

Editorial: Sixty years of the *American Journal of Physics*—More memorable papers

With this issue, AJP celebrates its first 60 years of publication and begins its second 60. Volume 1, No. 1 appeared in February, 1933, beginning with an article with an enigmatic title by Floyd K. Richtmyer [F. K. Richtmyer, "Physics is Physics," *Am. J. Phys.* **1**(1) 1–5 (1933)]. Richtmyer's name is known to all of us because of the annual Richtmyer Memorial Lecture. He is known to many of us as the author of the text, *Introduction to Modern Physics*, from which we first began to learn some of the mysteries of blackbody radiation, the origins of the quantum theory, and the peculiarities of LS and jj coupling. (By the time I myself first studied from it, in 1951, it was Richtmyer and Kennard; by the time I first taught from it, in 1956, it was Richtmyer, Kennard, and Lauritsen; still later it became Richtmyer, Kennard, and Cooper.) Professor Richtmyer would perhaps be astonished and dismayed to learn that "modern" still means $t \geq 1900$; perhaps before the new millenium arrives we will be sufficiently embarrassed to think up a different adjective.

We considered several ways of celebrating AJP's 60th birthday before I remembered AJP's most important function. To quote from the sentence in our Statement of Editorial Policy that best summarizes its role, AJP publishes papers that "meet the needs and intellectual interests of college and university physics teachers and students." Two years ago, we published a list of our readers' favorite papers: "Memorable papers from the *American Journal of Physics*, 1933–1990," **59** (3), 201–207 (1991). What better way to celebrate our 60th than to remind readers of that list and bring it up to date, by listing some of the best articles from 1991 and 1992, as well as a few that for one reason or another were omitted from the earlier list?

In addition, before the new list of memorable papers, we list our "Science Citation Index Leaders," the 13 papers that—according to the records of the Institute for Scientific Information, publisher of the *Science Citation Index*—received 100 or more citations during the period 1945–1990. (2 of the 13, those by Wigner (1963) and Werthamer (1969), were included in our 1991 compilation.)

AJP turns 60 this month. I myself turned 60 less than 2 years ago. Had my parents been sufficiently prescient, they could have begun my AJP subscription as a gift on my 2nd birthday. As it is, my own series began with the issue of September, 1952, the month I entered graduate school. I look at my 40-year collection with affection; when this issue arrives in my mailbox, it will be the 465th in an unbroken subscription. I know full well what a special and unique place this journal occupies in the physics community; it is a rare privilege and a sobering responsibility to be its editor.

This celebratory issue of the *American Journal of Physics* is dedicated to Diana Haynes Romer (October 8, 1931–February 4, 1992), for so many years a dedicated supporter of this journal and of its present editor.

Robert H. Romer, *Editor*

SCIENCE CITATION INDEX LEADERS

The following 13 papers are the AJP papers that received 100 or more citations in the journals and books

(published during the period 1945–1990) that are covered by the *Science Citation Index*.

- (677) J. Kraitchman, "Determination of Molecular Structure from Microwave Spectroscopic Data," **21** (1), 17–24 (1953).
- (445) Michael E. Fisher, "Magnetism in One-Dimensional Systems—The Heisenberg Model for Infinite Spin," **32** (5), 343–346 (1964).
- (204) N. Bloembergen, "The Stimulated Raman Effect," **35** (11), 989–1023 (1967).
- (195) O. M. P. Bilaniuk, V. K. Deshpande, and E. C. G. Sudarshan, "'Meta' Relativity," **30** (10), 718–723 (1962).
- (175) Eugene P. Wigner, "The Problem of Measurement," **31** (1), 6–15 (1963).
- (150) G. K. Horton, "Ideal Rare-Gas Crystals," **36** (2), 93–119 (1968).
- (119) W. Martienssen and E. Spiller, "Coherence and Fluctuations in Light Beams," **32** (12), 919–926 (1964).
- (115) N. R. Werthamer, "Theory of Quantum Crystals," **37** (8), 763–782 (1969).
- (112) H. F. Stimson, "Heat Units and Temperature Scales for Calorimetry," **23** (9), 614–622 (1955).
- (107) Abraham Goldberg and Harry M. Schey, "Computer-Generated Motion Pictures of One-Dimensional Quantum-Mechanical Transmission and Reflection Phenomena," **35** (3), 177–186 (1967).
- (106) J. A. Brinkman, "Production of Atomic Displacements by High-Energy Particles," **24** (4), 246–267 (1956).
- (106) Rodney Loudon, "One-Dimensional Hydrogen Atom," **27** (9), 649–655 (1959).
- (103) Arnold G. Meister and Forrest F. Cleveland, "Application of Group Theory to the Calculation of Vibrational Frequencies of Polyatomic Molecules," **14** (1), 13–27 (1946).

MORE MEMORABLE PAPERS

1946

- R. T. Cox, "Probability, Frequency and Reasonable Expectation," **14** (1), 1–13 (1946).

1959

- Rodney Loudon, "One-Dimensional Hydrogen Atom," **27** (9), 649–655 (1959).

1962

- O. M. P. Bilaniuk, V. K. Deshpande, and E. C. G. Sudarshan, "'Meta' Relativity," **30** (10), 718–723 (1962).

1963

- A. P. French and Jack R. Tassman, "Displacement Currents and Magnetic Fields," **31** (3), 201–204 (1963).
- Francis W. Sears, "Faraday's Law and Ampere's Law," **31** (6), 439–443 (1963).

1964

- W. Martienssen and E. Spiller, "Coherence and Fluctuations in Light Beams," **32** (12), 919–926 (1964).

1966

- Mario Bunge, "Mach's Critique of Newtonian Mechanics," **34** (7), 585–596 (1966).
- John G. King, "On Physics Project Laboratories," **34** (11), 1058–1062 (1966).

1967

- Abraham Goldberg and Harry M. Schey, "Computer-Generated Motion Pictures of One-Dimensional Quantum-Mechanical Transmission and Reflection Phenomena," **35** (3), 177–186 (1967).
- N. Bloembergen, "The Stimulated Raman Effect," **35** (11), 989–1023 (1967).

1975

- David A. Hastings, "Computational method for electrical potential and other field problems," **43** (6), 518–524 (1975).

1978

- E. U. Condon, "Tunneling—how it all started," **46** (4), 319–323 (1978).
- William H. Press, "Mathematical theory of the waterbed," **46** (10), 966–970 (1978).
- Ralph Baierlein, "Teaching the approach to thermodynamic equilibrium: Some pictures that help," **46** (10), 1042–1045 (1978).

1979

- P. J. Hansen and D. R. Nicholson, "Simple soliton solutions," **47** (9), 769–771 (1979).
- Beverly A. P. Taylor, "What is a solitary wave?" **47** (10), 847–850 (1979).

1980

- Donald H. Kobe, "Derivation of Maxwell's equations from the gauge invariance of classical mechanics," **48** (5), 348–353 (1980).

1982

- Thomas W. Arnold and William Case, "Nonlinear effects in a simple mechanical system," **50** (3), 220–224 (1982).
- William A. Newcomb, "Trouble with the method of images," **50** (7), 601–607 (1982).

1983

- R. Cohen, B. Eylon, and U. Ganiel, "Potential difference

and current in simple electric circuits: A study of students' concepts," **51** (5), 407–412 (1983).

- N. David Mermin, "Relativistic addition of velocities directly from the constancy of the velocity of light," **51** (12), 1130–1131 (1983).

1984

- Bernard F. Schutz, "Gravitational waves on the back of an envelope," **52** (5), 412–419 (1984).
- N. G. van Kampen and J. J. Lodder, "Constraints," **52** (5), 419–424 (1984).
- Robert W. Stanley, "Numerical methods in mechanics," **52** (6), 499–507 (1984).
- S. Margulies, "Force on a dielectric slab inserted into a parallel-plate capacitor," **52** (6), 515–518 (1984).

1985

- Ibrahim Abou Halloun and David Hestenes, "The initial knowledge state of college physics students," **53** (11), 1043–1055 (1985).
- Ibrahim Abou Halloun and David Hestenes, "Common sense concepts about motion," **53** (11), 1056–1065 (1985).

1986

- Bernard L. Cohen, "Risk analysis of buried wastes from electricity generation," **54** (1), 38–45 (1986).
- Donald D. Clayton, "Solar structure without computers," **54** (4), 354–362 (1986).
- M. A. Abramowicz and J. P. Lasota, "On traveling around without feeling it and uncurving curves," **54** (10), 936–939 (1986).

1987

- Fred M. Goldberg and Lillian C. McDermott, "An investigation of student understanding of the real image formed by a converging lens or concave mirror," **55** (2), 108–119 (1987).
- David Hestenes, "Toward a modeling theory of physics instruction," **55** (5), 440–454 (1987).
- George Greenstein, "Order-of-magnitude 'theory' of stellar structure," **55** (9), 804–810 (1987).

1988

- Mitchell J. Feigenbaum and N. David Mermin, " $E=mc^2$," **56** (1), 18–21 (1988).
- Ranabir Dutt, Avinash Khare, and Uday P. Sukhatme, "Supersymmetry, shape invariance, and exactly solvable potentials," **56** (2), 163–168 (1988).

1990

- M. J. Ballico, M. L. Sawley, and F. Skiff, "The bipolar motor: A simple demonstration of deterministic chaos," **58** (1), 58–61 (1990).
- M. P. Silverman, "Circular birefringence of an atom in uniform rotation: The classical perspective," **58** (4), 310–317 (1990).
- Sergio De Souza-Machado, R. W. Rollins, D. T. Jacobs,

and J. L. Hartman, "Studying chaotic systems using microcomputer simulations and Lyapunov exponents," **58** (4), 321–329 (1990).

Frank S. Crawford, "Elementary examples of adiabatic invariance," **58** (4), 337–344 (1990).

Lillian C. McDermott, "Research and computer-based instruction: Opportunity for interaction," **58** (5), 452–462 (1990).

Lillian C. McDermott, "A perspective on teacher preparation in physics and other sciences: The need for special science courses for teachers," **58** (8), 734–742 (1990).

1991

W. M. Saslow, "How a superconductor supports a magnet, how magnetically "soft" iron attracts a magnet, and eddy currents for the uninitiated," **59** (1), 16–25 (1991).

Ernst L. Asten, "A plea for the metric system," **59** (2), 103 (1991).

David J. Griffiths and Mark A. Heald, "Time-dependent generalizations of the Biot–Savart and Coulomb laws," **59** (2), 111–117 (1991).

K. Yusuf Billah and Robert H. Scanlan, "Resonance, Tacoma Narrows bridge failure, and undergraduate physics textbooks," **59** (2), 118–124 (1991).

Lillian Christie McDermott, "What we teach and what is learned—Closing the gap," **59** (4), 301–315 (1991).

Roland Gähler and Anton Zeilinger, "Wave-optical experiments with very cold neutrons," **59** (4), 316–324 (1991).

Hans Pfister and Walter Gekelman, "Demonstration of helicity conservation during magnetic reconnection using Christmas ribbons," **59** (6), 497–502 (1991).

Nalini Easwar and Douglas A. MacIntire, "Study of the effect of relativistic time dilation on cosmic ray muon flux—An undergraduate modern physics experiment," **59** (7), 589–592 (1991).

P. W. Milonni and M.-L. Shih, "Zero-point energy in early quantum theory," **59** (8), 684–698 (1991).

H. Winter and H. W. Ortjohann, "Simple demonstration of storing macroscopic particles in a 'Paul trap'," **59** (9), 807–813 (1991).

Alan Van Heuvelen, "Learning to think like a physicist: A review of research-based instructional strategies," **59** (10), 891–897 (1991).

Alan Van Heuvelen, "Overview, Case Study Physics," **59** (10), 898–907 (1991).

Collin L. Olson and M. G. Olsson, "Dynamical symmetry breaking and chaos in Duffing's equation," **59** (10), 907–911 (1991).

B. Duchesne, C. W. Fischer, C. G. Gray, and K. R. Jeffrey, "Chaos in the motion of an inverted pendulum: An undergraduate laboratory experiment," **59** (11), 987–992 (1991).

Eugene D. Commins, "Berry's geometric phase and motional fields," **59** (12), 1077–1080 (1991).

Barry R. Holstein, "Variations on the Aharonov–Bohm effect," **59** (12), 1080–1085 (1991).

Peter Heller, "Analog demonstrations of Ampere's law and magnetic flux," **60** (1), 17–25 (1992). See also Erratum, **60** (3), 274 (1992).

Joel Gersten, Harry Soodak, and Martin S. Tiersten, "Ball moving on a stationary or rotating horizontal surface," **60** (1), 43–47 (1992).

Richard J. Hughes, "On Feynman's proof of the Maxwell equations," **60** (4), 301–306 (1992).

Daniel E. Platt, "A modern analysis of the Stern–Gerlach experiment," **60** (4), 306–308 (1992).

Mary B. James and David J. Griffiths, "Why the speed of light is reduced in a transparent medium," **60** (4), 309–313 (1992).

Richard A. Muller, "Thomas precession: Where is the torque?" **60** (4), 313–317 (1992).

T. P. Hezel, C. E. Burkhardt, M. Ciocca, and J. J. Leventhal, "Classical view of the Stark effect in hydrogen atoms," **60** (4), 324–328 (1992).

T. P. Hezel, C. E. Burkhardt, M. Ciocca, L.-W. He, and J. J. Leventhal, "Classical view of the properties of Rydberg atoms: Application of the correspondence principle," **60** (4), 329–335 (1992).

Paul Erdős, Gérard Schibler, and Roy C. Herndon, "Floating equilibrium of symmetrical objects and the breaking of symmetry. Part 1: Prisms," **60** (4), 335–345 (1992).

Paul Erdős, Gérard Schibler, and Roy C. Herndon, "Floating equilibrium of symmetrical objects and the breaking of symmetry. Part 2: The cube, the octahedron, and the tetrahedron," **60** (4), 345–356 (1992).

A. John Mallinckrodt and Harvey S. Leff, "All about work," **60** (4), 356–365 (1992).

R. S. Davis, "Using small, rare-earth magnets to study the susceptibility of feebly magnetic metals," **60** (4), 365–370 (1992).

Troy Shinbrot, Celso Grebogi, Jack Wisdom, and James A. Yorke, "Chaos in a double pendulum," **60** (6), 491–499 (1992).

Robert Weinstock, "Inverse-square orbits: Three little-known solutions and a novel integration technique," **60** (7), 615–619 (1992).

W. M. Saslow, "Maxwell's theory of eddy currents in thin conducting sheets, and applications to electromagnetic shielding and MAGLEV," **60** (8), 693–711 (1992).

George E. Brown, Jr., "Guest Comment: The objectivity crisis," **60** (9) 779–781 (1992).

M. Santander, "The Chinese South-Seeking chariot: A simple mechanical device for visualizing curvature and parallel transport," **60** (9), 782–787 (1992).

W. E. Baylis, J. Huschilt, and Jiansu Wei, "Why *i*?" **60** (9), 788–797 (1992).

Donald G. Bruns, "A solid-state low-voltage Tesla coil demonstrator," **60** (9), 797–803 (1992).

P. A. Skordos and W. H. Zurek, "Maxwell's demon, rectifiers, and the second law: Computer simulation of Smoluchowski's trapdoor," **60** (10), 876–882 (1992).

- John G. King, Philip Morrison, Phylis Morrison, and Jerome Pine, "ZAP! Freshman electricity and magnetism using desktop experiments: A progress report," **60** (11), 973–978 (1992).
- David J. Griffiths, "Dipoles at rest," **60** (11), 979–987 (1992).
- Peter Heering, "On Coulomb's inverse square law," **60** (11), 988–994 (1992).
- Per Kraus and David J. Griffiths, "Renormalization of a model quantum field theory," **60** (11), 1013–1023 (1992).
- Alistair Steyn-Ross and Donald G. Ivey, "'Frames of Reference' revisited," **60** (12), 1069–1085 (1992).
- Joseph Ford and Giorgio Mantica, "Does quantum mechanics obey the correspondence principle? Is it complete?" **60** (12), 1086–1098 (1992).
- K. B. MacAdam, A. Steinbach, and C. Wieman, "A narrow-band tunable diode laser system with grating feedback, and a saturated absorption spectrometer for Cs and Rb," **60** (12), 1098–1111 (1992).
- A. E. Robson and J. D. Sethian, "Railgun recoil, Ampere tension, and the laws of electrodynamics," **60** (12), 1111–1117 (1992).

PRIMITIVE TRIBES

Experimentalists and theorists, for example, learn to display a studied disregard for each other's judgment. For example, one experimentalist said to me that "theorists believe anything if it is on graph paper." On the other hand, theorists thought it appropriate that I was concentrating my study on experimentalists: they saw the experimentalists as a rather predictable lot. They assumed that, as an anthropologist, I viewed the experimentalists as a "primitive tribe," which confirmed many of their own assumptions. While having lunch with an experimentalist and theorist at Fermilab, I asked about this studied disregard. The experimentalist said that if their results contradict current theories, experimentalists among themselves presume that something is wrong with their experiment. The theorist said that under the same circumstances theorists assume that something is wrong with their theories. But they agreed that when they are in each other's presence almost everyone acts as if the reverse were the case.

Sharon Traweek, *Beamtimes and Lifetimes: The World of High Energy Physicists* (Harvard U. P., Cambridge, 1988), p. 112.