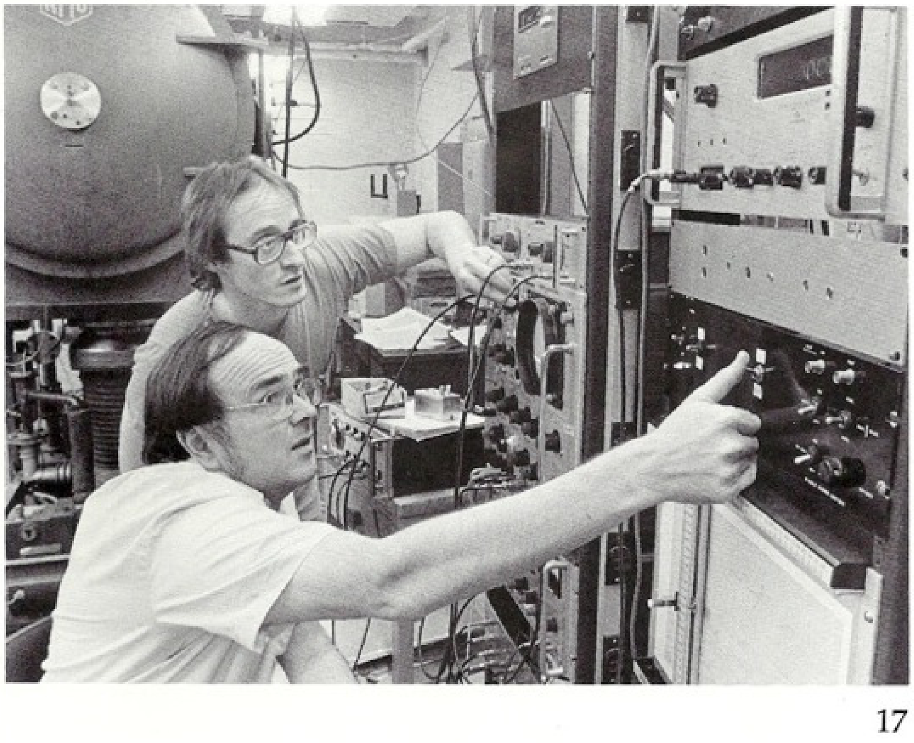
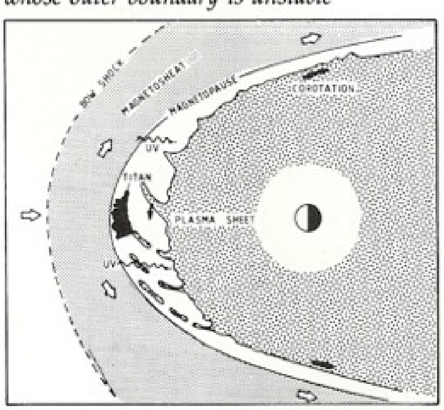
Professor Richard Carlson

Professor Karl Lonngren and a graduate student analyze nonlinear waves in a plasma experiment



Professor Wayne Polyzou

A schematic view of the Saturnian magnetosphere including the plasma sheet whose outer boundary is unstable



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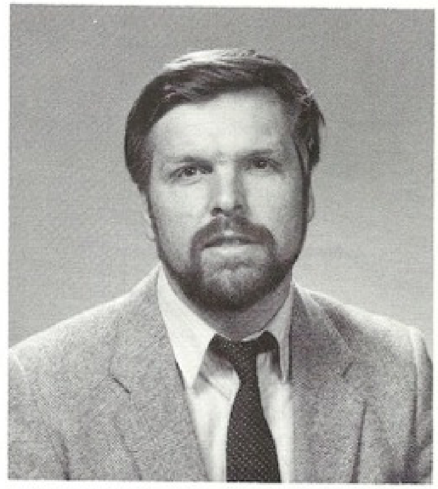

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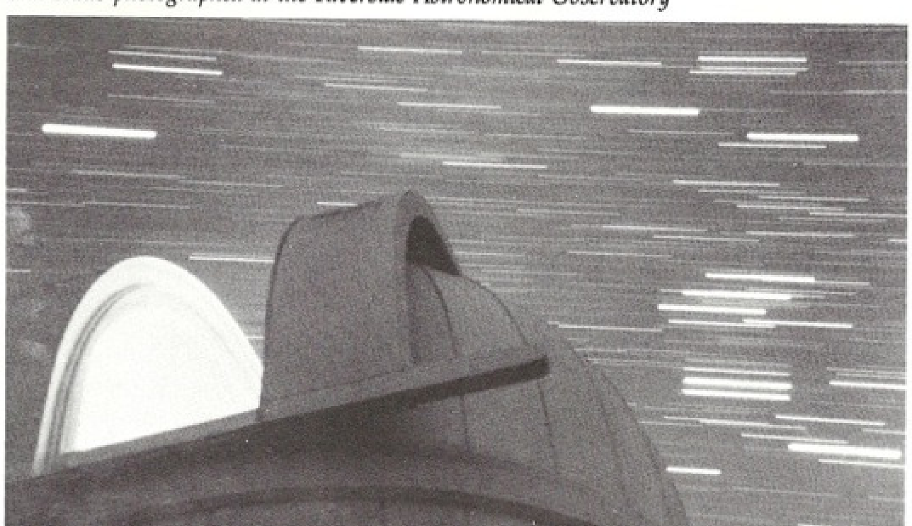
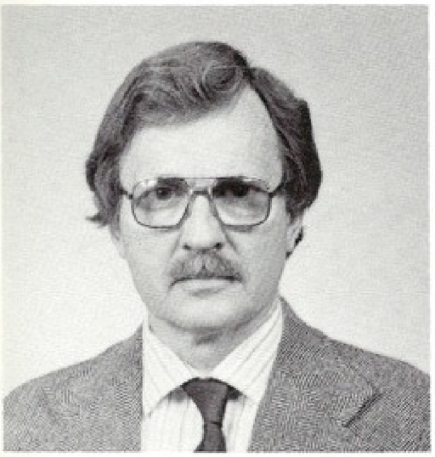
Star trails photographed at the Riverside Astronomical Observatory





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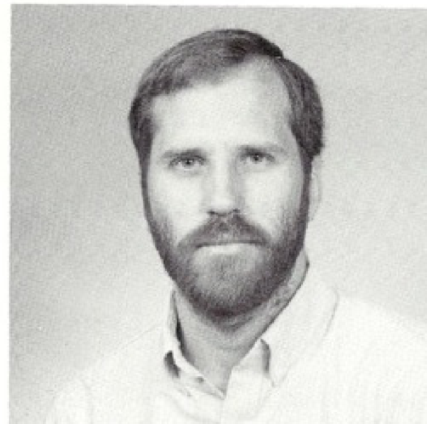
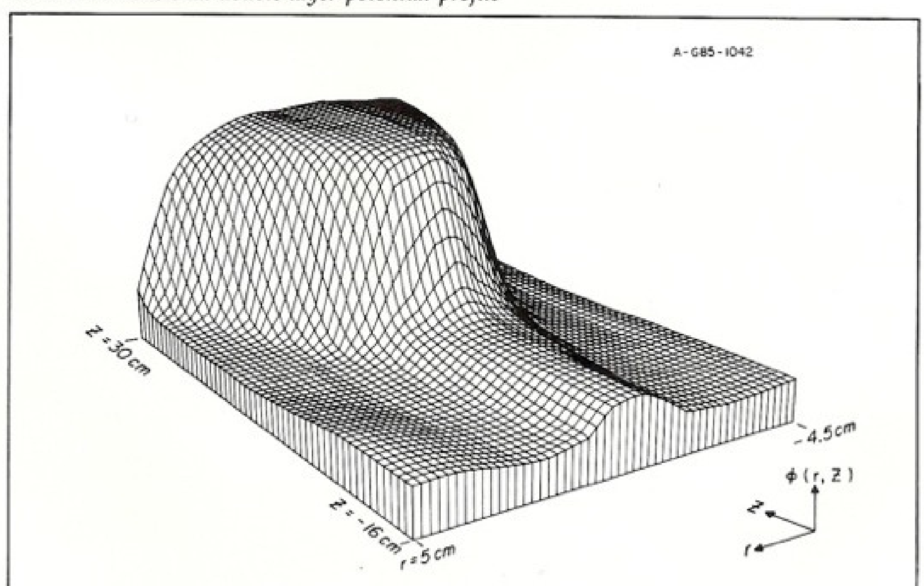


Professor Paul Kleiber

A three-dimensional double layer potential profile



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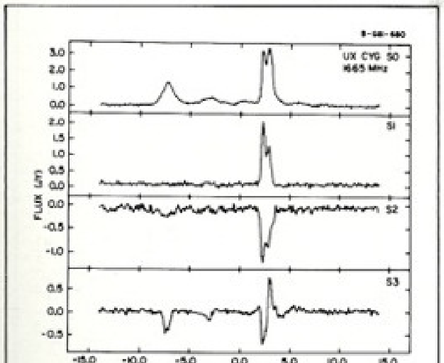

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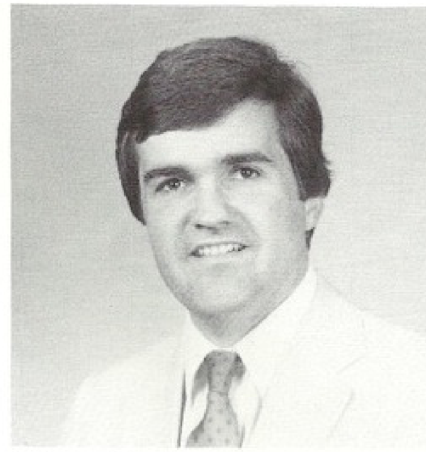

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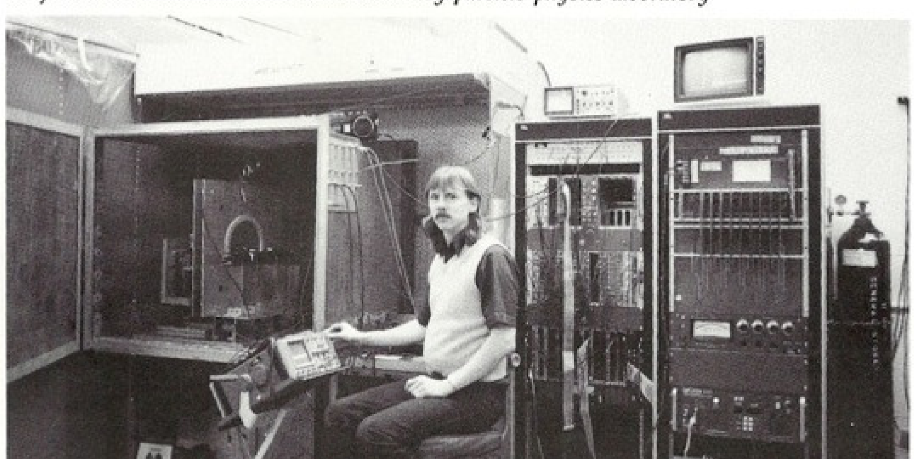
Professor Charles Newsom in the elementary particle physics laboratory



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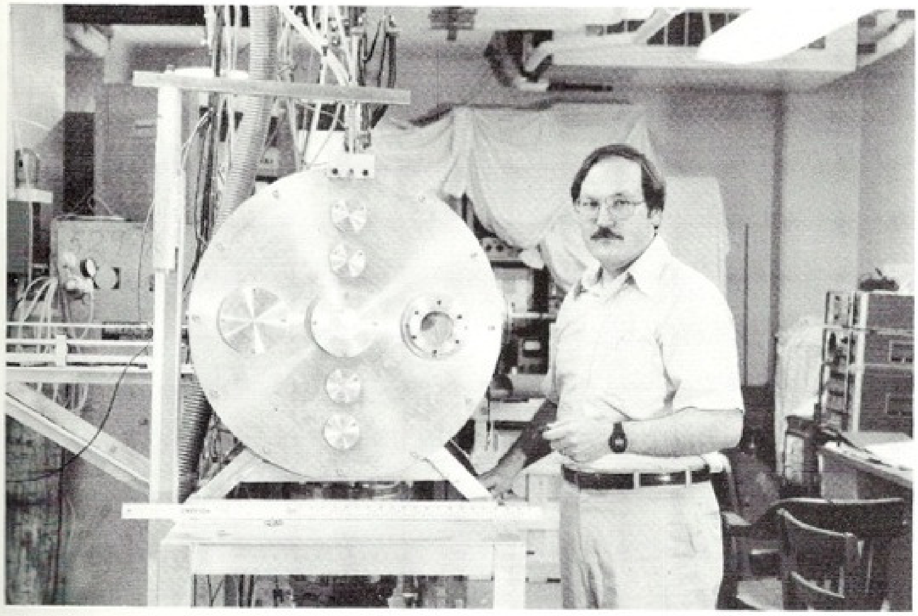

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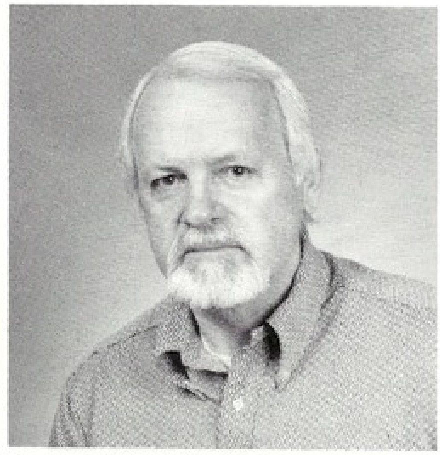

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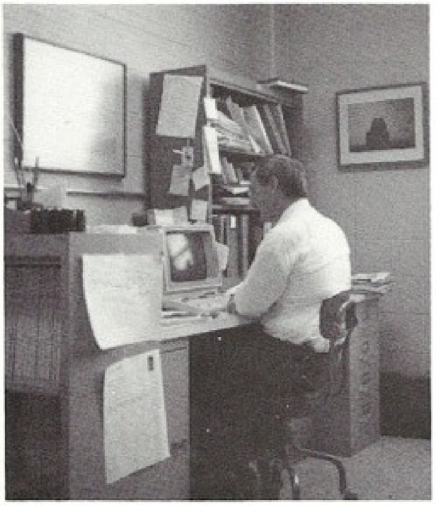

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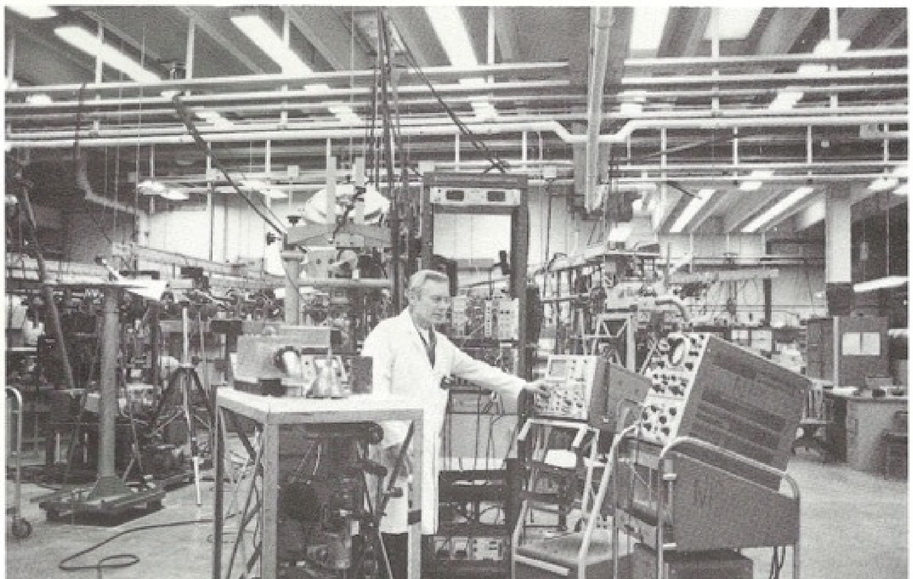

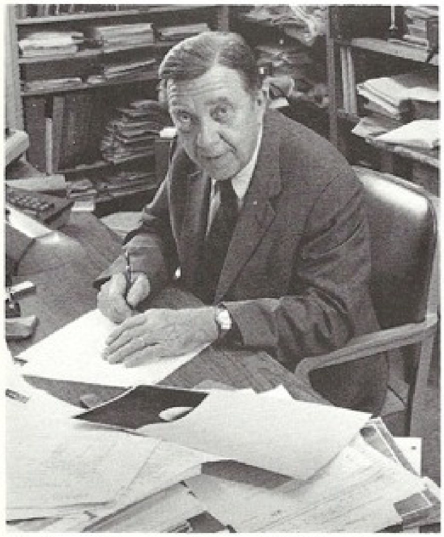

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