

PHYSICS TODAY TURNS 75



FREDDIE PAGANI

Richard Fitzgerald is the editor-in-chief of PHYSICS TODAY. He has been with the magazine for nearly 25 years, joining shortly after the magazine celebrated its 50th anniversary.



PHYSICS TODAY **75** YEARS

Richard J. Fitzgerald

Even as the physical sciences have advanced and transformed, many of the community's needs and concerns have persisted.

“PHYSICS TODAY is for the physicist, to inform him in comfortable, everyday language, of what goes on and why and who goes where. But it is also for the chemist, the biologist, and the engineer, to tell them of the science towards which they are driven by so many of their investigations; it is for the student, the teacher, the lawyer, the doctor, and all who are curious about physics; it is for administrative officials who deal with research; it is for editors and writers whose profession puts them midway between what is done and how it should be reported; it is for you, whatever reason brought you to this page.”

David Katcher, PHYSICS TODAY's first editor, wrote those words in May 1948 as part of his editorial introducing a new magazine. In those postwar days, concerns were growing that physics was becoming too specialized, too fractionated, and that the prominence and funding that flowed from the field's wartime successes were accelerating the process. There was a call within the American Institute of Physics and its five member societies—the American Physical Society, the Optical Society of America (now Optica), the Acoustical Society of America, the Society of Rheology, and the American Association of Physics Teachers—for a unifying influence to counter those forces. Thus was PHYSICS TODAY born.

In the intervening years, physics—and the physical sciences more generally—has experienced staggering degrees of progress and change. Yet as we mark the magazine's 75th anniversary this month, Katcher's description still holds true.

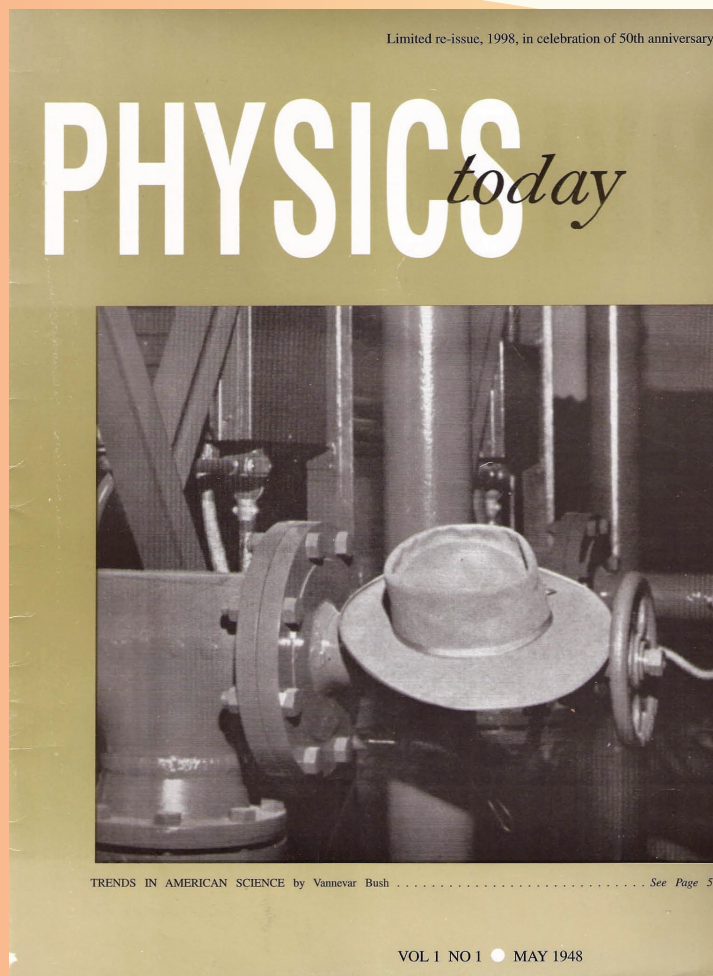
The mission of PHYSICS TODAY is to be a unifying influence for the diverse areas of physics and the physics-related sciences. It does that by providing authoritative, engaging coverage of physical science research and its applications without regard to disciplinary boundaries; by reporting on the often complex interactions of the physical sciences with each other and with other spheres of human endeavor; and by offering a forum for the exchange of ideas within the scientific community. With authoritative features, full news coverage and analysis, and fresh perspectives on technological advances and groundbreaking research, PHYSICS TODAY informs readers about science and its role in society.

The next several pages offer various lenses through which to appreciate how things have—and haven't—changed over the past 75 years.

As much as PHYSICS TODAY is about the physics, it is also about physicists. We strive to be a reminder of our commonalities as scientists, of the many interconnections among the varied disciplines, and of our shared priorities and concerns. Many of those concerns were extant at PHYSICS TODAY's debut, including research funding, public perceptions of science, the field's (and its practitioners') relationships with and responsibilities to society, the future of our planet, and how to prepare the next generation of scientist-citizens.

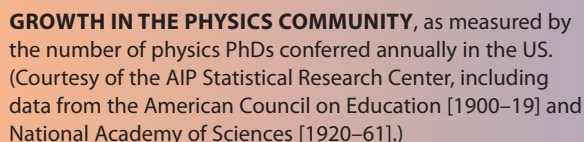
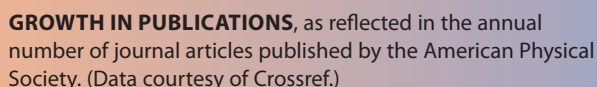
One part of Katcher's description above is notably out of date, though. PHYSICS TODAY has evolved into more than a magazine and can be found well beyond the printed page. We have a website, email newsletters, social media, and webinars, and we'll continue to seek out and engage with our audiences wherever they may be.

We know that you, our readers, are busy yet curious, scientifically savvy yet unacquainted with the terminology and context of subfields too far from your own. With content that we hope you find appealing, accessible, and informative, PHYSICS TODAY documents and reflects on the physics endeavor and its evolution, and it celebrates the diversity of the science and of the scientists.



THE FIRST ISSUE, May 1948 (reissued in 1998).

In its first year, *PHYSICS TODAY* went to some 7000 readers. That initial audience comprised the members of the five scientific societies that then belonged to the American Institute of Physics. Not only are those societies each much larger today, but there now are five more societies in the AIP federation—the American Crystallographic Association; the American Astronomical Society; the American Association of Physicists in Medicine; AVS: Science & Technology of Materials, Interfaces, and Processing; and the American Meteorological Society—bringing the magazine's readership to more than 100 000.

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Changing times, needs, and tools

Feature articles have always been at the core of *Physics Today*. The departments rounding out each issue have evolved to reflect shifts in our audience's needs and information sources. When the community was smaller and communications speeds slower, meeting calendars, previews, and reports each had their day, as did news of job changes, honors, and awards. Other departments merged, split, or were renamed. Of the current lineup, some debuted rather recently; others go back to our very first year (see at right).

It will come as no surprise that the most dramatic shift has been the explosive growth of the internet. Content can now be published online as fast as it can be typed. But along with that capability has come ever-increasing competition for readers' attention. In 2000 *Physics Today*'s website just posted manually produced HTML versions of each month's magazine. Today it features a steady stream of online content that complements and supplements what appears in print.

PHYSICS TODAY

www.physicstoday.org

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AIP

Member societies
ACA: The Structural Science Society
Acoustical Society of America
American Association of Physicists in Medicine
American Association of Physics Teachers
American Astronomical Society
American Meteorological Society
American Physical Society
APS: Science & Technology of Materials, Interfaces,
and Processing
Optics (formerly The Optical Society)
The Society of Rheology

Other member organizations
Sigma Pi Sigma Physics and Astronomy
Honor Society
Society of Physics Students

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Newsflash: Hints of the Higgs Grant LEP a One-Month Reprint

Our September issue sees the continuation of changes to the *Physics Today* web site. All the editorial content from the magazine is available on the Web. In the near future, restrictions will apply. In addition, new improved services will be available only to subscribers and individual members of societies connected to the *American Institute of Physics*. To learn more, please register below. Your details will be kept private and confidential.

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Feature Articles:

Physics in the Whirlwind of Optical Communications
Accelerating demands for high-speed communications are driving rapid innovations in lightwave communication, including versatile, high-bandwidth fibers, sources, amplifiers, and switches — Gordon A. Thomas, David A. Ackerman, Paul R. Prucnal, and S. Lance Cooper

DNA-Inspired Electrostatics
Not just the repository of our genetic information, DNA is also a fascinating, shape-shifting molecule whose behavior in solution counters our intuition and challenges our physical understanding — William M. Gelbart, Robin F. Bruinsma, Philip A. Pincus, and V. Adrian Parsegian

Hot Prospects for Ultracold Molecules
Researchers have taken giant strides down several paths toward trapping molecules at submillikelvin temperatures. At the end of these paths lies the promise of more precise measurements and new phenomena — Barbara Goss Levi

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THE PHYSICS TODAY WEBSITE, in September 2000 and in April 2023.

inspect. TopMode Adding precision to your metrology TOPTICA

PHYSICS TODAY

HOME BROWSE INFO RESOURCES JOBS

SIGN UP FOR ALERTS

Community brightens attention to science

FROM THE VAULT
JUNE 2016

Hypervelocity stars in the Milky Way
Warren R. Brown

inspect. TopMode

Articles, news stories, and other editorial material aren't the only content that informs readers about what's going on in the community. So, too, do the advertisements. Ads from book publishers proliferated in the first decade and have been around ever since. The earliest issues also featured ads for surplus military optics from Edmund Salvage Corp (later Edmund Scientific) and for US savings bonds.

Ads depict not only the instrumentation and technology trends but also the job market and the field's demographics. As the Cold War and space race heated up, for example, ads for the defense and aerospace industries burgeoned. The January 1968 issue, flush with ads, ran 192 pages long. For the first several decades, most recruitment ads assumed that candidates were male and almost all the scientists depicted in them were white. As part of PHYSICS TODAY's 70th anniversary commemoration, former senior editor Melinda Baldwin surveyed the ups and downs of the physics job market as told through the magazine's display and classified ads (see "PHYSICS TODAY ads track employment boom and bust," PHYSICS TODAY online, 7 May 2018).

announcing

the new 1950 revision

CHART OF THE ATOMS

Showing the newly-discovered element BERKELIUM, and all changes approved Sept. 5, 1949, by the International Union of Chemistry at Amsterdam.

Periodic Chart of the Atoms

The Atom Group According to the Number of Outer (Valence) Electrons

Electrons in the completed shells

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1 H He 2 1.0080 4.0026

2 Li Be B C N O F Ne 8 6.941 9.0122 10.811 12.011 14.007 16.000 18.998 20.183

3 Na Mg Al Si P S Cl Ar 23 24 27 28 31 32 35 39.948 39.948 44.956 47.88 50.942 55.845 63.546 69.723

4 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr 39 40 44.956 47.88 50.942 55.845 63.546 69.723 74.922 78.972 79.904 83.904 85.464 87.62 91.224 92.906 95.94 97.90 101.07 102.905 106.42

5 Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe 85.464 87.62 91.224 92.906 95.94 97.90 101.07 102.905 106.42 107.87 112.41 114.913 118.710 121.757 127.60 131.29 132.905 137.40 138.905 144.913 150.919 157.25 162.50 167.26 173.04 178.49 183.84 188.906 192.22 196.227 200.59 204.38 208.980 212.59 217.00 221.01 226.03 231.04 235.04 238.03 242.04 246.05 250.10 254.10 258.10 262.10 266.10 270.10 274.10 278.10 282.10 286.10 290.10 294.10 298.10 302.10 306.10 310.10 314.10 318.10 322.10 326.10 330.10 334.10 338.10 342.10 346.10 350.10 354.10 358.10 362.10 366.10 370.10 374.10 378.10 382.10 386.10 390.10 394.10 398.10 402.10 406.10 410.10 414.10 418.10 422.10 426.10 430.10 434.10 438.10 442.10 446.10 450.10 454.10 458.10 462.10 466.10 470.10 474.10 478.10 482.10 486.10 490.10 494.10 498.10 502.10 506.10 510.10 514.10 518.10 522.10 526.10 530.10 534.10 538.10 542.10 546.10 550.10 554.10 558.10 562.10 566.10 570.10 574.10 578.10 582.10 586.10 590.10 594.10 598.10 602.10 606.10 610.10 614.10 618.10 622.10 626.10 630.10 634.10 638.10 642.10 646.10 650.10 654.10 658.10 662.10 666.10 670.10 674.10 678.10 682.10 686.10 690.10 694.10 698.10 702.10 706.10 710.10 714.10 718.10 722.10 726.10 730.10 734.10 738.10 742.10 746.10 750.10 754.10 758.10 762.10 766.10 770.10 774.10 778.10 782.10 786.10 790.10 794.10 798.10 802.10 806.10 810.10 814.10 818.10 822.10 826.10 830.10 834.10 838.10 842.10 846.10 850.10 854.10 858.10 862.10 866.10 870.10 874.10 878.10 882.10 886.10 890.10 894.10 898.10 902.10 906.10 910.10 914.10 918.10 922.10 926.10 930.10 934.10 938.10 942.10 946.10 950.10 954.10 958.10 962.10 966.10 970.10 974.10 978.10 982.10 986.10 990.10 994.10 998.10 1002.10 1006.10 1010.10 1014.10 1018.10 1022.10 1026.10 1030.10 1034.10 1038.10 1042.10 1046.10 1050.10 1054.10 1058.10 1062.10 1066.10 1070.10 1074.10 1078.10 1082.10 1086.10 1090.10 1094.10 1098.10 1102.10 1106.10 1110.10 1114.10 1118.10 1122.10 1126.10 1130.10 1134.10 1138.10 1142.10 1146.10 1150.10 1154.10 1158.10 1162.10 1166.10 1170.10 1174.10 1178.10 1182.10 1186.10 1190.10 1194.10 1198.10 1202.10 1206.10 1210.10 1214.10 1218.10 1222.10 1226.10 1230.10 1234.10 1238.10 1242.10 1246.10 1250.10 1254.10 1258.10 1262.10 1266.10 1270.10 1274.10 1278.10 1282.10 1286.10 1290.10 1294.10 1298.10 1302.10 1306.10 1310.10 1314.10 1318.10 1322.10 1326.10 1330.10 1334.10 1338.10 1342.10 1346.10 1350.10 1354.10 1358.10 1362.10 1366.10 1370.10 1374.10 1378.10 1382.10 1386.10 1390.10 1394.10 1398.10 1402.10 1406.10 1410.10 1414.10 1418.10 1422.10 1426.10 1430.10 1434.10 1438.10 1442.10 1446.10 1450.10 1454.10 1458.10 1462.10 1466.10 1470.10 1474.10 1478.10 1482.10 1486.10 1490.10 1494.10 1498.10 1502.10 1506.10 1510.10 1514.10 1518.10 1522.10 1526.10 1530.10 1534.10 1538.10 1542.10 1546.10 1550.10 1554.10 1558.10 1562.10 1566.10 1570.10 1574.10 1578.10 1582.10 1586.10 1590.10 1594.10 1598.10 1602.10 1606.10 1610.10 1614.10 1618.10 1622.10 1626.10 1630.10 1634.10 1638.10 1642.10 1646.10 1650.10 1654.10 1658.10 1662.10 1666.10 1670.10 1674.10 1678.10 1682.10 1686.10 1690.10 1694.10 1698.10 1702.10 1706.10 1710.10 1714.10 1718.10 1722.10 1726.10 1730.10 1734.10 1738.10 1742.10 1746.10 1750.10 1754.10 1758.10 1762.10 1766.10 1770.10 1774.10 1778.10 1782.10 1786.10 1790.10 1794.10 1798.10 1802.10 1806.10 1810.10 1814.10 1818.10 1822.10 1826.10 1830.10 1834.10 1838.10 1842.10 1846.10 1850.10 1854.10 1858.10 1862.10 1866.10 1870.10 1874.10 1878.10 1882.10 1886.10 1890.10 1894.

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SEPTEMBER 1948

Beginning This Month

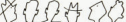
*Have you something to sell ?
... or to exchange ?
A job to offer ?
Yourself to place ?*

use the **CLASSIFIED ADS**
in **PHYSICS**
today

RATES: 10¢ per word, minimum charge \$5.00 payable in advance. 6¢ letter and space per line. Five standard queries and 15 lines of text included at no charge. All other copy at 10¢ per line of preceding matter. Display advertising will be handled on contract basis. There is no agency discount. For display ads the rates per column inch are:

Single insertion	\$10.00 per inch
Three insertions in one year	\$15.00 per inch
Six insertions in one year	\$18.00 per inch
Twelve insertions in one year	\$22.00 per inch

Address: Physics Today, Classified Ad Department, 57 East 52nd St., New York 22, N.Y.



MAY 1950

**Physicists and
Applied Mathematicians**

An established research organization has openings for professionals of Ph.D. or equivalent. The work has a basic and scientific approach; it includes problems in flight mechanics of guided missiles, the theory of radar and other electronic techniques, and atomic and nuclear physics. The organization is non-industrial and is located within the metropolitan Los Angeles area. Salaries are commensurate with ability. Please include details of education and experience in reply, addressed to Box 1048B, 57 East 55th Street, New York 22, New York.

OCTOBER 1948

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JANUARY 1990

**Are You An Experienced
Electronic Engineer,
Physicist Or
Applied Mathematician**

?

There is a good position for you at RAYTHEON provided you can qualify for development and design work or analytical studies in the fields of radar and general electronic circuits, computers, servomechanisms, microwave components and antennas, or radar systems.

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EMPLOYMENT MANAGER

RAYTHEON MANUFACTURING CO.
Fowles Avenue Williston, Mass.

SEPTEMBER 1954

SEPTEMBER 1948

E=mc³

Slips like this are the kind you're not likely to make with the Sharp 5100, because you see the actual form of the equation instead of an assembly code.

The more you think about Sharps Scientific Calculators, the more it seems—essentially—from all your existing ideas about programmable calculators.

The 5100 is the first programmable calculator in which algebraic equations can be entered directly, using algebraic symbols, trigonometric functions, logarithms, exponential, and others.

The 5100 is also the only hand-held to give you a complete display of the equation: you see 24 characters at a time in a dot-matrix display that rolls right or left to accommodate one or more formulas up to 80 steps. It also has a computer-like cursor which you can move to any part of the display to edit or correct the equation you've entered.

Where programmable calculators display one program step at a time (and which then has to be decoded), the 5100 serves up the actual equation in its entirety.

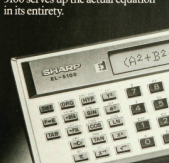
The rest of the 5100's technology is on the high level. There are ten registers for variables in which numerical values can also be stored. Values can be quickly changed for successive approximations. Anything entered can be played back instantly. All formulas and figures remain in memory with the power off (it's like carrying your engineering notebook around with you). It has so many uses an entire book has already been written about it.

Share a complete line of highly useful scientifics, starting at \$16.95! But if you want nothing less than the leading edge today in scientific calculators, buy the 5100 under \$100.00!

And that's not what to avoid the consequences of $E=mc^3$.

Advanced Product with the Sharp 5100 Scientific Calculator
by John W. Peterson, John Wiley & Sons, Inc.

TO MAKE CALCULATORS
THIS ADVANCED YOU'VE GOT TO BE SHARP



Circle No. 26 on Reader Service Card

FEBRUARY 1980

A. P. KHAMKUDOV

S.O.S FOR ORLOV & SICHKARANSKY



Scientists and Engineers Pledge Memoratum on Behalf of Colleagues

On 22 January 1980, our colleague Andrei Sakharov, an outstanding Soviet and world-renowned leader of human rights, was arrested and exiled to Gorki by the Soviet authorities for the "crime" of expressing his personal opinions. Since then he has been repeatedly harassed and even physically assaulted by the police. His wife reports he is in poor health. We must help him!

To protect the Soviet government's savage treatment of their colleagues Orlov and Shchukarsky, more than 2,400 American scientists pledged last year to restrict their scientific cooperation with the Soviet Union. This action was strongly applauded by Sakharov and other Soviet dissidents (and was widely denounced in the Soviet media). Nearly 1,000 French and Australian scientists also adopted similar pledges. Because of Sakharov's exile and the deteriorating plight of other dissident scientists, we must act now and in much greater numbers than ever before.

We appeal to you, fellow scientists and engineers the world over, to join together in a strong and significant protest of the Soviet Union's blatant violation of the human rights provisions of the Helsinki Accords to which it is a signatory. We propose a memorandum on scientific cooperation with the

Soviet Union for a limited duration linked to Helsinki Accord provisions.

To commemorate the founding of the Moscow Helsinki Watch Group by Orlov, Shchukarsky and others, the Memoratum shall begin on the fourth anniversary of that date, 12 May 1980. Six months later, on 11 November 1980, there will commence a major campaign in Madrid to monitor compliance with the Helsinki Accords, with representatives from all 35 countries which signed the treaty. We propose to maintain the Memoratum until the end of the Madrid campaign. Evidence from that meeting can then help determine the need for, and the course of, future action.

Sign your names everywhere, acting independently of their governments, must express their deep concern now! We urge you to sign the pledge copies below and to solicit additional signatures from your professional colleagues.

The pledge does not preclude personal communication with Soviet scientists in the interests of promoting human rights and world peace.

We will publicize the pledge, along with the names of signers, and send the list to Soviet President and Secretary Leonid Brezhnev and to the President of the Soviet Academy of Sciences, A. P. Aleksandrov.

Memoratum Pledge

To protect the human rights violations by the Soviet Union in the case of Sakharov, Orlov and Shchukarsky, we, the undersigned scientists and engineers, pledge a memorandum on professional cooperation with the Soviet scientific community for a period beginning 12 May 1980, the anniversary of the founding of the Moscow Helsinki Watch Group, and ending at the completion of the November 1980 Madrid Conference to monitor the Helsinki Accords. During this period we will not visit the Soviet Union or welcome Soviet scientists and engineers to our laboratories.

NAME (Please Print)

SIGNATURE

AFFILIATION (Department, Institution, Country)

Please mail this pledge copy before 1 May 1980, if possible, to: Scientists for Orlov and Shchukarsky, P.O. Box 6123, Berkeley, CA 94704, USA. (Telephone: (415) 846-4403). To help defray expenses, we would greatly appreciate a contribution. Checks may be made out to SCS or Scientists for Orlov and Shchukarsky. Thank you.

APRIL 1980

Special issues

PHYSICS TODAY has occasionally developed all the feature articles in an issue to a specific topic. Here is a taste:

People

- ▶ Niels Bohr (October 1963)
- ▶ A Memorial to Oppenheimer (October 1967)
- ▶ Albert Einstein 1879–1955 (March 1979)
- ▶ Richard Feynman (February 1989)
- ▶ Andrei Sakharov (August 1990)
- ▶ John Bardeen (April 1992)
- ▶ Portraits of Fermi (June 2002)
- ▶ Hans Bethe (October 2005)
- ▶ John Archibald Wheeler (April 2009)
- ▶ A Chandrasekhar Centennial (December 2010)

Anniversaries

- ▶ Superconductivity (March 1986)
- ▶ Centennial of the Michelson–Morley Experiment (May 1987)
- ▶ *Physical Review* Centenary (October 1993)
- ▶ X Rays 100 Years Later (November 1995)
- ▶ The Ubiquitous Electron (October 1997)

Education and careers

- ▶ Introductory Physics Education (March 1967)
- ▶ Physics for the Nonscience Major (March 1970)
- ▶ The Education of the Professional Physicist (June 1986)
- ▶ Pre-college Education (September 1991)
- ▶ Annual Careers Issues (October 2019, 2020, 2021, 2022)

Going broad, going deep

- ▶ Instrumentation (July 1967)
- ▶ Astrophysics (March 1973)
- ▶ Liquid Crystals (May 1982)
- ▶ Fluids Out of Equilibrium (January 1984)
- ▶ Helium-3 and Helium-4 (February 1987)
- ▶ Nanoscale and Ultrafast Devices (February 1990)
- ▶ The Physics of Digital Color (December 1992)
- ▶ Physics and Biology (February 1994)
- ▶ Everyday Physics (November 1999)
- ▶ Planetary Diversity (April 2004)
- ▶ Sound Affects (December 2020)

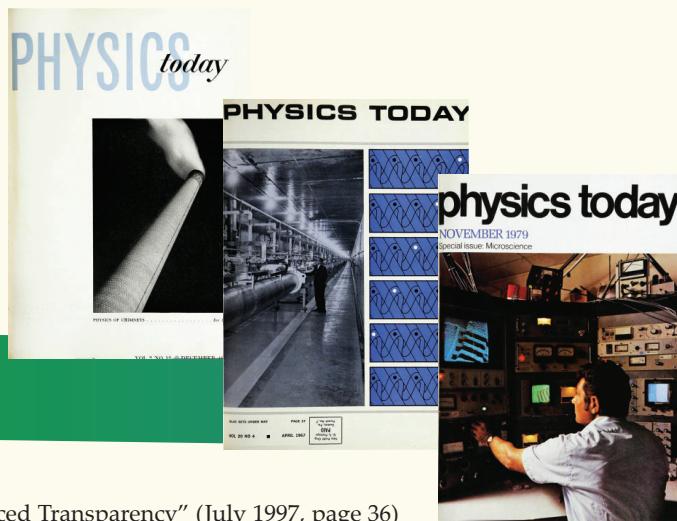
The wider world

- ▶ Communicating Physics to the Public (November 1990)
- ▶ Physics and the Environment (November 1994)
- ▶ Radioactive Waste (June 1997)
- ▶ The Physics Community and the Wider World (March 1999)
- ▶ Physics and National Security (December 2000)
- ▶ The Energy Challenge (April 2002)

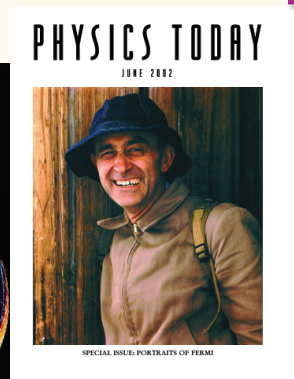
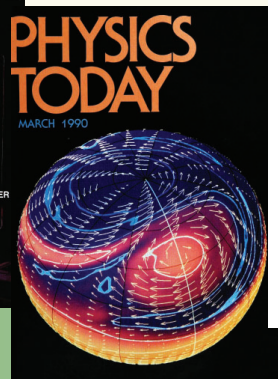
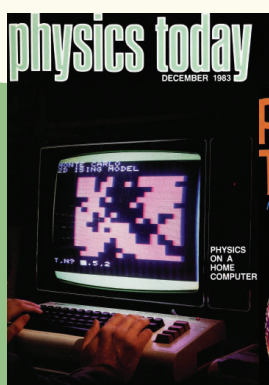
FOR MORE ON THE HISTORY
OF **PHYSICS TODAY**, VISIT
physicstoday.org/PT75th

A valuable archive

Although *PHYSICS TODAY* is not an archival journal, our content—and not just the feature articles—demonstrates lasting value. Our top 10 most-cited pieces (as reported by Crossref) span the years 1957–2004:



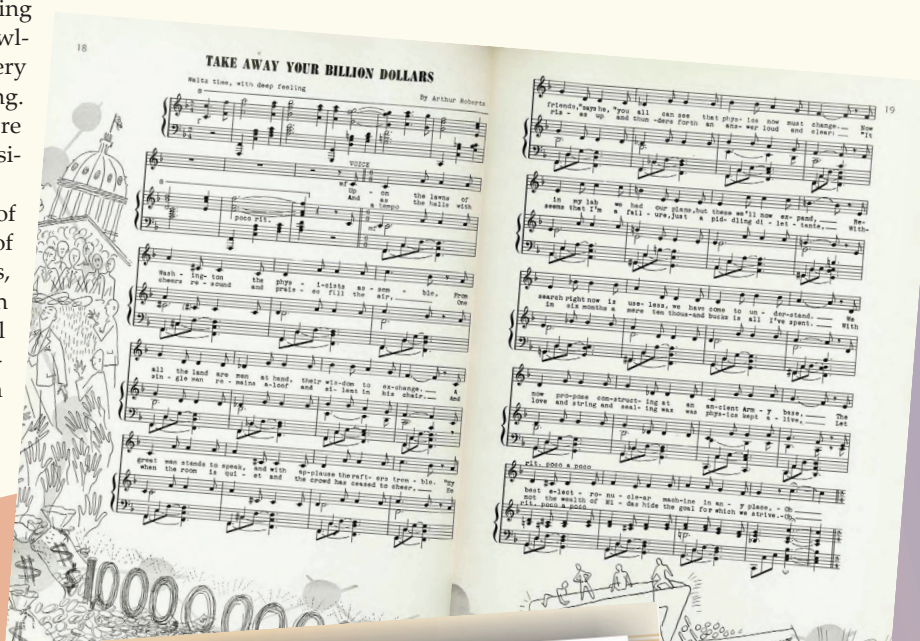
1. Stephen E. Harris, “Electromagnetically Induced Transparency” (July 1997, page 36)
2. Frank S. Bates and Glenn H. Fredrickson, “Block Copolymers—Designer Soft Materials” (February 1999, page 32)
3. Victor Twersky, review of *Light Scattering by Small Particles* by Hendrik C. Van de Hulst (December 1957, page 28)
4. Wojciech H. Zurek, “Decoherence and the Transition from Quantum to Classical” (October 1991, page 36)
5. Kevin Noone, review of *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change* by John H. Seinfeld and Spyros N. Pandis (October 1998, page 88)
6. George Weiss, review of *The Logic of Scientific Discovery* by Karl R. Popper (November 1959, page 53)
7. Cees Dekker, “Carbon Nanotubes as Molecular Quantum Wires” (May 1999, page 22)
8. George W. Crabtree, Mildred S. Dresselhaus, and Michelle V. Buchanan, “The Hydrogen Economy” (December 2004, page 39)
9. William P. Reinhardt, review of *Stochastic Processes in Physics and Chemistry* by Nicolaas G. Van Kampen (February 1983, page 78)
10. Orlando Auciello, James F. Scott, and Ramamoorthy Ramesh, “The Physics of Ferroelectric Memories” (July 1998, page 22)



The joy of physics

Although physics can be challenging and obscure, the quest for knowledge and the process of discovery can also be thrilling and inspiring. That wonder and satisfaction are worth celebrating—by both physicists and the public.

During the 2005 World Year of Physics, honoring the centennial of Albert Einstein's annus mirabilis, we embraced that celebration with gusto. Straying from our usual content mix, we also featured literature by Alan Lightman and John Updike, a contemplation on life's meaning, correspondence and a speech by Einstein, and more.



We ran two music-themed articles as part of our World Year of Physics celebration. "A Physics Songbag" (July 2005, page 56) featured 11 songs spanning more than 80 years and announced a lyric-writing contest; the winning entry was featured in "A Physics Songbag Redux" (December 2005, page 56) along with "The Physics Today Rag." Music first appeared in the magazine back in November 1948 (page 17), with the song "Take Away Your Billion Dollars," by physicist and composer Arthur Roberts, in which he satirized the push toward ever-bigger machines.