Chapter Twelve

Astrophysics Program
Harold Zapolsky (1973-1979)

The Department carried out an extensive search for a new Department Chairman. Following this search the Department selected Harold Zapolsky as its new Chairman. The appointment of the new chairman was not easy. The New Brunswick Provost, Kenneth Wheeler, was opposed to bringing in a department chairman from outside the University for any department, but was finally persuaded to agree to the appointment.[1]

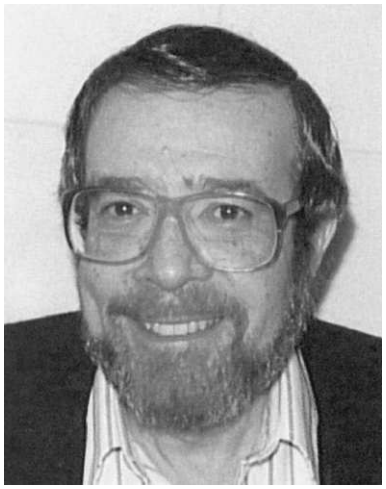

Figure 42 Harold Zapolsky

Zapolsky received his A.B. degree from Shimer College in 1954 at the age of 18. Shimer College was part of the University of Chicago, with the Robert Maynard Hutchins Great Books Plan. It was a rigid four-year curriculum with no electives, and the student could place out of courses by examination. Zapolsky placed out of half of the courses. Zapolsky did his

[1]Interview with Harold Zapolsky; Physics Archives.

graduate work at Cornell University, where he did a thesis in quantum electrodynamics with Hans Bethe. After receiving his Ph.D. degree in 1962, Zapolsky went to the NASA Institute for Space Studies in New York (1962-63) as a research associate, where he worked with Edward Saltpeter and became interested in astrophysics.

Zapolsky then went to the University of Maryland as a research associate for two years, where he worked on a problem in relativity with Charles Misner, after which he was appointed Assistant Professor at Maryland. He worked on problems in astrophysics and relativity and was recognized for his outstanding teaching. When Zapolsky was not promoted at Maryland, he decided to take a leave of absence (1970-71) and went to the National Science Foundation as Associate Program Director for Theoretical Physics. Towards the end of the year, Maryland offered him tenure, but he had been named Program Director for Theoretical Physics, and decided to stay at the NSF. Zapolsky reported that this time at the NSF was a very fruitful and enjoyable period for him.[2]

In the spring of 1973, Zapolsky was approached about coming to Rutgers. Although he was Program Officer for the Weiss-Abrahams NSF grant, he did not know very much about Rutgers at that time. He set out to learn what he could about the Rutgers Physics Department and concluded that the Physics Department at Rutgers had made good progress and had a promising future. He now believes that he was correct in that assessment, i.e., that the Department has moved on to a substantially higher level of prestige in the physics community.[3]

When Zapolsky came to Rutgers in 1973, he faced a number of problems. The Science Development Grant was winding down, the University came to face considerable fiscal constraints, and the Department had severe space problems. He was confronted with a difficult situation involving a faculty member, and he was challenged to initiate a program in astrophysics in the Department.

The NSF had made the initial Science Development Grant award for 1966-69 and provided a nocost extension for 1969-71. There followed a supplementary grant for 1971-73 and another no cost extension for 1973-75. In the proposal for the supplement, the Department had emphasized its

[2]Interview with Harold Zapolsky.
[3]Ibid.

desire to move into new areas of research such as astrophysics or biophysics.

Zapolsky moved vigorously to establish a viable program in astrophysics. A search committee was formed to identify a leader for the new program. The committee considered a number of candidates in theoretical and observational astrophysics, and focused on Herbert Schnopper, an outstanding x-ray astronomer at MIT. The Department felt that Schnopper had strong potential for building a first-rate program in astrophysics at Rutgers. The Department had resources to support the appointment from the SDG, but needed approval for the tenure appointment for Schnopper. Provost Wheeler had set a rigid policy that there would be no new tenure appointments from outside the University at that time, and made no exception for the Physics Department. Zapolsky made a very strong case to Associate Provost Paul Pearson and Provost Wheeler, but was not able to obtain approval for the appointment. In addition to his general policy about not making new tenure appointments, it also appeared that Wheeler was not enthusiastic about starting a new program in astrophysics in the Physics Department, which was already quite large.

Zapolsky went over the head of the Provost with a direct appeal to President Bloustein. The appeal to the President was also not successful, and probably adversely affected Zapolsky's relationship with the Provost. At that point, Zapolsky had just come to the University and had not yet established strong ties with the administration, and there were no others in the Department or Administration who were willing or able to come to his aid. Zapolsky believes that the failure to make this excellent appointment in astronomy probably set back the development of astrophysics in the Department by seven or eight years. It was clearly a great disappointment for the new Department Chairman.

Although Zapolsky did not succeed in his efforts to make this outstanding senior appointment in astrophysics, he was able to make four appointments in astrophysics at the assistant professor level during his six years as Department Chairman. The first of these was Terry Matilsky who came to the Department in 1976. He had received his Ph.D. in astronomy from Princeton in 1971, and had been a postdoc at American Science and Engineering Corp. and at MIT before coming to Rutgers. Robert Stellingwerf, a theorist, came to Rutgers in 1977. He had received his

Ph.D. from Colorado in 1974 and served as a research associate at Columbia. Andrew Cheng, another theorist, came to the Department in 1978. He had received his Ph.D. from Columbia in 1977, and was a fellow at Bell Telephone Laboratories. Zapolsky also recruited a fourth Astrophysics faculty member, Theodore Williams, who came to the Department in 1979. Matilsky and Williams eventually received tenure in the Department, while Stellingwerf and Cheng left before receiving tenure.

Although astronomy had been a part of the Rutgers scene for a long time, and the Department had strong desires to establish a presence in astrophysics, it was the appointment of Zapolsky in 1973 that enabled the Department to move ahead in that area. The four assistant professor appointments provided a basis for a slow, but steady, development of that program. The program was destined to achieve considerable stature in the years to come. The Department, which started its research program in condensed-matter physics in 1946, and added programs in nuclear and elementary-particle physics in the 1960's, added considerably to its intellectual base in the 1970's with the creation of the program in astrophysics.

Apart from the beginning of the program in astrophysics during Zapolsky's term as Chairman, there was little further growth in the size of the Department. The number of the physics faculty members in the Physics Department had grown significantly through the years. In 1880, when the physics faculty was separated from the mathematics faculty, there was a single physics faculty member, Francis Van Dyck. In 1899 a second faculty member, Frank Pratt, joined the Department. With the opening of N.J.C., Frank Ferguson joined the Department as the third faculty member. In 1923 David Porter joined the faculty as the fourth faculty, and the following year Lloyd Greenlees replaced an instructor, keeping the size of the faculty at four. When Frank Pratt went to full-time service at N.J.C. in 1927, there were again three full-time faculty members in the College of Arts and Sciences Physics Department. With the appointment of Robert Atkinson in 1929 the Department returned to its complement of four full-time faculty members. With the appointment of Samuel Anderson in 1934 there were five full-time faculty members in the Department, then six in 1937 and seven in 1938.

During the World War II the number of full-time faculty members dropped to a low of four in 1943-44 (Winchester, Greenlees, Miller, and Porter), although there were a number of part-time faculty members

teaching in the special wartime programs. In 1945-46 there were 6 faculty members in the Physics Department, and in 1946-47 there were 12. This was the first major expansion of the Department, associated with the establishment of the post-war research activities. There was little further expansion in the size of the Department while Frank Dunnington was Chairman. When Charles Whitmer became Chairman in 1952, there were 11 full-time faculty members, and when Henry Torrey became Chairman in 1959, there were 17. When Peter Weiss became Chairman in 1964 there were 27 full-time faculty members in the Department, and when Zapolsky became Chairman in 1973 there were 43. The large increase in the number of faculty members in the Department while Peter Weiss was Chairman was primarily a result of the funds provided by the Science Development Grant.

Coming into the Physics Department with Zapolsky in 1973 were three other new faculty members, Joseph Sak and Tang Fong Wong as Assistant Professors, and Joseph Johnson as Associate Professor. Sak had received his Ph.D. in condensed matter theory from the Institute of Solid State Physics, Czechoslovak Academy of Sciences, Prague, and then held Research Associate and Instructor positions at Chicago and Cornell. Wong had received his Ph.D. in high-energy theory from Brown, and then held Research Associate positions at Brookhaven and Rutgers before being appointed to the faculty position.

Joseph Johnson received his B.A. degree from Fisk in 1960, and his Ph.D. degree from Yale in 1965. He was a member of the Technical Staff of Bell Telephone Laboratories from 1965-68, and was Visiting Professor of Engineering and Applied Science at Yale, 1968-69. He then went to Southern University, as Professor and Chairman of the Physics Department. He came to Rutgers as Associate Professor of Physics with tenure in 1973. At Rutgers, Johnson set up an active research program in fluid dynamics and courses in that field were added to the curriculum.

Johnson, whose appointment had been approved by the Department before Zapolsky became Chairman, was the first black faculty member in the Physics Department. Traditionally, in the entire U.S., there were very few black students in physics, and even fewer black faculty members. From time to time the University Administration had encouraged the Physics Department to recruit black faculty members, but these efforts had not been successful. In the early 1960's black students

comprised about 1% of the total undergraduate student body at Rutgers. At that time efforts were made by a few faculty members to identify and encourage a few black high school students to prepare themselves for college at Rutgers. A five high school program was set up, which eventually was expanded to ten and then fifteen high schools. From the Physics Department, Ernest Lynton and Allen Robbins were a part of this effort, which focused on high schools such as Trenton, Plainfield, and New Brunswick. Advising, tutorial, and summer programs were set up for potential students. Partly as a result of these early efforts, the University came to devote a substantial effort to recruiting minority students for the University, and the black student enrollment at Rutgers eventually increased tenfold. With Joseph Johnson's appointment to the physics faculty in 1973, the Department finally provided a role model for potential black students.

In Zapolsky's first year as Department Chairman, the University faced a severe budget reduction. The result was a hiring freeze that prevented any new appointments in the Department, even though there were unfilled faculty lines on the books. Although the freeze was lifted the following year, there was no further expansion in the Department for some time. In fact, the total number of full-time faculty members in the Department was down to 40 by Zapolsky's last year as Chairman (1978-79), as ten faculty members joined the Department and thirteen faculty members left the Department during the period of Zapolsky's Chairmanship.

The new faculty members, all assistant professors, included: Richard Imlay, Douglas Potter, and Mohan Kalelkar in high-energy experiment; Haruo Kojima and Mark Croft in experimental condensed matter physics; Willem Kloet in theoretical nuclear physics; Terry Matilsky in observational astronomy; and Robert Stellingwerf and Andrew Cheng in astrophysics theory. Five of the nine new assistant professors eventually received tenure in the Department (Croft, Kalelkar, Kloet, Kojima, and Matilsky). The others left without receiving tenure. The promotion to tenure of approximately half of the new assistant professors reflected the setting of high standards for promotion by the Department and the new Department Chairman. In addition to the new assistant professors joining the Department, Henry Torrey returned to the Department in 1974 after his service as Dean of the Graduate School.

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Leaving the Department between 1973 and 1979 were six tenure faculty members and seven assistant professors. The tenure faculty members leaving the Department included: Maurice Bazin, who resigned; Bogdan Maglic, who left to join the Fusion Energy Corporation; Bruno Lüthi, who left for the University of Frankfurt; Shiro Yoshida, who left for Sendai; Henry Torrey, who retired in 1976 after 30 years of service at Rutgers; and Paul Leath who moved on to the Provost's Office as Associate Provost. The Assistant Professors who left the Department included: Robert Ehrlich, who went to SUNY, New Paltz; Peter Yamin, who went to Brookhaven National Laboratory; Kenneth Cohen and Philip Goode, who went to Bell Telephone Laboratories; Lillian Hoddeson, who went to Los Alamos National Laboratory; John Huang, who went to Exxon Research and Engineering; and Henry Kugel, who went to Princeton Plasma Physics Laboratory. In addition to those listed above, Ernest Lynton, who had not taught in the Department since 1965, left his position as Dean of Livingston College to become Vice-President for Academic Affairs at the University of Massachusetts.

Upon Zapolsky's arrival at Rutgers, he was immediately confronted with a controversy surrounding the fusion energy project of Bogdan Maglic. Maglic had come to the Department in 1969, joining with Devlin and Esterling in securing NSF support for high-energy physics research using counter and spark chamber techniques. That relationship did not fare well, led to considerable friction, and eventually broke up.

Meanwhile, Maglic began to work on a device for producing energy from controlled thermonuclear fusion. The device, called a Mig-macell, was adapted from his unsuccessful attempts to develop a high-energy physics colliding beam device. In the Migmacell a beam of deuterons was directed to collide with itself in a magnetic field by looping in a figure-eight path. The proposed Migmacell was a breeder fusion device, since it developed part of its own fuel, while producing an energy output when the charged particles were collected on plates and an electric current drawn off. This device would not require a steam-turbine generator cycle, and thus there would be no waste heat needing disposal. Maglic suggested that one cell could produce 100 kW of energy, and a 1,000 MW reactor could be made up of 10,000 of these small cells. Maglic claimed to have set up a working cell, which produced a few

microwatts of energy, and was looking to improve the output of the device.[4]

Although there was considerable skepticism about whether the device could ever be made to work as projected, Maglic was able to secure some financial support from High Voltage Engineering Corporation, and from Swiss and Japanese industrial concerns. Unsuccessfully, he sought additional funding from government agencies in this country. One AEC official deduced that a large scale Migmacell would in fact contain a plasma, and that the particle scattering would invalidate the theory put forth by Maglic. Maglic also sought support from Rutgers University. Maglic approached President Bloustein and the Board of Governors. He received testimonials and support from a number of individuals, including Robert Van de Graaff, the inventor of the Van de Graaff accelerator, and Vladimir Zworykin, the father of television. The Board of Governors was naturally interested in the possibility of lucrative patents.

Zapolsky had heard about the Maglic proposal before he came to Rutgers, and made his own assessment, based on NSF evaluations, that the proposed device would not be successful and was not worth pursuing. After Zapolsky arrived at Rutgers, Maglic pressed him for resources to carry out the Migma project. Zapolsky declined to provide the requested support and advised the Rutgers Administration that the Migmacell patents would be worthless. It was a time of some considerable stridency within the Department. Eventually Maglic left the Department in the fall of 1974 and continued his work on the Migmacell at the Fusion Energy Corporation, which he had set up in Princeton, New Jersey. He continued his work on the device for several years without ever bringing it to successful operation.

In 1973-74 Zapolsky had assistance from capable associate professors. Paul Leath was Associate Chairman and Graduate Program Director, and Charles Glashausser became Undergraduate Coordinator. The position of Undergraduate Coordinator was established for the first time, combining the responsibilities of the Chairmen of the Undergraduate Curriculum and Advising Committees. In the following year the two committees were merged into a single committee.

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[4]Roger Smith, *Nucleonics Week*, December 27, 1973.

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In 1973-74 there were approximately 80 undergraduate physics majors, and about the same number of graduate students. At the end of the year, the Department graduated its first class of general physics majors, six of the seventeen seniors who received their B.A. degrees in physics. Six of the graduating professional physics majors received some level of departmental distinction. All of the eleven graduating professional physics majors intended to pursue graduate study in physics. An indication of the respect for the Rutgers College physics program was the list of offers of financial support to the physics graduates. These offers came from Stanford, California Institute of Technology, Cornell, Wisconsin, Michigan, Brown, Harvard, Columbia, Princeton, SUNY (Stony Brook), Washington, and Rutgers. There were also six graduate students who received the Ph.D. degree, all of them going on to postdoctoral positions. They received offers from distinguished research institutions, including MIT, Cal. Tech., UCLA, Oxford, Washington, Wisconsin, and Indiana.

Enrollment in the undergraduate physics courses was up by about 15% from the previous year as a result of increased enrollment in the College of Engineering and Cook College. The fiscal constraints on the University, however, resulted in an 18% decrease in the instructional budget for the Department, putting the budget back at the level of 1966-67. This decrease in the budget resulted in unmet needs for course material and for equipment repair and replacement.

The Department was moved to address the needs for instruction on the other campuses in New Brunswick. Lecture and recitation sections in two introductory courses were given on the Douglass and Cook College campuses, and laboratory sections for these courses were given for the first time on the Cook College campus. The Concepts in Physics course, a biology counterpart of the introductory physics course, was given on the Livingston College campus, in cooperation with the Livingston College Biology Department. The Department approved a new course, Physical Astronomy, for nonscience majors, which was given for the first time the following year. The course came to be very well received and attracted a large number of students. Other new courses, which were approved, were an undergraduate physics of fluids course, and new graduate courses, astrophysics and fluids, and plasma phenomena. The Department also introduced an honors physics course, gravitation and general relativity. These new courses clearly reflected the interests of the new Department

Chairman and of Joseph Johnson who established research in fluid dynamics. At this time the undergraduate Physics Club was revived after several years of inactivity, and there was a resurgence of the Rutgers Astronomical Society. The Astronomical Society, although dominated by physics students, also drew students widely from other disciplines. It is interesting to note that the University provided the Society with an annual operating budget of $250, some $40 more than its counterpart Rutgers Astrological Society.

The need for additional space had become serious. In mid-year temporary space was made available in the old Radiation Sciences Building on the Livingston College Campus. This space provided working laboratories for the experimental elementary-particle physics counter groups (Sannes, Devlin, Yamin, and Cohen). This additional space did not fully meet the pentup needs of the Department. In the fall a number of faculty members were returning to the Department from leave or administrative positions and there was not adequate office space available. The shortage of space would continue to plague the Department for a number of years. During the course of the year, the Board of Governors formally approved the designation of the main physics building as the Bernard Serin Physics Laboratory, in recognition of the very substantial contributions to the Department made by Serin. It could be argued that Serin's discovery of the isotope effect in superconductivity was the greatest research accomplishment in the entire history of the Department.

In 1974-75 the undergraduate enrollments increased by 18% and the enrollments in the first-year course for physics majors increased from 15 students in 1973-74 to 50 students the following year. The number of Ph.D. degrees in physics increased from 6 in 1973-74 to 13 the next year. There was a 3% increase in the instructional budget, nowhere near replacing the 18% reduction of the previous year. The Department joined with the Electrical Engineering Department of the College of Engineering to establish a joint M.S. degree program for the two disciplines. The program was directed towards employees of nearby light industries who would like to work part-time towards advanced degrees. Initially some 20 employees of the RCA plant in Somerville enrolled in the program, taking one physics course and one electrical engineering course at a site in Somerville. RCA provided released time tuition for its employees, and

awarded an RCA fellowship to the University, which was shared by the Electrical Engineering and Physics Departments.

At the conclusion of 1974-75, the final year of the NSF Science Development Grant, Zapolsky wrote a report to the NSF, outlining the progress made in the Department under this Grant. He concluded that, although the Physics Department had not come as quickly to national preeminence as the Mathematics Department, it had made very substantial progress in that direction. In 1965-66, just before the award of the grant, there were 25 faculty members in the Physics Department, with project grant support of approximately $700,000 per year. There were established research programs in magnetic resonance, experimental superconductivity, experimental nuclear physics, experimental high-energy physics with bubble chambers, and many-body theory. In 1974-75 there were over 40 faculty members, with project grant support of approximately $1,500,000 per year. The Department had added research programs in experimental high-energy physics with counters, experimental atomic physics, experimental fluid physics, experimental superfluid physics, particle theory, and nuclear theory.

The resources of the SDG were also used to supplement existing areas of strength in the Department. These included polarized ion sources for the tandem Van de Graaff accelerator and a PEPR computerized scanner for the bubble chamber high-energy physics group. There were also new faculty members in nuclear theory and in many-body theory. The many-body theory group came to be compared with the groups at Cornell and Illinois, recognized national and international centers of excellence. The resources of the SDG were also used to build strengths in new areas. With the establishment of the HEP counter group, the NSF supported the two experimental high-energy physics groups in the Department with project grant funds at the level of $350,000 per year.

The resources in the SDG were directly responsible for hiring and equipping an expert in superfluid ^{4}He, William Glaberson, and the last remaining funds were used for a similar effort to study phase transitions in liquid ^{3}He at millidegree temperatures by Haruo Kojima. The Rutgers particle theory group was probably the only new particle theory group in the country to obtain NSF support as a group during fiscal 1973. It was acknowledged that it had not been possible to move ahead in astrophysics, biophysics, or geophysics, as outlined in the supplementary proposal. This

shortcoming was a result of the fiscal difficulties that faced all publicly supported state institutions, but especially those in a state like New Jersey, which had not adopted broad-based taxation. Nonetheless, the Science Development Grant provided the impetus and resources for the Department to grow in size and stature. In particular, it led to continuing support by the University of a large fraction of the technical staff of the current department, including an electronics engineer, a systems programmer, and an electronics technician.

The budgetary cutbacks took their toll in various ways in the Department. In 1972 the Department lost four unfilled faculty lines that were part of the State's cost sharing commitment to the SDG. An additional 1.67 lines, which represented the final part of the State's commitment for 1974-75, also were withdrawn. In 1975-76 there was a crisis in staff support. Between 1973 and 1976 the Department lost three of its seven secretarial lines and one technical staff line. It was anticipated that an additional three faculty lines and seven teaching assistant lines would be lost in the following year. There was an increase of 15% in the undergraduate enrollment in the physics courses, placing an additional burden on the Department. The graduate student body had decreased from 111 in 1965 to 65 in 1976, consistent with the national decline of 40% in graduate student enrollment in physics during that period.

In November 1975, there was a one-day meeting in Honor of Bernard Serin, recognizing the renaming of the physics laboratory. The program included reminiscences from many who had been associated with Serin during his twenty-six years at Rutgers, including his first graduate student, Myron Garfunkel, who received his Ph.D. with Serin in 1951 and later became a professor at the University of Pittsburgh.

In February 1976, the Department adopted a policy on appointments and promotions, recognizing the importance of the physics faculty member as a teacher, research physicist, and contributor to the general life of the Department and University. The new policy outlined some of the factors that would be considered in the evaluation for promotion. It declared that the basic idea of the university is that teaching is not separable from research. In May, on the occasion of the retirement of Henry Torrey, the Department held a special colloquium, at which his colleagues R. V. Pound and E. M. Purcell gave their personal

reminiscences of the Nobel Prize winning discovery of nuclear magnetic resonance in bulk material in which Henry Torrey collaborated.

Figure 43 R. V. Pound, H. C. Torrey, and E. M. Purcell at Henry Torrey's Retirement Celebration in May, 1976

In May 1976, the Department experienced its first external review. A distinguished committee of R. K. Adair (Yale), D. F. Holcomb (Cornell), and H. Primakoff (Pennsylvania) visited the Department on May 20 and 21. The External Review Committee issued its report in June 1976. The Committee indicated that it evaluated the Physics Department as a part of a university that aspires to excellence, where excellence is exemplified by the great private universities such as Harvard, and the great state universities such as the University of California at Berkeley.

The Committee found a variety and breadth of research interests, which were comparable to those in the strongest departments, and with the possible exception of astrophysics, covered all the disciplines that were considered to be essential. It assessed each of the research groups. The Committee found that the condensed matter group (Carr, Glaberson, Kojima, Koller, Lindenfeld, Lüthi, McLean, Pifer, Torrey) tended to consist of individuals with relatively little interaction, leading to slow progress in research. Most of the areas were topical and displayed good contact with the current interests in condensed matter physics nationally and internationally. The Committee found that the group as a whole was a bit weaker than some of the other groups in the Department, and needed a

senior appointment. Bruno Lüthi's impending departure exacerbated that weakness considerably. The Committee reported that the condensed-matter theory group (Abrahams, Horton, Langreth, Leath, Sak, Stephen, Weiss) was excellent, and suggested that an empty line could be moved to experimental condensed matter physics.

The Committee found that the particle and nuclear theory group (Bronzan, Harrington, Lovelace, Rockmore, Shapiro, Wong, Mekjian, Zamick) contained excellent young people, imaginative, inventive, eager, hardworking, clearly on top of their respective specialties. The report urged that Yoshida's position be used for a relatively senior theorist in elementary particles or astrophysics. The Committee observed that the experimental particle physics group (Cohen, Devlin, Sannes, Plano, Watts) had strong outside funding, large in absolute terms, and competitive with similar groups in the strongest universities in the country. It indicated that the strong funding reflected the quality of the programs, but that there was a need for national leadership.

The Committee reported that the experimental nuclear physics group (Koller, Kruse, Kugel, Robbins, Temmer) had an unusually imaginative program, which was among the strongest in the U.S. They drew attention to the importance of the relations with Bell Telephone Laboratories, and expressed concern about whether the nuclear physics program would continue to receive the external financial support it deserved. Finally the Committee indicated that the fluid dynamics program (Johnson) had a promising beginning.

This external review recognized the great strides made in the Department since 1946, and affirmed the steps the Department was taking to address weaknesses in the program.

With the arrival of Terry Matilsky in 1976, there was a revival of interest in astronomy in New Brunswick. Matilsky taught the undergraduate course in astronomy which came under the sole purview of the Physics Department once again, after having been taught for several years by the Mathematics Department at Douglass College and by the Geology Department at Rutgers College. By 1977 there were almost 100 students enrolled in that course. Matilsky was successful in helping to revive the Rutgers Astronomical Society, and by 1977 there were close to 40 active members. Rutgers College assisted with the purchase of a new telescope which could be used on the Busch Campus, away from the overhanging

trees of Old Queens and the Sodium vapor lights of nighttime New Brunswick. In recognition of the change in emphasis of the Department, the Rutgers College faculty approved the change in the name of the Department to the Department of Physics and Astronomy and the Board of Governors approved the change.

Some of the significant research accomplishments in 1976-77 included the discovery of Λ_o polarization in inclusive production by protons by the Michigan-Rutgers-Wisconsin collaboration at Fermilab (Devlin), the discovery of neutrino induced dimuon events at the same laboratory by the Harvard-Penn-Rutgers-Wisconsin collaboration (Imlay), the Bell-Rutgers measurement of the Lamb shift in Fluorine (Kugel), and the development of an ultralow temperature facility which can routinely cool He^3 below its superfluid phase transition temperature of 2.5×10^{-3} ^oK (Kojima). As a guest investigator at the Harvard-MIT-Smithsonian SAS-C x-ray satellite, Matilsky began to acquire research data, which led to the discovery of the longest period pulsar found to date. The research efforts of Kojima, Imlay and Matilsky were in new areas for Rutgers, broadening the graduate program and enhancing the reputation of the Department. In 1977 the group led by Felix Sannes redirected their research activities from the Fermi National Accelerator Laboratory in Batavia, Illinois, to the new Cornell electron storage ring (CESR) colliding beam facility, which was being constructed. The Rutgers group joined a consortium of Cornell, Harvard, Rochester, Rutgers, Syracuse, and Vanderbilt. The Rutgers group was responsible for the design and construction of eight ten-ton γ-ray shower detectors, which would surround the storage ring.

In 1977 Joel Lebowitz joined the Department of Mathematics and was given a joint appointment in the Department of Physics and Astronomy. He was appointed George William Hill Professor of Mathematics and Physics and Director of the Center of Mathematical Sciences Research. Through the years he received a number of awards for his outstanding contributions to mathematical physics and statistical mechanics. He participated in the life of the Physics Department, shared his counsel, and trained physics graduate students. His conferences in statistical mechanics, given twice a year, were the premier conferences in that field. In 1982 Michael Aizenman was also given a joint appointment in Mathematics and Physics, and Antti Kupiainen followed him in 1991.

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In the spring of 1978, the Department prepared a Master Plan for the Department of Physics and Astronomy. With a physics faculty of 42 members at the level of assistant professor or above, it recognized that there would probably be no further growth in the size of the faculty except as the University might grow in size. The Master Plan identified experimental condensed-matter physics, astrophysics, and experimental particle physics as areas to receive priority attention in the following five-year period. In the previous ten years, several of the most distinguished faculty in experimental condensed-matter physics had been lost through retirements and resignations. Every effort would be made to hire a senior person and young people in this field. The development of astrophysics was just beginning. There were then three faculty members (Zapolsky, Matilsky, Stellingwerf) and two research grants in the area. It was felt that a total of five faculty members was needed for a minimum critical mass in astrophysics.

The plan reported an outstanding depth and breadth in the area of experimental particle physics, but indicated the desire to recruit one additional assistant professor in the area. The plan declared that the priority efforts should be made in such a way as to not interfere with the existing strength of the groups in experimental and theoretical nuclear physics, theoretical condensed matter physics, and theoretical particle physics, which should continue to be nurtured.

The Master Plan noted that the Department had become known as a department that was particularly hospitable to women graduate students. In the preceding seven years 15% of the physics Ph.D. degrees at Rutgers were awarded to women, and approximately 15% of the current graduate students were women. This contrasted with less that 5% of Ph.D. physicists in the country who were women, and 7% of the total physics graduate student enrollment in the country who were women. The Department indicated its intention to continue its efforts to encourage graduate study in physics for women. It noted the continued difficulty of attracting black students to physics. This group comprised approximately 1% of the physics Ph.D. population.

The search for a senior condensed-matter experimentalist continued. After a search of a year and one-half, the Department identified an outstanding candidate to fill a senior line, which had been designated for this field. Paul Horn of the University of Chicago was interested in

coming to the Department if it could supply seed money for an x-ray generator facility, which he would use to continue his exciting studies of phase transitions in two-dimensional systems. The Department was not successful in obtaining the necessary funds, and Horn accepted an offer at IBM with substantially more research support than he had been seeking from Rutgers. This was a great disappointment for the Department, which would continue for some time to try to fill the void left by the departure of Serin, Torrey, Lüthi, and others.

In 1978 Paul Leath became Associate Provost for Academic Affairs. Leath had joined the Department in 1967 and had served as Associate Department Chairman for two years (1973-75). While in the Provost's Office he maintained an office in the Physics Department and was able to continue his research. In the Provost's Office, intellectual and management skills enabled him to make valuable contributions to the development of the Department and the University. He served as Associate Provost for nine years (1978-87) and then as Provost for five years (1987-92).

In 1978-79 Harold Zapolsky completed his six-year term as Department Chairman. The size of the Department had remained approximately constant, or decreased slightly. There were 72 full-time and 25 part-time graduate students, and about 60 undergraduate physics majors, divided approximately equally between the professional and general programs. Almost all members of the faculty were active in research, with over 80% of them receiving external grant support. The total grant support for the Department was $2,037,311 and the state support was $2,012,815.

Although the Department had not grown in size during Zapolsky's period as chairman, the advances made under the Science Development Grant were maintained and a significant program in astrophysics was undertaken. The Department had its first external review, and set down its first formal Master Plan. Although financial resources and faculty and staff lines were removed from the Department, Harold Zapolsky, together with his able Business Manager, Robert Kelsey, was able to avoid any deterioration in the Department. He provided stability to the Department, set high standards for the Department, and laid the groundwork for further expansion of the Department in the years to come.