# Current Comments

## The 1976 Articles Most Cited in 1976 and 1977. 2. Physical Sciences

Number 17 April 23, 1979

We recently published a list of the 1976 life sciences articles most cited in 1976-1977.[1] In this second part of the report, we cover the physical sciences. The list in Figure 1 shows some of the "hot" areas of research in 1976 and 1977. And data from the 1978 *Science Citation Index®* *(SCI®)* indicate that many continue to be hot. We have made no attempt to reorder the list because of 1978 data. However, it is provided to supplement data from 1976-1977.

In studies of this kind it is necessary to include citation data from two years due to the chronological artifact of annual citation studies. Obviously, a paper published late in 1976 has a smaller chance of being cited before the year is out than a paper published early in 1976. Many papers published in 1976 received no citations that year, but enough in 1977 to appear on our list.

The typical 1976 paper published in a journal covered by the *SCI* would be cited once or twice in 1976-1977. However, the least-cited paper on this list received 26 citations, and the most-cited paper received 178. The average paper on the list received 42.4 citations in 1976-77, of which 9.9 were in 1976 and 32.5 in 1977. In 1978 there is a slight falling-off to 29.8 citations. This decline reflects the intense activity in several fields, especially particle physics. Many of the papers of prime interest in 1976 and 1977 have already been superseded by more recent work. In particle physics, for example, 26 of the 33 articles received fewer citations in 1978 than in 1977.

While physics papers dominate the list in Figure 1, this doesn't mean physics is more significant than the other disciplines represented. It simply indicates that certain physics specialties were quite active in the period following the appearance of these papers in 1976.

The names of three 1978 Nobel prize winners appear on the list. Co-authors of the paper with P. G. Wannier in the astronomy section are Arno A. Penzias and Robert W. Wilson, who received the physics award for discovering the background radiation which was interpreted as the remnant of the "big bang." Their 1976 paper dealt with interstellar clouds. Also on the list is Peter Mitchell, who won the chemistry prize for showing how plants and animals convert nutrients into energy. Had we published this study in the spring of 1977, as originally planned, the predictive value of the list would have been more dramatic.

Twenty-nine journals which published the 100 articles are shown in Figure 2. *Physical Review Letters* contributed 41 papers and *Physics Letters B* seven. Thus, these two journals contributed about half of the papers.

These papers come from 86 institutions, shown in Figure 3, of which fifty-five are in the United States. Eight are located in the Federal Republic of Germany, and five in France. England and Australia are represented by three institutions; Israel and Japan by two. Den-

**Figure 2.** Journals represented on the list of 1976 physical science articles most cited in 1976-1977. The number in parentheses is the impact. (Impact equals the average number of citations received by 1975-1976 articles in 1977.) The numbers at the right indicate how many papers from the journal are on the list.

| | |
|---|---|
| Phys. Rev. Lett. (6.35) | 41 |
| Phys. Lett. B (3.24) | 7 |
| J. Am. Chem. Soc. (4.41) | 6 |
| Phys. Rev. D (3.05) | 6 |
| Astrophys. J. (4.32) | 5 |
| Phys. Rev. B (3.04) | 5 |
| Appl. Phys. Lett. (3.27) | 4 |
| Science (5.75) | 3 |
| Account. Chem. Res. (8.62) | 2 |
| Opt. Commun. (2.13) | 2 |
| Acta Crystallogr. Sect. A (1.82) | 1 |
| Appl. Optics (1.65) | 1 |
| Biochem. Soc. Trans. (2.15) | 1 |
| Chem. Phys. (2.72) | 1 |
| Chem. Phys. Lett. (2.21) | 1 |
| Chem. Rev. (8.98) | 1 |
| Electron. Lett. (0.79) | 1 |
| J. Appl. Phys. (1.67) | 1 |
| J. Chem. Phys. (3.22) | 1 |
| J. Electron. Spectrosc. Relat. Ph. (3.01) | 1 |
| J. Org. Chem. (2.47) | 1 |
| J. Phys. Chem. (2.05) | 1 |
| Mon. Notic. Roy. Astron. Soc. (2.73) | 1 |
| Nature (4.96) | 1 |
| Nucl. Phys. B (2.82) | 1 |
| Phys. Rep. (7.65) | 1 |
| Sov. J. Quant. Electr. (0.51) (Kvantovaya Elektronika) | 1 |
| Phys. Rev. C (1.97) | 1 |
| Synthesis-Stuttgart (2.12) | 1 |

mark, Sweden, Italy, Canada, Belgium, the USSR, Switzerland, and the Netherlands are represented by one institution each.

All but one were originally published in English. The review paper on laser isotope separation by V. S. Letokhov and C. B. Moore was originally published in the Russian journal, *Kvantovaya Elektronika* and later appeared in the translation journal *Soviet Journal of Quantum Electronics*. Note, however, that this paper was co-authored by an American scientist. The Russian version was cited 14 times in 1976-1977 and 15 times in 1978. The English version was cited 28 times in 1976-1977 and 22 times in 1978. Part one of this review article did not make the list.[2] It was cited "only" 35 times in 1976-1978.

Astronomy and astrophysics are the subjects of nine papers on the list. Topics dealt with here include X-ray astronomy, black holes, and the composition of the atmosphere of Mars.

Three papers concern "supergravity," an extension of general relativity. It is uncertain who coined the term, but physicists began using it around 1973.[3] Supergravity is a mathematical construction which aims at a unified field theory along the lines of general relativity.

Field theory is the subject of eight papers. Modern quantum field theory is the study of the fundamental forces of the universe. It seeks to show how different kinds of particles transform and interact. For example, the forces of electromagnetism arise from the exchange of photons between charged particles. Physicists postulate the graviton to explain gravity. The ultimate goal of field theory is to explain all the forces in the universe in terms of a single theoretical framework, or unified field theory. So far physicists have narrowed the kinds of forces down to four: electromagnetism, gravitation, a strong nuclear interaction, and a weak nuclear interaction. In June 1978, 20 physicists from five institutions performed an experiment at the Stanford Linear Accelerator Center (SLAC) which provided evidence supporting a theory which unifies electromagnetism and the weak nuclear interaction.[4,5] If the whole theory is verified, it means that all of the forces in the universe are the product of—at most—three basic forces, not four. So the SLAC experiment shows that progress has been made toward a unified field theory.[6]

Field theory in solid state physics is the subject of two papers. Solid state physics is the study of the physical properties of solid materials, particularly crystals, glasses, and polymers. Field theory is one approach which enables solid state physicists to understand the properties of crystals at the atomic level.

**Figure 3.** The institutional affiliations of authors on the list, shown with the number of authors from each institution.

| | |
|---|---|
| Harvard Univ. | 15 |
| MIT | 12 |
| Univ. California, Berkeley | 11 |
| Fermi Accelerator Lab., Batavia, IL | 9 |
| Univ. Pennsylvania | 8 |
| Univ. Wisconsin | 7 |
| Stanford Univ. SLAC | 6 |
| SUNY, Stony Brook, NY | 5 |
| Columbia Univ. | 4 |
| Cornell Univ. | 4 |
| Brookhaven Nat. Lab., Upton, NY | 3 |
| CERN, Switzerland | 3 |
| Enrico Fermi Inst., Chicago, IL | 3 |
| IBM Thomas J. Watson Res. Ctr., Yorktown Heights, NY | 3 |
| Oak Ridge Nat. Lab., TN | 3 |
| Akad. Sci., Moscow, USSR | 2 |
| Ecole Normal Supérieure, Paris | 2 |
| Harvard College Observatory & Smithsonian Astrophys. Lab. | 2 |
| Princeton Univ. | 2 |
| Rockefeller Univ., NY | 2 |
| Univ. Hawaii | 2 |
| Univ. Illinois | 2 |
| Univ. Oxford | 2 |
| Univ. Sydney, Australia | 2 |
| Univ. Texas | 2 |
| Yale Univ. | 2 |
| Amer. Sci. & Engineering, Cambridge, MA | 1 |
| Ames Res. Ctr., Moffett Field, CA | 1 |
| Astron. Inst., Utrecht, Netherlands | 1 |
| Bell Labs., Murray Hill, NJ | 1 |
| Bell Tel., Holmdel, NJ | 1 |
| California Inst. Technol. | 1 |
| Chalmers Univ. Tech., Goteborg, Sweden | 1 |
| Ctr. d'Etudes Nucléaires de Saclay, France | 1 |
| Clarkson Coll. Tech., Potsdam, NY | 1 |
| Corning Glass Works, NY | 1 |
| CSIRO, Australia | 1 |
| Deutsches Electronen Synchrotron, Hamburg, FRG | 1 |
| E. I. DuPont Co., Wilmington, DE | 1 |
| Ecole Polytech., Palaiseau, France | 1 |
| Florida State Univ. | 1 |
| General Electric Corp. Res. & Devel., Schenectady, NY | 1 |
| Glynn Les Labs., Bodmin, Cornwall, England | 1 |
| Goddard Space & Flight Ctr., Greenbelt, MD | 1 |
| Georgia Inst. Technol. | 1 |
| Hebrew Univ., Israel | 1 |
| INFN, Univ. Milano, Italy | 1 |
| Inst. Advanced Study, Princeton | 1 |
| Johns Hopkins Univ., Baltimore, MD | 1 |
| Lab. Accélérateur Linéaire, Orsay, France | 1 |
| Louisiana State Univ. | 1 |
| Martin Marietta Corp., Denver, CO | 1 |
| Max Planck Inst., Munchen, FRG | 1 |
| NASA Langley Res. Ctr., Hampton, VA | 1 |
| National Inst. Arthritis Metabol. & Digestive Diseases, Bethesda, MD | 1 |
| Naval Res. Lab., Washington, DC | 1 |
| Nippon Telegraph & Telephone Publ. Corp., Japan | 1 |
| Pennsylvania State Univ. | 1 |
| RWTH Phys. Inst., Aachen, FRG | 1 |
| Sandia Labs., NM | 1 |
| Science Applications, Inc., Alexandria, VA | 1 |
| SUNY, Buffalo, NY | 1 |
| Technische Hochshule, Aachen, FRG | 1 |
| Tech. Univ., München, FRG | 1 |
| Tel-Aviv Univ., Israel | 1 |
| Univ. Åarhus, Denmark | 1 |
| Univ. Alberta, Canada | 1 |
| Univ. California, Davis | 1 |
| Univ. California, Irvine | 1 |
| Univ. California, Livermore, CA | 1 |
| Univ. California, Los Alamos | 1 |
| Univ. California, Los Angeles | 1 |
| Univ. College, London | 1 |
| Univ. Hamburg, FRG | 1 |
| Univ. Kaiserslautern, FRG | 1 |
| Univ. Maryland | 1 |
| Univ. Michigan | 1 |
| Univ. Minnesota | 1 |
| Univ. München, FRG | 1 |
| Univ. North Carolina | 1 |
| Univ. Paris-Sud, Orsay, France | 1 |
| Univ. Queensland, Australia | 1 |
| Univ. Tokyo | 1 |
| Univ. Washington, Washington, DC | 1 |
| VUB, Belgium | 1 |
| Xerox Western Res. Ctr., Webster, NY | 1 |

Eleven more papers are about solid state physics in general. Five of them concern a compound called tetrathiafulvalene-tetracyanoquinodimethane (TFF-TCNQ). TTF-TCNQ is an organic semiconductor. Semiconductors can act as both insulators and conductors of electricity. This "on-off" capacity makes them potentially useful in electrical components and computer memory devices. Inorganic semiconductors, usually made of silicon or germanium, cannot be synthesized from commonly available materials. TTF-TCNQ semiconductors can be. This makes it desirable to use organic compounds similar to TTF-TCNQ in a wide range of devices. Author Y. Tomkiewicz tells us that TTF-TCNQ has not yet found wide practical applications. But laboratory studies have created considerable excitement among physicists.[7]

About one-third of the papers on the list, or 33 of them, deal with elementary particle physics. This branch of physics is sometimes called "high energy physics" or simply "particle physics." It is primarily concerned with the quest for a fundamental theory to explain the existence, properties, and interactions of the various kinds of subatomic particles.

Theoretical models involving the hypothetical quarks have enabled physicists to explain the behavior of hundreds of known subatomic particles. However, nobody has yet detected a quark in isolation. High energy physicists are also searching for a simple theory explaining the existence and behavior of the quarks themselves. It is noteworthy that the average number of authors on these papers is 14.4. Furthermore, each paper involves about half a dozen institutions.

Ten papers are about atomic and molecular physics. These disciplines are concerned with understanding the properties and interactions of atoms and molecules and with the practical techniques which exploit this understanding.

Two papers are in nuclear physics. This specialty has practical applications in weaponry, power, and medicine.

Lasers and fiber optics are the topics of five papers. The many uses of lasers in communications, medicine, and other areas are well known. Optical fibers, which conduct light along selected paths, are also useful to communications. Today they are being widely used in telephone communications. The Soviet scientist Letokhov, co-author of the review on lasers mentioned earlier, chose to publish his other paper on lasers in English.

Two papers are in chemical physics. Seven papers concern physical chemistry. Four of the physical chemistry papers have possible applications to solar energy conversion.

Three papers deal with inorganic or organometallic chemistry. Organic chemistry is the topic of four more papers. In general, papers in this group are method papers. One is by R. Huisgen, who is not new to our bibliometric studies. He is one of the 300 most-cited authors whose work was published 1961-1976.[8]

We have put Nobelist Peter Mitchell's paper at the end of the list under Biophysics. We were unsure if this paper belonged in the life or physical sciences list. Some may quarrel with the decision to put it on this list. However, when we contacted the author, Mitchell himself expressed uncertainty about the article's placement. Such borderline cases indicate that even the dichotomy between life and physical sciences may break down as a way of classifying researchers.

The most-cited paper on the list is by G. Goldhaber and 40 co-authors. Most of the authors of this paper also co-authored the second most cited paper by I. Perruzzi and 39 others. Both of these papers report the results of experiments at the SLAC-Lawrence Berkeley Laboratory that confirmed the predicted existence of a new subatomic particle, the charmed meson.

Only six papers listed are reviews. In the life sciences group, one-fifth of the papers were reviews. The meaning of this difference needs some thoughtful study. Our list of 1975 physical sciences articles, which was also dominated by particle physics, contained no reviews.[9] When discoveries were being made as rapidly as they were in particle physics during 1976, maybe it was not possible to prepare meaningful reviews. None of the physical sciences reviews were in particle physics, but rather in astrophysics, lasers and fiber optics, chemical physics, physical chemistry, and organic chemistry.

Since elementary particle physics was very active in 1976, we were curious to see what the 1976 list would look like without the domination of these particle physics papers. We found that the next 33 most-cited items are nine more papers in particle physics, seven in solid state physics, five in astrophysics and astronomy, three in organic chemistry, two in physical chemistry, two in field theory in solid state physics, and one each in nuclear physics, atomic and molecular physics, chemical physics, in-

organic and organo-metallic chemistry, and unified field theory.

As I noted in the earlier essay, we list only the 100 most cited papers because of limitations of time, space, and energy. Nearly 200 physical sciences papers published in 1976 received 20 or more citations in 1976-1977. The articles on this list are not necessarily the most important papers of 1976, but they are the ones which had the most immediate impact on researchers.

I intend to continue this series of annual studies which have now covered the most-cited papers published in 1972-1976. We now have data for the 1977 papers most-cited in 1977-1978 and hope to report on them while they are still hot. I'm sure you'll agree that a large number of the papers reported in these studies qualify as "breakthroughs." Most that are not breakthroughs are review papers that reflect fields that are hot. 

## REFERENCES


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3. **Zumino B.** Supergravity. *Eighth Texas Symp. Relativistic Astrophys.* 302:545-6, 1978.
4. **Prescott C Y, Atwood W B, Cottrell R L A, DeStaebler H, Garwin E L, Gonidec A, Miller R H, Rochester L S, Sato T, Shesden D J, Sinclair C K, Stein S, Taylor R E, Clendenin J E, Hughes V W, Sasao N, Schuler K P, Borghine M G, Lubelsmeyer K & Jentschulce W.** Parity nonconservation in elastic electron scattering. *Phys. Lett. B* 77:347-52, 1978.
5. **Atwood W B, Cottrell R L A, DeStaebler H, Miller R, Pessard H, Prescott C Y, Rochester L S, Taylor R E, Alguard M J, Clendenin J, Cooper P S, Ehrlich R D, Hughes V W, Lubell M S, Baum G, Schuler K P & Lubelsmeyer K.** Search for parity violation in deep inelastic scattering of polarized electrons by unpolarized deuterons. *Phys. Rev. D* 18:2223-6, 1978.
6. **Sullivan W.** New quarks stir debate on basic laws of nature. *NY Times* 13 February 1979, p. C1, 2.
7. **Tomkiewicz Y.** Personal communication, 13 March 1979.
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9. ----------. 1975 physical sciences articles highly cited in 1975. *Current Contents* (16):5-8, 19 April 1976.*

*Reprinted in: **Garfield E.** *Essays of an information scientist.* Philadelphia: ISI Press, 1977. Vol. 2, p. 457-60.


**Figure 1:** The 1976 physical sciences articles most-cited in 1976-1977. Citation counts for 1978 also appear here to supplement the earlier data. Authors' affiliations follow each citation. Journals are often ambiguous about addresses. When we could not tell which author was at which organization, we have simply given the addresses without linking them to specific authors.

| Total Citations 76 77 78 | Bibliographic Data |
|---|---|
| **ASTROPHYSICS & ASTRONOMY** | |
| 12 28 30 | **Clark D H[1] & Caswell J L[2].** A study of galactic supernova remnants, based on Molonglo-Parkes observational data. *Mon. Notic. Roy. Astron. Soc.* 174:267-305, 1976. (1) Univ. Sydney, Sch. Phys., NSW 2000, Australia. (2) CSIRO, Div. Radiophys., Epping NSW 2121, Australia. |
| 7 31 40 | **Code A D[1], Davis J[2], Bless R C[1] & Brown R H[2].** Empirical effective temperatures and bolometric corrections for early-type stars. *Astrophys. J.* 203:417-34, 1976. (1) Univ. Washington, Washburn Observatory, Madison, WI. (2) Univ. Sydney, Sch. Phys., Chatterton Astron. Dept., Australia. |
| 17 22 19 | **Grindlay J[1], Gursky H[1], Schnopper H[1], Parsignault D R[2], Heise J[3], Brinkman A C[3] & Schrijver J[3].** Discovery of intense x-ray bursts from the globular cluster NGC 6624. *Astrophys. J.* 205:L127-30, 1976. (1) Harvard Coll. Observatory & Smithsonian Astrophys. Observatory, Ctr. Astrophys., Cambridge, MA 02138. (2) American Sci. & Engineering, Cambridge, MA 02139. (3) Astron. Inst., Space Res. Lab., Beneluxlaan 21, Utrecht, Netherlands. |

## ASTROPHYSICS & ASTRONOMY (continued)

11 15 10 **Grindlay J & Gursky H.** Scattering model for x-ray bursts: massive black holes in globular clusters. *Astrophys. J.* 205:L131-33, 1976.
Harvard Coll. Observatory & Smithsonian Astrophys. Observatory, Ctr. Astrophys., Cambridge, MA 02138.

10 23 12 **Lewin W H G, Doty J, Clark G W, Rappaport S A, Bradt H V D, Doxsey R, Hearn D R, Hoffman J A, Jernigan J G, Li F K, Mayer W, McClintock J, Primini F & Richardson J.** The discovery of rapidly repetitive x-ray bursts from a new source in Scorpius. *Astrophys. J.* 207:L95-9, 1976.
MIT, Dept. Phys. & Ctr. Space Res., Cambridge, MA 02139.

16 16 11 **Nier A O[1], Hanson W B[2], Seiff A[3], McElroy M B[4], Spencer N W[5], Duckett R J[6], Knight T C D[7] & Cook W S[7].** Composition and structure of the Martian atmosphere: preliminary results from Viking 1. *Science* 193:786-8, 1976.
(1) Univ. Minnesota, Sch. Phys. & Astron., Minneapolis, MN 55455. (2) Univ. Texas, Ctr. Space Sci., Dallas, TX 75080. (3) Ames Res. Ctr., Moffett Field, CA 94035. (4) Harvard Univ., Ctr. Earth & Planetary Phys., Cambridge, MA 02138. (5) Goddard Space Flight Ctr., Greenbelt, MD 20771. (6) NASA Langley Res. Ctr., Viking Project Off., Hampton, VA 23365. (7) Martin Marietta Corp., P.O. Box 179, Denver, CO 80201.

13 13 16 **Owen T[1] & Biemann K[2].** Composition of the atmosphere at the surface of Mars: detection of Argon-35 and preliminary analysis. *Science* 193:801-3, 1976.
(1) SUNY, Dept. Earth & Space Sci., Stony Brook, NY 11794. (2) MIT, Dept. Chem., Cambridge, MA 02139.

3 31 32 **Ross J E[1] & Aller L H[2].** The chemical composition of the sun. *Science* 191:1223-9, 1976.
(1) Univ. Queensland, Dept. Phys., Queensland, Australia. (2) Univ. California, Dept. Astron., Los Angeles, CA 90024.

15 20 21 **Wannier P G, Penzias A A, Linke R A & Wilson R W.** Isotope abundances in interstellar molecular clouds. *Astrophys. J.* 204:26-42, 1976.
Bell Telephone Labs., Crawford Hill Lab., Holmdel, NJ 07733.

## SUPERGRAVITY

12 73 83 **Deser S & Zumino B.** Consistent supergravity. *Phys. Lett. B* 62:335-7, 1976.
CERN, Geneva, Switzerland.

12 68 80 **Freedman D Z[1], van Nieuwenhuizen P[1] & Ferrara S[2].** Progress toward a theory of supergravity. *Phys. Rev. D* 13:3214-8, 1976.
(1) SUNY, Inst. Theoret. Phys., Stony Brook, NY 11794. (2) Lab. de Physique Théorique de l'Ecole Normale Supérieure, 24 rue Lhomond, 75231 Paris Cedex 05, France.

3 29 29 **Freedman D Z[1], van Nieuwenhuizen P[1] & Ferrara S[2].** Properties of supergravity theory. *Phys. Rev. D.* 14:912-4, 1976.
(1) SUNY, Inst. Theoret. Phys., Stony Brook, NY 11794. (2) Lab. de Physique Theorique de l'Ecole Normale Supérieure, 24 rue Lhomond, 75231 Paris Cedex 05, France.

## FIELD THEORY

17 27 15 **Appelquist T[1], Carazzone J[2], Kluberg-Stern H[2] & Roth M[2].** Infrared finiteness in Yang-Mills theories. *Phys. Rev. Lett.* 36:768-72, 1976.
(1) Yale Univ., Dept. Phys., New Haven, CT 06520. (2) Fermi Nat. Accelerator Lab., Batavia, IL 60510.

13 53 67 **Gürsey F[1] & Sikivie P[2].** $I_7$ as a universal gauge group. *Phys. Rev. Lett.* 36:775-8, 1976.
(1) Yale Univ., Dept. Phys., New Haven, CT 06520. (2) Univ. Maryland, Phys. Dept., College Park, MD 20742.

3 36 39 **Jackiw R & Rebbi C.** Conformal properties of a Yang-Mills pseudoparticle. *Phys. Rev. D* 14:517-23, 1976.
MIT, Lab. Nuclear Sci. & Dept. Phys., Cambridge, MA 02139.

12 16 14 **Jackiw R & Rebbi C.** Spin from isospin in a gauge theory. *Phys. Rev. Lett.* 31:1116-9, 1976.
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3 52 97 **Jackiw R & Rebbi C.** Vacuum periodicity in a Yang-Mills quantum theory. *Phys. Rev. Lett.* 37:172-5, 1976.
MIT, Lab. Nuclear Sci. & Dept. Phys., Cambridge, MA 02139.

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13 17 19 **Yao Y P.** Infrared problem in non-Abelian gauge theory. *Phys. Rev. Lett.* 36:653-6, 1976.
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## FIELD THEORY IN SOLID STATE PHYSICS

17 23 20 **Brézin E & Zinn-Justin J.** Renormalization of the nonlinear $\sigma$ model in $2+\epsilon$ dimensions—application to the Heisenberg ferromagnets. *Phys. Rev. Lett.* 36:691-4, 1976.
Ctr. d'Etudes Nucleaires de Saclay, Serv. Phys. Theorique, 91190 Gif-Sur-Yvette, France.

10 16 18 **Halperin B I[1], Hohenberg P C[1,2] & Siggia E D[3].** Renormalization-group treatment of the critical dynamics of superfluid helium, the isotropic antiferromagnet, and the easy-plane ferromagnet. *Phys Rev. B* 13:1299-328, 1976.
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## SOLID STATE PHYSICS

15 29 35 **Bak P & Emery V J.** Theory of the structural phase transformations in tetrathiafulvalene-tetracyanoquinodimethane (TTF-TCNQ). *Phys. Rev. Lett.* 36:978-82, 1976.
Brookhaven Nat. Lab., Upton, NY 11973.

2 25 37 **Chelikowsky J R & Cohen M L.** Nonlocal pseudopotential calculations for the electronic structure of eleven diamond and zinc-blende semiconductors. *Phys. Rev. B* 14:556-82, 1976.
Univ. California, Dept. Phys., Berkeley, CA 94720. Univ. California, Materials & Molecular Res. Div., Lawrence Berkeley Lab., Berkeley, CA 94720.

14 23 24 **Etemad S.** Systematic study of the transition in tetrathiafulvalene-tetracyanoquinodimethane (TTF-TCNQ). *Phys. Rev. B* 13:2254-61, 1976.
IBM Thomas J. Watson Res. Ctr., Yorktown Heights, NY 10598.

11 22 27 **Harris A B, Lubensky T C & Chen J H.** Critical properties of spin-glasses. *Phys. Rev. Lett.* 36:415-8, 1976. Univ. Pennsylvania, Dept. Phys., Philadelphia, PA 19174.

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2 30 17 **Pouget J P[1], Khanna S K[1], Denoyer F[1], Comès R[1], Garito A F[2] & Heeger A J[2].** X-ray observation of $2k_F$ and $4k_F$ scatterings in tetrathiafulvalene-tetracyanoquinodimethane (TTF-TCNQ). *Phys. Rev. Lett.* 37:437-40, 1976.
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E. I. DuPont de Nemours & Co., Central Res. & Development Dept., Expll. Station, Wilmington, DE 19898.

15 22 16 **Tomkiewicz Y, Taranko A R & Torrance J B.** Roles of the donor and acceptor chains in the metal-insulator transition in TTF-TCNQ (tetrathiafulvalene-tetracyanoquinodimethane). *Phys. Rev. Lett.* 36:751-4, 1976.
IBM Thomas J. Watson Res. Ctr., Yorktown Heights, NY 10598.

## ELEMENTARY PARTICLE PHYSICS (Experimental)

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