

**The Johns Hopkins University**  
**Department of Physics**  
*Baltimore, Maryland 21218*

### I. INTRODUCTION

The Department of Physics is situated on the Homewood Campus of the Johns Hopkins University, which is located in a pleasant residential neighborhood of north central Baltimore. On San Martin Drive, on its Homewood Campus, the Johns Hopkins University has currently under construction the building that will house the Space Telescope Science Institute (STScI). The astrophysics research program at Hopkins, at present largely centered on sounding-rocket and Spacelab experimental astrophysics, complements the powerful observational astrophysics program that will be the central activity of the STScI. Graduate students will be well placed to carry out hands-on experimental research as well as Space Telescope observational research.

### II. PERSONNEL

On 30 June 1982, Adjunct Research Professor W. G. Fastie formally retired from the Johns Hopkins University, and accepted a temporary position at the STScI. Fastie will continue his research activities at Johns Hopkins, despite formal retirement. In addition, Dr. Riccardo Giacconi has now joined the tenured ranks of the department, as Professor of Physics. Other permanent staff members contributing to research in astronomy and astrophysics are A. F. Davidsen (currently on leave), P. D. Feldman, R. C. Henry, and H. W. Moos, Professors; and K. S. Long, Jr., Research Scientist. Postdoctoral Research Associates during the past year have been G. F. Hartig (now at CTIO) and S. T. Durrance. Graduate students publishing over the past year include C. Bowers, R. W. Eastes, W. Landsman, R. Pembroke, T. E. Skinner, W. Snyder (now at NRL), P. Tennyson, M. Urry, and H. A. Weaver (now at GSFC).

### III. RESEARCH AND ACTIVITIES

Arthur F. Davidsen (who is on leave) conducts a research program in space astronomy, currently focused on ultraviolet spectrophotometry of extragalactic objects and development of new instrumentation applicable to such studies. He is a Co-Investigator on the Faint Object Spectrograph (FOS) for Space Telescope, and is P.I. for the Hopkins Ultraviolet Telescope (HUT) Project, which involves a 36-in. telescope to be flown aboard the Space Shuttle as part of an instrument package called OSS-3. The HUT has evolved from an Aries rocket design. OSS-3 is expected to fly in late 1985. The HUT will obtain spectra at  $\sim 2\text{-}\text{\AA}$  resolution on flat-spectrum objects as faint as  $V \simeq 17$ , primarily in the 900–1200- $\text{\AA}$  range, but with some capability from 500 to 1800  $\text{\AA}$ . The initial flight will concentrate on Halley's Comet, although a broad range of observations, including quasars and other active galactic nuclei, planets, stars, nebulae, and

galaxies, is also planned. Davidsen was elected to the AURA Board of Directors in 1979, and has served on the AURA Executive Committee in 1981–1982. He has also served on the NASA Management and Operations Working Group in Space Astronomy since 1980, the AXAF Science Working Group since 1977, and was elected a Councilor of the AAS in 1981.

William G. Fastie continued application of physical optics, particularly the Ebert spectrometer, to a wide variety of problems in auroral and planetary physics, and astrophysics. In addition to his work concerning Space Telescope and the STScI, he continued his work on evaluation of optical components, particularly gratings, and played his usual substantial role in the Johns Hopkins sounding-rocket and Space Shuttle ultraviolet astronomy program.

Paul D. Feldman directs the NASA-supported sounding-rocket program and makes extensive use of the *International Ultraviolet Explorer* (IUE) satellite for ultraviolet spectroscopy of the terrestrial atmosphere and the atmospheres of comets and planets. Feldman has continued his IUE program of ultraviolet studies of comets with observations of comets *Bowell* (1980b), *P/Grigg-Skjellerup* (1982a), *Austin* (1982g), and *P/D'Arrest* (1982e) during 1982. This work was done in collaboration with M. F. A'Hearn of the University of Maryland and M. C. Festou of Service d'Aéronomie (France). In addition, he has continued, with H. W. Moos and S. T. Durrance, the IUE study of the Jovian system. There was only one sounding-rocket experiment during this period: a collaborative launch with A. B. Christensen of Aerospace Corp. to study the ultraviolet spectrum in the magnetospheric cleft region. This was done as part of a joint U.S.-Canadian campaign, called CENTAUR, from Cape Parry, Northwest Territories, Canada in December 1981. Feldman has served as a member of the IUE Users' Committee since 1980.

Riccardo Giacconi has continued (on a time-available basis) his research program in x-ray astronomy while beginning to learn the characteristics of the ST observatory. The work is a continuation of collaborative efforts with the High Energy Astrophysics group at the Center for Astrophysics, and included a study of the x-ray structure of Cen A, the study of sources of x-ray background through deep and medium surveys, and the discussion of future projects for x-ray astronomy. As the science operations concepts for ST mature, Giacconi is bringing them to the attention of the astronomical community through suitable means of communication and through publications and reports at professional societies. This past year Giacconi was elected to the Space Science Board of the National Academy of Sciences, to the Scientific Council of the Maryland Academy of Sciences, and was honored as a Fellow in the American Association for the Advancement of Science. He was the Henry Norris Russell lecturer at the American Astronomical Society meeting in Boulder, Colorado. In January 1982, Giacconi was awarded the distinguished Gold Medal of the

Royal Astronomical Society (Great Britain) in recognition of his outstanding contribution to the development of the field of x-ray astronomy.

Richard C. Henry conducts research on the interstellar medium, cosmology, and x-ray and ultraviolet background radiation. During this period, Henry published a summary of the "Workshop on Ultraviolet Background Radiation" that he chaired at the Tenth Texas Symposium on Relativistic Astrophysics. In this summary, he focused on the discordant nature of the various observations, and pointed particularly to the danger, with small field-of-view experiments, of misinterpreting the light of very faint stars as patch diffuse background. Henry was an invited participant at the first "Rencontre de Moriond" to be centered on astrophysics. At that meeting, he discussed ultraviolet background radiation, and in the resulting publication, he analyzed recent results; presented additional *Apollo 17* data on the ultraviolet background [the major *Apollo 17* publication, with R. C. Anderson and W. G. Fastie, appears in *Astrophys. J.* **259**, 573 (1982)]; and, finally, discussed the implications of ultraviolet background radiation for elementary-particle physics. In the latter connection, Henry (with P. D. Feldman) was able to use *Apollo 17* data from the experiment of W. G. Fastie to set lower limits on the lifetimes of heavy neutrinos against radiative decay [*Phys. Rev. Lett.* **47**, 618 (1981)]. Feldman, Brune, and Henry also reexamined previously published rocket spectra of the far-ultraviolet background, suggesting the presence of emission lines, possibly due to a hot corona of the galaxy. Finally, W. B. Landsman, with Henry and Feldman, published IUE data bearing on the nature of the ultraviolet background. Henry continued as Editor-in-Chief of the journal *Astrophysical Letters*, with Davidsen (JHU), Pounds (Leicester), and Jugaku (Tokyo) as Editors. Submissions to *Astrophysical Letters* are increasing in number and the quality remains very high. Henry continued to serve on the Committee on Space Astronomy and Astrophysics of the Space Science Board.

Knox S. Long is currently working primarily on the Hopkins Ultraviolet Telescope (discussed above), for which he is the Project Scientist. In addition, he is continuing his studies of the x-ray properties of normal galaxies and of supernova remnants, using data from the *Einstein Observatory*.

H. Warren Moos, with P. D. Feldman, S. T. Durrance, and T. E. Skinner, is continuing to use the IUE satellite to study the outer planets. Recently, studies have been performed on the stability of the Io torus, the stability of hydrogen concentration in the Jovian upper atmosphere, and evidence for an aurora on Uranus (and hence a magnetic field). Moos is a member of the Far Ultraviolet Spectroscopic Explorer Working Group. Recent laboratory work has been concerned with the development of pulse-counting intensified solid-state arrays for space astronomy. Moos also continued his activity as Co-Investigator on the far-ultraviolet spectrometer experiments on *Voyagers 1* and *2*, and continued a laboratory program in ultraviolet diagnostics of high-temperature Tokamak plasmas, a program with direct relevance to astrophysics.

#### IV. REFERENCES

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### Data Survey (Astronomy Personnel)

- (1) No. of faculty/staff: tenured or tenure-track 5 (M), 0 (F); post-doc 1 (M), 0 (F); res. assoc. 1 (M), 0 (F); other Ph.D.'s 0 (M), 0 (F).
- (2) No. of graduate students: first year 0 (M), 0 (F); total 10 (M), 0 (F).
- (3) No. of degrees awarded: terminal Master 0 (M), 0 (F); Ph.D. 2 (M), 0 (F).
- (4) Employment of those in (3): post-doc 0 (M), 0 (F); res. assoc. 0 (M), 0 (F); tenure-track 0 (M), 0 (F); FFRDC 0 (M), 0 (F); govt. lab 2 (M), 0 (F); industry 0 (M), 0 (F); foreign 0 (M), 0 (F); other 0 (M), 0 (F).