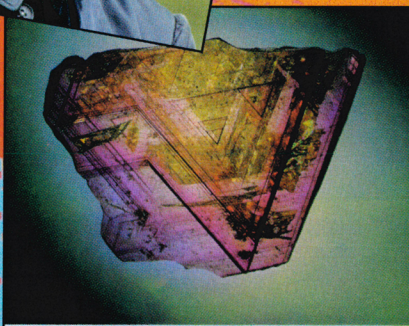


1968-1978

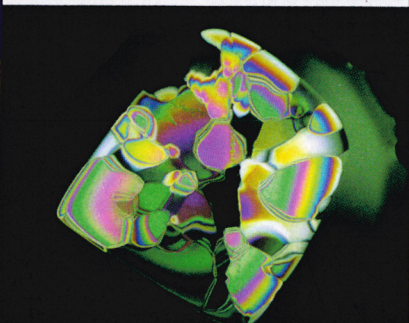
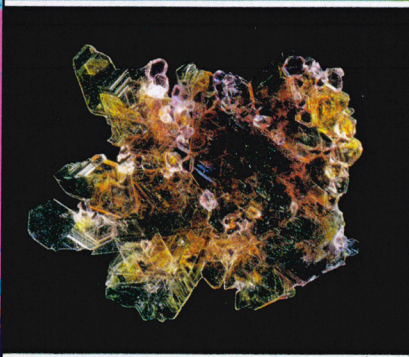
It was the heyday of particle physics: New accelerators were being built around the world. Experiments delivered new quarks and leptons—charm, bottom and the tau—and neutral currents besides. Theorists brought order to the particle zoo with the ever more standard Standard Model: renormalizable quantum chromodynamics and the unification of electromagnetism and the weak interaction. Outside the laboratory, things were less unified. Signs proclaimed “No Gas,” “No Jobs,” “No ABMs.” And students cried that physics was not “relevant”. But many physicists did get involved, calling for freedom for Jewish physicists in the Soviet Union and equal opportunities for female and minority scientists. Studies of energy and the environment blossomed.



One of the Chinese scientists visited by American physicists when doors to that nation began to reopen, as reported in December 1972.



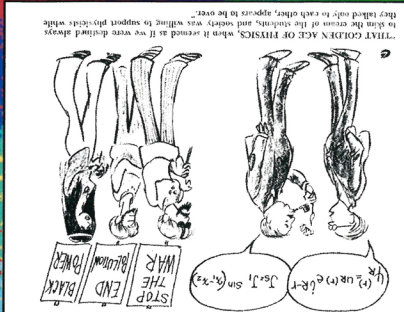
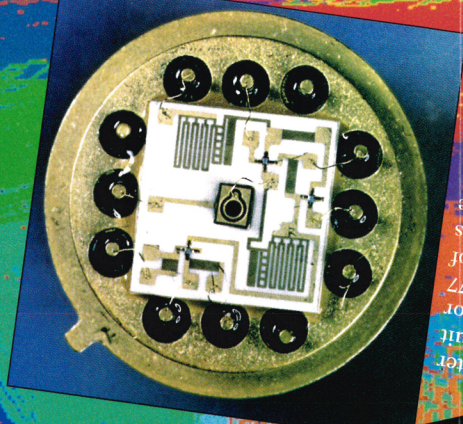
Crystals typical of those being studied in 1969 with x rays, neutrons, protons and electrons.



Avalanche photodiode, in center of this hybrid integrated-circuit receiver. As Hans Melchior discussed in a November 1977 article, development of avalanche photodiodes was driven by the needs of lightwave communication.



ode, in center
grated-circuit
us Melchior
ember 1977
velopment of
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unication.



Communications gap between
physicists and students who saw the
discipline as "not relevant"

"THAT GOLDEN AGE OF PHYSICS, when it seemed as if we were divided always
to find the crumb of the subsidy, and surely was willing to support physics while
they talked only to each other, appears to be over."

Interpretation of a black hole,
which PHYSICS TODAY commissioned
from Helmut Wimmer to
illustrate a 1971 article by Kerner,
Ruffini and John Wheeler.

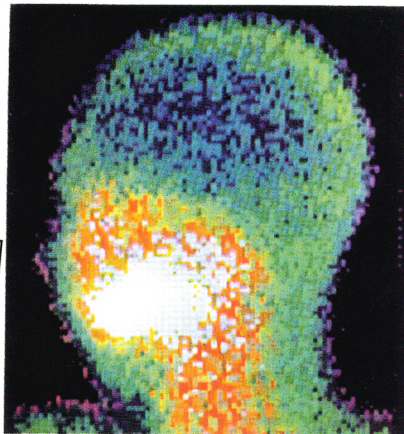


UNILAC heavy-ion
accelerator being
assembled at GSI in
1974, one of numerous
accelerators built
in the 1970s.

physics today

NOVEMBER 1973

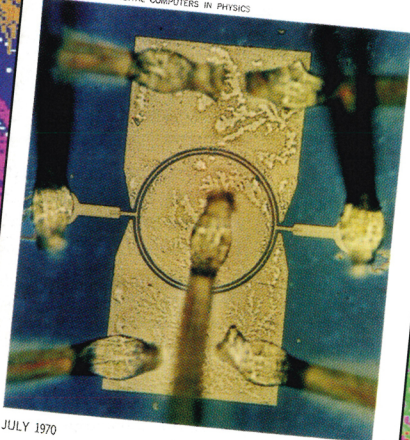
Physics in medicine



Gallium arsenide transistor developed in 1970, illustrating the trend toward smaller and faster logic devices.

PHYSICS TODAY

SPECIAL ISSUE: DIGITAL COMPUTERS IN PHYSICS



JULY 1970

Normal brain scan with a gamma camera, illustrating the contributions of physics to medicine. From a November 1973 article introducing the American Association of Physicists in Medicine, which had just joined the American Institute of Physics.

Hans Bethe, whose festschrift was reviewed in January 1968 by Eugen Merzbacher. Sketch by William J. Numeroff.



Focus on graduate students, their training and employment.



1968–1978

▼ March 1968, page 73: *Raymond Davis finds deficit in solar neutrinos*

The flux of neutrinos that originate in thermonuclear processes in the sun's interior is much lower than expected, according to recent measurements by Raymond Davis Jr, Don Harmer, Kenneth Hoffman and Blair Munhofen of Brookhaven. The experiment suggests that our ideas about the sun's interior may need to be revised.

▼ April 1970, page 23: *Arnold Strassenburg on the 'Supply and Demand for Physicists'*



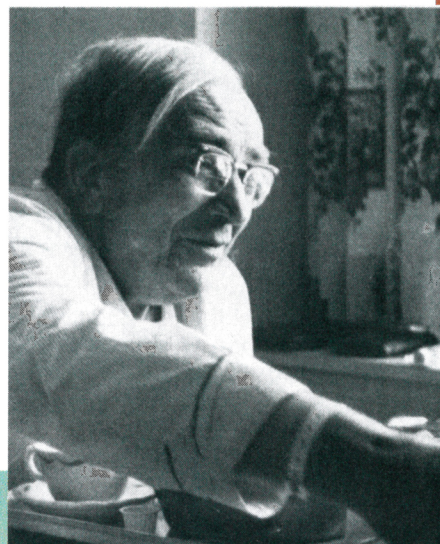
The evidence has been gathering since 1967, and a 1969 employment survey confirms our earlier suspicions: More physicists are dissatisfied with their jobs now, and even those jobs were more difficult to obtain than before.

▼ May 1968, page 75: *Pulsars discovered*

At least three radio observatories have recently reported an entirely new type of radio source that emits pulses with extremely stable repetition frequency and apparently random amplitude. It is tempting to identify these sources as neutron stars, postulated but not yet observed, or as white dwarf stars. Observations with optical telescopes are under way to look for visible radiation from these sources and to see whether the same pulsation occurs.

▼ February 1968, page 101: *Interview with George Gamow (by R. Hobart Ellis Jr)*

Meeting George Gamow is a bit like being a bookworm that has meandered into the middle of an encyclopedia of physics. Physics of all kinds is in all directions: quantum mechanics, particles, stars, cosmology. Yet the book is not one of physics alone. The gusto of the conversation has more in common, perhaps, with flashing swords and knights in armor and deeds of derring-do. If there is a swashbuckling physicist, perhaps Gamow is the most appropriate man to carry the label.



▼ April 1968, page 148: *Fred Hoyle advises high-energy physicists on funding matters*

We make a mistake, I believe, in thinking the rising cost and sophistication of physics is a smooth function of time. When we change the kind of physics we aim to study—more precisely, the coupling constants—we become involved in economic discontinuities. Problems controlled by the Rydberg are cheap. Problems of nuclear structure are still within the economic range that society will support. Problems of nucleon structure are so large that only a clearcut victory in physics-society relations will permit a resolution of the financial problem in favor of the physicist.

▼ October 1970, page 73: *Bomb blast kills a physicist at the University of Wisconsin (reported by Gloria B. Lubkin)*

Five minutes before the blast occurred police received a telephone warning. The bomb, located inside a truck, exploded at 3:45 AM, just outside the lab of Henry H. Barschall. His student, David Schuster, was running an experiment on the accelerator. In a low-temperature laboratory, Robert Fassnacht, a postdoctoral researcher who worked with Joseph Dillinger, was running an experiment on superconducting transitions of separated isotopes. That morning he was studying aluminum. Fassnacht, 33, and the father of three children, had earned his PhD under Dillinger.

The bomb explosion left Fassnacht dead (see obituary on page 69).

▼ December 1970, page 28: from Marvin L. Goldberger, *'How Physicists Can Contribute'*

Physical scientists are frequently confronted with the accusation that "their science," and the technology derived from it, enables the exploding population to destroy the environment. This, together with the exploitation of scientific developments by the military, has led to a widespread antipathy towards science in young people. The situation is exceedingly unfortunate. Even though science alone may not provide all needed solutions it is only through imaginative utilization of science and technology that many of the present problems can be solved.

...
Much work needs to be done in connection with water pollution, solid-waste disposal, recycling of raw materials, utilization of infrared technology in satellite photography for earth-resource surveys and crop management. There are many unexplored areas in theoretical and experimental meteorology, thermal pollution, electrical power transmission, and energy resources. I personally feel that the time may be ripe for a crash program on controlled fusion.

▼ February 1971, page 17:
Substructure of the proton
(reported by Gloria B. Lubkin)

A picture of the proton at high energies is emerging from the work of many theorists trying to explain the deep inelastic scattering observed with the SLAC electron linac. These theories visualize the proton as consisting of pointlike constituents with charge less than the electron charge and a spin of $1/2$. The deep inelastic scattering, they say, measures the momentum distribution within the proton of these pointlike constituents, be they quarks, partons or "stratons" (a term coined by the Chinese to refer to the stratification of atoms, nuclei and nucleons).

▼ October 1971, page 54:
Kenneth W. Ford reviews Paul Hewitt's Conceptual Physics

The content of this book can best be defined in recipe form: Start with several recently published surveys of physics for nonphysics students. Boil them down. Add one cup of Feynman. Strain out the equations. Liberally sprinkle what remains with examples drawn from everyday experience. Spice with just a touch of social commentary and adorn with clear but homely drawings by the author. I find the result quite palatable. For many nonscience students, it will be digestible, and perhaps even pleasant tasting.

▼ April 1971, cover

physics today

APRIL 1971

By Gloria B. Lubkin



▼ July 1971, page 9: From
letter by Judith C. Brown

I must then add that I have never seen a woman physicist, either in the US or in Europe, wearing an elaborate evening ring as she turned an instrument dial in the laboratory. In my opinion your choice of a cover photograph indicates as much comprehension of the problem as if you had chosen a black man (or woman) with a piece of watermelon for a similar article on blacks.

▼ October 1972, page 23:
From 'Einstein on the Firing Line'
by Clifford M. Will

An astronomer detects mysterious pulses in the light from a star at the center of the Crab Nebula, and theorists speculate that the source is a rotating neutron star (a "pulsar"). Massive aluminum cylinders in Illinois and Maryland are suddenly and simultaneously set into vibration, and theorists suggest that a gravitational wave has just passed through the solar system. Radio astronomers discover that space is filled with blackbody radiation at a temperature of about 3 K, and theorists say that it is a by-product of the initial "big bang" of the Universe. X-ray astronomers discover aperiodic fluctuations in the x-ray emission from Cygnus-X1; optical astronomers discover that Cygnus-X1 is associated with a single-line spectroscopic binary star. From this evidence theorists speculate that the x rays come from a black hole in orbit around a normal star.

But when the theorists sit down and begin to construct detailed models for these phenomena, they suddenly pull up short. All the phenomena, they notice, involve "relativistic" gravitation in a very crucial way. Newton's theory of gravitation is certainly inadequate to describe these phenomena quantitatively, and two of them (black holes and gravitational waves) it cannot describe even qualitatively.

▼ April 1971, page 23:
From 'Women in Physics'
by Gloria B. Lubkin

Why do we need women in physics? The reasons are many. Ajzenberg-Selove said, "I believe that most of us want for everyone, of whatever race, religion or sex, a full flowering of each individual's personality and attainment to the limit of that person's ability and commitment." She also quoted Wu as saying, "If in this human society, women are endowed with just as much intellectual capability as men, why then should they be deprived of such aspiration and fulfillment? Why should they not share the responsibilities of the progress of science with men?"

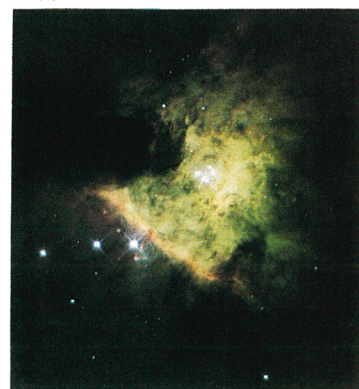
Townes observed that physics should have as large a group of talented people as possible to choose from. "We find in physics a very wide variety of personalities and approaches to physics that are successful." Physics has a multitude of types of problems, and its people have a variety of styles, attitudes and approaches that have been very successful and serve to complement each other. "We need this variety badly," Townes concluded.

▼ March 1973, cover

physics today

MARCH 1973

Astrophysics



▼ August 1971, page 23:
From 'The Search for High-Temperature Superconductors'
by Bernd T. Matthias

Controlled fusion has now become a distinct possibility, and its progress over the last twenty years has covered many orders of magnitude. During this same time, superconducting transition temperatures have expanded from a range of 0.4 K to 16 K to a range stretching from 0.0002 K to 21 K.^{1,2} If this upper limit could be further increased, not by another order of magnitude, but by a factor of as little as 1.2, or as large as 1.5, superconductivity, while still far from room temperature, would revolutionize our technology. This revolution would encompass electric power transmission, electric motors, high-field electromagnets, and the metallurgy of magnetic suspensions as a whole. In this article I will explain why I believe that this factor of 1.5 is a distinct possibility. I will also explain why room-temperature superconductivity (regardless of a thousand statements by theorists and an equal number of theories) is—in my opinion—pure science fiction.

1968–1978

▼ **April 1972, page 17: 'New Theory of Weak and Electromagnetic Interactions' (as reported by Gloria B. Lubkin)**

A new paper by Steven Weinberg (MIT) is causing great excitement among high-energy physicists. One leading theorist calls it "the most important development in weak-interaction theory in the last 15 years." Weinberg explained to us that his new work is a possible solution of two outstanding problems. One is how, in a natural way, to unify the weak and electromagnetic interactions. The second is how to make a theory of weak and electromagnetic interactions in which the infinities can be dealt with in as simple a way as they are in quantum electrodynamics.

Weinberg's theory is very close in spirit to theories proposed much earlier by Julian Schwinger (Harvard), Sheldon Glashow (Harvard), Abdus Salam (then at Imperial College, London), John Ward (then at Johns Hopkins University) and many others. Their idea is that the weak interactions are carried by some kind of intermediate vector meson in the same way that electromagnetism is carried by the photon. The weak interactions might arise from some kind of gauge invariance of the theory.

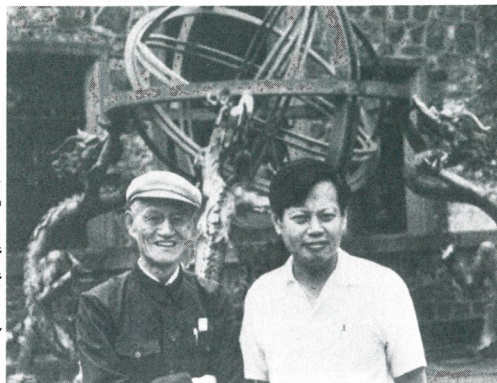
"Right now there's not a grain of experimental evidence that this general idea is right. But it solves so many theoretical problems all at once, that it smells right," Weinberg says.

▼ **August 1972, page 17: 'AEC Opens Up on Laser Fusion Concept' (as reported by Gloria B. Lubkin)**

Interest in laser-produced thermonuclear fusion is increasing rapidly. Until recently almost all discussion in the open literature mentioned only the possibility of using the laser to heat a fusion-fuel pellet, and most observers argued that the laser energy requirement for a fusion reactor would be impracticably high.

In November, in testimony before the Joint Congressional Committee on Atomic Energy, Robert Hirsch (then in the AEC Division of Research), revealed that the laser could also be used to cause an implosion of the pellet. This was apparently the first AEC announcement of the hitherto classified concept.

► **December 1972, page 27: Chang Yu-che (left) and Chen-Ning Yang. Yang had been the first American physicist to visit China in many years. From 'Physics in China' by Gloria B. Lubkin**



▼ **June 1969, page 54: From 'Artsimovich Talks About Controlled-Fusion Research' by James L. Tuck**

LEV ARTSIMOVICH is secretary of the physics-mathematics section of the USSR Academy of Sciences, chairman of its council on plasma physics and directs the plasma-physics division of the Kurchatov Institute in Moscow. He is also involved in construction of the great 6-meter optical telescope, which will probably be the world's largest when completed.

Recently he spent a month in the US, giving lectures and visiting laboratories. In one such visit a small group of Los Alamos Sherwood staff members . . . had an informal discussion with Artsimovich on the current outlook for fusion reactors.

His comments are especially valuable because Artsimovich has the reputation of being a highly competent and articulate physicist, who says what he thinks. In the past (Salzburg International Fusion Conference, 1961, for example, and in his book, *Controlled Thermonuclear Reactions*, Gordon and Breach, New York, 1964) he has been critical of the Scylla theta-pinch claims to be thermonuclear at a time when no other genuine laboratory thermonuclear reaction existed. Now, in Tokomak, he has a genuine thermonuclear reaction of his own.

▼ **July 1969, page 67: US Fusion Scientists Want to Build Tokamaks**

The recent visit of Lev Artsimovich to the US, in which he reported significant plasma confinement at thermonuclear temperatures in the Tokomak T-3 (PHYSICS TODAY, June, page 54), has generated a wave of US proposals to build Tokomaks or Tokomak-like devices. Among the laboratories proposing Tokomak experiments are Princeton, Oak Ridge, MIT, University of Texas and Gulf General Atomic.

Meanwhile, at the Kurchatov Institute, Moscow, plans for a much larger Tokomak are already well advanced.

▼ **June 1969, page 56: From 'Artsimovich Talks About Controlled-Fusion Research' by Gloria B. Lubkin**

"Which approach to the controlled-fusion problem looks best?" we asked, perhaps putting him on the spot. Artsimovich personally feels that toroidal systems are the most promising approach, but that many systems should be tried. He said: "At this stage we have to have peaceful co-existence between different directions of research. . . . Not only peaceful co-existence but also active cooperation within the framework of international scientific cooperation."

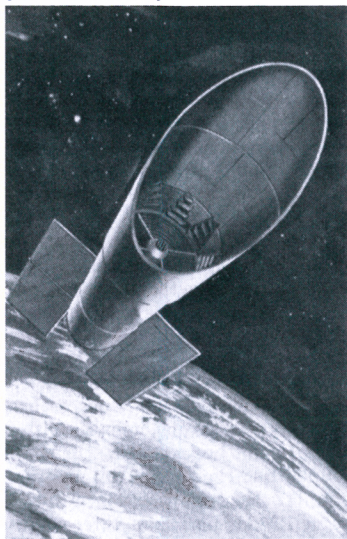
"There are at least three approaches that can lead to the practical solution of this problem," he said. These are: closed systems, magnetic mirrors, and very dense, short-pulse systems. These very dense plasmas are achieving success both in the US and USSR, he noted. Because of their high density, one need confine the plasma for only a short time.

▼ **February 1973, page 69: AEC sets goal of fusion feasibility by 1980–1982 (as reported by Gloria B. Lubkin)**

The AEC Division of Controlled Thermonuclear Research has recently completed a review of the large confinement systems it supports and has identified three high-priority experiments: the Princeton Large Torus now under fabrication, the Scyllac device at Los Alamos, which is now being converted to a toroidal configuration, and the 2XII mirror device at Lawrence Livermore Laboratory. The Division's new director, Robert L. Hirsch, told us that they have formally adopted the immediate goal of establishing the feasibility of fusion by 1980 to 1982. Ultimately the Division's goal is to make a practical, commercial, environmentally attractive fusion power plant.

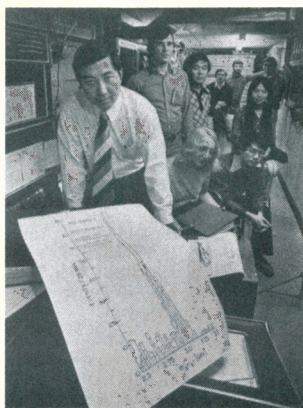
1968–1978

▼ February 1973, page 20:
**Concept for a 3-meter Large
Space Telescope, which
resulted in the 2.4-m Hubble
Space Telescope**



▼ October 1973, page 17:
**No gravity waves seen (as
reported by Gloria B. Lubkin)**

Two new experiments have failed to detect gravity waves of the intensity originally reported by Joseph Weber in 1969–70. Richard L. Garwin and James L. Levine of IBM Research Center, operating a Weber-type antenna at 1695 Hz, report¹ no signals after 18 days of serious data collection. At Bell Labs, J. Anthony Tyson, who has a Weber-type antenna sensitive to 710 Hz, found² no signals after three months of operation in the present set-up.



▲ Celebrating are Sam Ting and his coworkers (left) and Martin Perl, Burton Richter and Gerson Goldhaber (right)

▼ July 1973, page 9: From
letter by David Bowen

The single best piece of advice in starting a job search is to start early. If you see the handwriting on the wall, don't wait until the last minute. At least one full year should be allowed, and plan to spend a considerable fraction of your time on the effort. It would be even better to allow two years; the first to look for the position you would like to accept; the second to look for the position you have to accept.

The Moon is one of the more obvious of our neighbors in space and is certainly the most accessible. In spite of intensive analysis and probing by virtually every conceivable chemical and physical technique, the maneuvering room for speculation on lunar origin has scarcely diminished as a result of the Apollo program. This is not primarily due to lack of information but to the unexpected and confusing nature of the newly acquired data, most of which is open to multiple interpretations.

The Moon's unique characteristics have become even more unique as a result of lunar exploration. This strange body, shown particularly well in the Apollo 17 photograph (figure 1), is like no other in the solar system that we know about, either presently orbiting the Sun or having fallen on the Earth. It is similar to no planet or meteorite. Curiously, it is most like some tiny white inclusions in a meteorite that fell spectacularly to Earth in Mexico during the midst of the lunar exploration program.

▼ September 1974, page 32:
**From 'The Colonization of
Space' by Gerard K. O'Neill**

New ideas are controversial when they challenge orthodoxy, but orthodoxy changes with time, often surprisingly fast. It is orthodox, for example, to believe that Earth is the only practical habitat for Man, and that the human race is close to its ultimate size limits. But I believe we have now reached the point where we can, if we so choose, build new habitats far more comfortable, productive and attractive than is most of Earth.



◀ March 1974, page 44:
**From 'The Interior of the Moon'
by Don L. Anderson**

► January 1975, page 17:
**Discovery of the J/ψ particle
(as reported by
Barbara Goss Levi)**

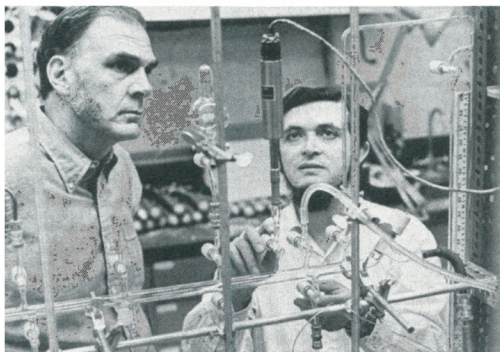


The world of high-energy physics has been set afire by the discovery of a new particle with very narrow width at 3.1 GeV. Experimentalists everywhere have rushed to their laboratories to try to measure some of the properties of the new particle. Already a second particle has been found at 3.695 GeV by one of the two groups that discovered the first particle. Theorists are consulting in corridors and in hastily summoned seminars to discuss possible interpretations of the discoveries. Some are calling the events "the greatest thing since strange particles."

Although the theoretical interpretations are very much up in the air, the experimental evidence for the new particle at 3.1 GeV is on very solid ground; it has been seen to date at three different laboratories and in several different decay modes.

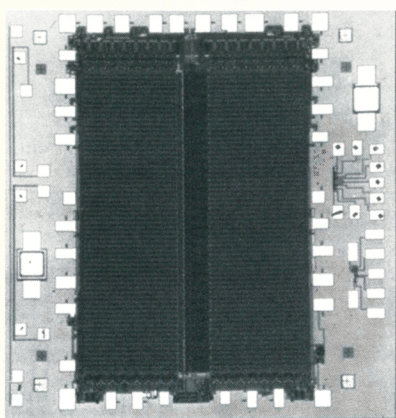
1968–1978

▼ October 1975, page 35: F. Sherwood Rowland and Mario J. Molina. From an article about their 1974 postulate that chlorofluorocarbons could destroy stratospheric ozone (written by Gloria B. Lubkin)



▼ August 1975, page 17: Semiconductor heterostructures (as reported by Gloria B. Lubkin)

Thanks to teams at two laboratories, that textbook abstraction of quantum mechanics, the one-dimensional square well, has become realized in a physical object. Known as a "heterostructure," this object consists of accurately deposited thin layers of two different semiconductors of matching lattice constants. When these man-made square wells are built up into stacks of 10–100 periods, they constitute essentially an infinite configuration (because of the finite mean free path of the carriers) known as a "superlattice" (PHYSICS TODAY, August 1973, page 20). These structures open the possibility of creating quantum states with predetermined energy levels and bandwidths.



▼ October 1975, page 17: 'Mixed Reception for the Magnetic Monopole Announcement' (as reported by Gloria B. Lubkin)

The possibility that a fundamental magnetic charge might exist has intrigued physicists over the years.

Now a group of four cosmic-ray observers have announced finding an event that they interpret as being caused by a moving magnetic monopole.

The announcement made headlines in many newspapers and magazines throughout the world and is being widely discussed in the physics community. Many observers were openly skeptical of the report, particularly since only one event was found. Some are arguing that the event could be interpreted instead as a high-Z nucleus.

▼ February 1976, page 9: From letter by Herman Cummins and eight colleagues, who had attended a Sunday seminar while in Moscow

Every Sunday at noon some thirty Soviet scientists gather in the tiny Moscow apartment of Mark Azbel for a weekly seminar, which represents their only remaining opportunity to practice the science to which they have devoted their professional lives. Azbel is an internationally known theoretical physicist, formerly a member of the prestigious Landau Institute near Moscow. Two and a half years ago he applied to emigrate to Israel and was immediately dismissed from the Institute. For him and the others in the Seminar there has been no further opportunity to participate in Soviet scientific life. They are shunned by practically all of their former colleagues. Access to libraries and laboratories is forbidden; telephone service is cut and all mail is intercepted, including subscriptions to Western scientific journals. Although these scientists live in a constant state of personal fear and deprivation, they make a determined effort to remain intellectually alive through the Sunday Seminar and the occasional participation of visiting scientists.

▼ October 1975, page 17: Evidence for tau lepton (as reported by Barbara Goss Levi)

In a year full of surprises in high-energy physics, an experiment at the SPEAR colliding-electron-beam facility has uncovered yet another unexpected phenomenon: A significant number of events have been seen in which an electron and positron collide and produce one electron and one muon plus some missing energy. The experimenters can find no conventional explanation for this anomalous production of leptons and postulate that this reaction could proceed through the production of a pair of new particles. Each of the U particles, as they have been tentatively called, would then decay into an electron or a muon plus one or two neutrinos.

Although the data suggest the production of a pair of particles with strong leptonic decay modes, they cannot determine the exact nature of such particles. The most popular candidates are a heavy lepton, a heavy meson and an elementary boson.

▼ August 1976, page 18: Poem by Frederick Reines

Ode to Frustration

If at first you don't succeed
What did you expect?
Progress would be slow indeed
With nothing to reject.

A false step here, another there
It means you're really trying
Besides, the struggle up the stair
Itself is satisfying.

So labor with your charming quarks
Though endless multiplying
And weigh each lepton, one by one,
And look for baryons dying.

Dimuon pairs, imploding stars
All vie for a solution
With quarks behind their prison bars
Compounding the confusion.

Oh, Pauli, Fermi guide us
Banish our illusions
And elevate our hunches
To sensible conclusions.

◀ January 1976, page 56: 'High-density' (8192-bit) memory array on a chip 1.1 mm by 1.6 mm

1968–1978

▼ November 1976, page 71: *I. I. Rabi reviews Stanislaw Ulam's biography, Adventures of a Mathematician*

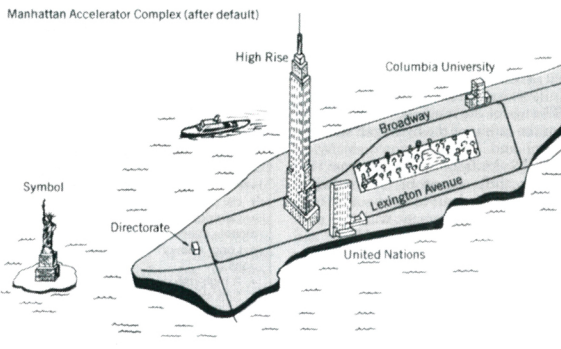
In Los Alamos, where I first knew Ulam, he was the man who was above the grubby battle, the aristocrat providing witty and slightly malicious comments on the struggles of the deeply engaged. From time to time, with a pithy remark and a clever piece of calculation presented in a somewhat indifferent manner, he could make—as in the matter of the hydrogen bomb—a contribution of very great significance. All along, one had the feeling that he was a visitor from another world, the world of pure mathematics. Other things—physics, politics, human affairs—although of some interest, were not enough to stir one deeply. This attitude is not a pose, it is the essence of this remarkable personality.

▼ December 1976, page 23: *From 'Heisenberg and the Early Days of Quantum Mechanics' by Felix Bloch*

Once I came back after dinner to my room in the Institute to finish some work. While I sat at my desk I heard Heisenberg, who was an excellent pianist, playing in his apartment under the roof of the building. It was already late at night when he came down to my room and said he just wanted to talk a little before going to bed after he had practiced a few bars of a Schumann concerto for three hours. And then he told me that Franz Liszt, when he was already a famous pianist, found that his scales of thirds and fifths were not smooth enough. So he cancelled all engagements, and for a year practiced nothing but these scales before he started to perform again. The reason I remember this so well is that I felt that Heisenberg, without intention, had told me something important about himself. The audience of Liszt after that year must have thought it a wonder how easily he was able to play those difficult scales. But the real wonder was of course that he had had the strength and the gift of concentration to keep on perfecting them incessantly for a whole year.

Now, one of the most marvellous traits of Heisenberg was the almost infallible intuition that he showed in his approach to a problem of physics and the phenomenal way in which the solutions came to him as if out of the blue sky. I have asked myself whether that wasn't a form of the "Liszt phenomenon," and for that the more admirable. Not that Heisenberg would ever have cancelled all other activity for a year to master a special technique. But we all knew the dreamy expression on his face, even in his complete attention to other matters and in his fullest enjoyment of jokes or play, which indicated that in the inner recesses of the brain he continued his all-important thoughts on physics.

► May 1977, page 20: *Leon Lederman proposes Manhattan as site for Very Big Accelerator*



Lederman's proposed site for the VBA. The Broadway and Lexington Avenue subway lines would provide ready-made tunnels for the accelerator's straight sections. The high rise is the Empire State Building, and the stirring symbol is the Statue of Liberty. Inaccessibility to the public is assured by the traffic jams at toll bridges. Justification for the cession of Manhattan Island to the VBA complex by the US Government could be financial default by New York City.

▼ May 1977, page 44: *From 'Coherent Raman Spectroscopy' by Marc D. Levenson*

... For the first thirty-five years Raman scattering was a laborious and exotic technique, important more for the quantum-mechanical principles it illustrated than for its practical applications.

Then, fifteen years ago, the development of gas lasers completely revolutionized the practice of Raman spectroscopy. Gone were the discharge lamps and hours-long photographic exposures; they were replaced by the cw laser, tandem monochromator and cooled photomultiplier. What had been a difficult and exotic technique became a routine analytical procedure for studying vibrational and other elementary excitations of materials.¹ The development of powerful tunable lasers now promises a second revolution.

▼ February 1977, page 28: *From 'Can Physics Develop Reasoning?' by Robert G. Fuller, Robert Karplus and Anton E. Lawson*

In short, our fixation on the formal aspects of physics instead of its concrete experiences has made physics unnecessarily difficult and dry. We have removed the sense of exploration and discovery from the study of physics for the majority of students. Several generations of public-school students have been alienated from physics.^{8,9}

▼ October 1977, page 17: *Evidence for bottom quark (as reported by Gloria B. Lubkin)*

Possible evidence for a new kind of quark has been reported by a group working at Fermilab. The team of experimenters from Columbia University, Fermilab and the State University of New York at Stony Brook observed a dimuon resonance, which they called Υ , at 9.4 GeV, by far the most massive resonance ever found. They reported their results at the European Physical Society Particle-Physics Conference held in Budapest in July. Since then the group reported evidence for Υ' at 10.0 GeV and preliminary indications for a third resonance at about 10.4 GeV. Both Υ and Υ' have widths less than or equal to 200 MeV. These latest results were announced at the International Symposium on Lepton-Photon Interactions held in Hamburg late in August.

One promising interpretation of the Υ is that it is a bound state of a new quark and its antiquark. This new quark, proposed by a number of theorists over the past couple of years, would join the ranks of the up, down, strange and charmed quarks.

▼ January 1976, page 102: *'Soviets Halt Distribution of PHYSICS TODAY Issue'*

At the Moscow physics show held 25 November–3 December, Soviet show officials prevented the distribution of 2500 copies of the November issue of PHYSICS TODAY. The special issue, devoted to Soviet physics achievements, also carried a news story on the award of the Nobel peace prize to physicist Andrei Sakharov.

1968–1978

A DECADE OF ACCELERATOR CONSTRUCTION

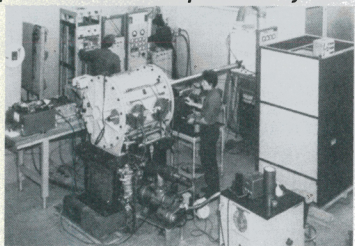
▼ January 1968, page 105:
Serpukhov synchrotron produces 76 GeV protons



▼ May 1972, page 17: As National Accelerator Lab (now Fermilab) reaches 200 GeV, Robert R. Wilson toasts event with same brand of chianti used to celebrate first nuclear pile



▼ February 1974, page 77:
Testing at CERN Super Proton Synchrotron, expected to produce 400 GeV protons by 1976



▼ August 1972, page 18: Jubilation at Los Alamos Meson Physics Facility as proton beam reaches 800 MeV. Louis Rosen is clapping.



▼ February 1975, page 17: Tri-University Meson Facility becomes world's third operating meson facility



▼ August 1977, page 62: Groundbreaking for PEP storage ring at the Stanford Linear Accelerator Center. Wielding shovels are (from left) Andrew Sessler, Alan Cranston, Donald Beattie and Wolfgang Panofsky



◀ September 1976, page 19:
KEK laboratory near Tokyo houses a proton synchrotron expected to reach 12 GeV

