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"Current Comments"

1975 Physical Sciences Articles Highly Cited in 1975

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Last week we published the list of 53 1975 biomedical articles cited eleven or more times. On the following pages you'll find the list of 49 physics and chemistry articles.

All were published during the first half of the year. They appeared in twelve different journals. *Physical Review Letters* published 29 of them, more than half. *Physical Review D (Particles and Fields)* published four. The *Astrophysical Journal* published papers 15, 28 and 36. *Journal of the American Chemical Society* published a group of three papers by Bingham *et al.* *Review of Modern Physics* published two (items 43 and 46), while each of the following journals had one: *Journal of Geophysical Research* (9); *Reports on Progress in Physics* (10); *Applied Optics* (19); *Reviews of Geophysics and Space Physics* (27); *Journal of Chemical Physics* (40); and *Advances in Physics* (41).

The specialists qualified to discuss and explain the many articles on charmed quarks and particle annihilation must be already familiar with them. For a layman like myself and other readers, the list is not however entirely useless. It alerts us to the fact that a great deal of work is being done in subatomic particles. This work is rapidly progressing to identify a fourth class of quarks, to supplement the three kinds now thought to compose ordinary hadrons.

Dr. Benjamin W. Lee of the National Accelerator Laboratory at Batavia, Illinois, one of the authors of item 43, informs me that "in order to fit everything we know into one bag to explain particles," he and his colleagues felt they "needed a new constituent, a new quark, but one with a certain property called charm. Charm is something like electric charge, but not entirely, since it may be destroyed in weak interactions." Why has their paper been so highly cited? "This unified theory was very exciting and full of promise. Some experimental support was called for. Soon after publication, published experimental results came forth indicating that the theory may be right."[1]

In addition to charm, you'll find that some of these papers talk of color as well in referring to particles. Like charm, color is a purely theoretical concept, a pictorial shorthand for expression of a mathematical concept. Several other papers discuss $e^+ e^-$ annihilation--the collision and annihilation of electrons and positrons to form a pure state of energy from which all kinds of particles are produced.

The only chemistry papers are the group of three papers by Bingham, Dewar and Lo. These could just have easily been published in a journal of chemical physics. As to why so little chemistry appears on this list is hard to figure out. If citation frequencies were a

purely random phenomenon, we might expect a larger variety of journals to be represented. Had we just lowered our threshold to ten citations, instead of eleven, we would have had another twelve papers on the list, but all of these were published in physics journals.

The immediacy phenomenon involved here is not simple. It may be that a field like physics has its spurts of new activity whereas chemistry produces papers that are cited over a longer period. The so-called half-life of papers is known to vary from field to field, but one cannot make generalizations. These lists of highly cited papers concern a small fraction of the total scientific literature. The statistical properties of highly cited papers may be quite different from the large population of papers that are cited only a few times after publication.

Out of 500,000 to 1,000,000 papers published last year throughout the world we ought to identify one out of each thousand that is significant. We have dealt here with one in 10,000 that achieved citation distinction the same year the paper was published. If space were not a limiting factor, we could easily supply the next 900 papers cited above the appropriate threshold. This would only be about 20 titles per week and a project worth considering in the future.

1. **Lee B W**, Personal communication, March 1976.

1975 Physical Sciences Articles Highly Cited in 1975

Item	Times Cited 1975	Bibliographical Data
1.	11	**Andrews D F, Harvey J, Lobkowicz F, May E N, Nelson C A, Thorndike E H & Nordberg M E.** Search for photoproduction of psi (3105). *Phys. Rev. Letters* **34**(4):231-33, 1975.
2.	64	**Appelquist T & Politzer H D.** Heavy quarks and $e+ e-$ annihilation. *Phys. Rev. Letters* **34**(1):43-45, 1975.
3.	15	**Augustin J E et al.** Measurement of $e^+ e^- \rightarrow e^+ e^-$ and $e^+ e^- \rightarrow \mu + \mu -$. *Phys. Rev. Letters* **34**(4):233-38, 1975.
4.	17	**Barnett R M.** Model with three charmed quarks. *Phys. Rev. Letters* **34**(1):41-43, 1975.
5.	44	**Borchardt S, Mathur V S & Okubo S.** Possible explanation of the new resonance in $e^+ e^-$ annihilation. *Phys. Rev. Letters* **34**(1):38-40, 1975.
6.	17	**Bright A A, Cohen M J, Carito A F, Heeger A J, Mikulski C M. Russo P J & MacDiarmid A G.** Optical reflectance of polymeric sulfur nitride films from ultraviolet to infrared. *Phys. Rev. Letters* **34**(4):206-09, 1975.
7.	38	**Callan C G, Kingsley R L, Treiman S B, Wilczek F & Zee A.** Remarks on the new resonances at 3.1 and 3.7 GeV. *Phys. Rev. Letters* **34**(1):52-56, 1975.
8.	69	**Derujula A & Glashow S L.** Is bound charm found? *Phys. Rev. Letters* **34**(1):46-49, 1975.
9.	13	**Garrett C & Munk W.** Space-time scales of internal waves; progress report. *J. Geophys. Res.* **80**(3):291, 1975.

10. 12 **Gehring G A & Gehring K A.** Co-operative Jahn-Teller effects. *Rep. Progr. Physics* **38**(1):1-89, 1975.

11. 17 **Goldhaber A S & Goldhaber M.** Are the new particles baryon-anti-baryon nuclei? *Phys. Rev. Letters* **34**(1):36-37, 1975.

12. 17 **Greene R L, Street G B & Suter L J.** Superconductivity in polysulfur nitride $(SN)_x$. *Phys. Rev. Letters* **34**(10):577-79, 1975.

13. 20 **Greene R L, Grant P M & Street G B.** Low-temperature specific heat of polysulfur nitride $(SN)_x$. *Phys. Rev. Letters* **34**(2):89-92, 1975.

14. 29 **Harrington B J, Park S V & Yildiz A.** Spectrum of heavy mesons in e^+ e^- annihilation. *Phys. Rev. Letters* **34**(3):168-71, 1975.

15. 29 **Hulse R A & Taylor J H.** Discovery of a pulsar in a binary system. *Astrophys. J.* **195**(2):L51-53, 1975.

16. 11 **Kadanoff L P & Houghton A.** Numerical evaluations of critical properties of two-dimensional Ising model. *Phys. Review B Sol. St.* **11**(1):377-86, 1975.

17. 24 **Nieh H T, Wu T T & Yang C N.** Possible interactions of the *J*-particle. *Phys. Rev. Letters* **34**(1):49-52, 1975.

18. 23 **Okubo S, Mathur V S & Borchardt S.** SU(4) symmetry and the possible existence of new hadrons. *Phys. Rev. Letters* **34**(4):236-39, 1975.

19. 11 **Palmer K F & Williams D.** Optical constants of sulfuric acid; application to clouds of Venus. *Appl. Optics* **14**(1):208, 1975.

20. 13 **Schwinger J.** Interpretation of a narrow resonance in e^+ e^-. *Phys. Rev. Letters* **34**(1):37, 1975.

21. 22 **Yennie D R.** Comment on radiative corrections to e^+ e^- psi (3105). *Phys. Rev. Letters* **34**(4):239-41, 1975.

22. 36 **Appelquist T, DeRujula A, Politzer H D & Glashow S L.** Spectroscopy of the new mesons. *Phys. Rev. Letters* **34**(6):365-69, 1975.

23. 29 **Benevenuti A *et al.*** Observation of new-particle production by high-energy neutrinos and antineutrinos. *Phys. Rev. Letters* **34**(7):419-22, 1975.

24. 51 **Eichten E, Gottfried K, Kinoshita T, Kogut J, Lane K D & Yan T M.** Spectrum of charmed quark-antiquark bound states. *Phys. Rev. Letters* **34**(6):369-72, 1975.

25. 14 **Martin J F *et al* (MIT), Dakin J T (Univ. Mass.) & Feldman G J *et al* (Stanford).** Experimental upper limit on photoproduction cross section for the psi (3105). *Phys. Rev. Letters* **34**(5):288-90, 1975.

26. 13 **Quigg C, Pirila P & Thomas G H.** Direct evidence for independent emission of clusters. *Phys. Rev. Letters* **34**(5):290-93, 1975.

27. 11 **Rowland F S & Molina M J.** Chlorofluoromethanes in the environment. *Rev. Geophys.* **13**(1):1-35, 1975.

28. 12 **Thorne K S & Price R H.** Cygnus X-1; an interpretation of spectrum and its variability. *Astrophys. J.* **195**(3):L101-105, 1975.

29. 20 **Wofsy S C, McElroy M B & Sze N D.** Freon consumption; implications for atmospheric zone. *Science* **187**(4176):535-37, 1975.

30. 63 **Augustin J E *et al* (Stanford) & Abrams G S *et al* (Univ. of California/Berkeley).** Total cross section for hadron production by electron-positron annihilation between 2.4 and 5.0 GeV center-of-mass energy. *Phys. Rev. Letters* **34**(12):764-67, 1975.

31. 22 **Bardeen W A, Chanowitz M S, Drell S D, Weinstein M & Yan T-M.** Heavy quarks and strong binding; a field theory of hadron structure. *Phys. Review D Part. & Fields* 11(5):1094-1136, 1975.

32. 11 **Benvenuti A, Cline D, Ford W T, Imlay R, Ling T Y, Mann A K, Messing F, Reeder D O, Rubbia C, Stefanski R, & Sulak L.** Invariant-mass distributions from inelastic ν and $\bar{\nu}$ interactions. *Phys. Rev. Letters* 34(10):597-600, 1975.

33. 21 **Bingham R C, Dwar M J S & Lo D H.** Ground states of molecules. 25. MINDO/3. An improved version of the MINDO semiempirical SCR-MO method. *J. Amer. Chem. Soc.* 97(6):1285-93, 1975.

34. 15 **Bingham R C, Dewar M J S & Lo D H.** Ground states of molecules. 26. MINDO/3 calculations for hydrocarbons. *J. Amer. Chem. Soc.* 97(6):1294-1301, 1975.

35. 13 **Bingham R C, Dewar M J S & Lo D H.** Ground states of molecules. 27. MINDO/3 calculations for CHON species. *J. Amer. Chem. Soc.* 97(6):1302-06, 1975.

36. 11 **Evans N J, Zuckermann B, Morris G & Sato T.** Interstellar H_2CO. 1. Absorption studies, dark clouds, and cosmic background radiation. *Astrophys. J.* 196(2):433-56, 1975.

37. 18 **Goldstone J & Jackiw R.** Quantization of nonlinear waves. *Phys. Review D Part. & Fields* 11(6):1486-98, 1975.

38. 13 **Moncton D E, Axe J D & DiSalvo F J.** Study of superlattice formation in 2H-$NbSe_2$ and 2H-$TaSe_2$ by neutron-scattering. *Phys. Rev. Letters* 34(12):734-37, 1975.

39. 11 **Salam A & Strathdee J.** Superfields and Fermi-Bose symmetry. *Phys. Review D Part. & Fields* 11(6):1521-35, 1975.

40. 11 **Velazco J E & Setser D W.** Bound-free emission spectra of diatomic xenon halides. *J. Chem. Physics* 62(5):1990-91, 1975.

41. 14 **Wilson J A, DiSalvo F J & Mahajan S.** Charge density waves and superlattices in metallic layered transition metal dichalcogenides. *Adv. Physics* 24(2):117-201, 1975.

42. 12 **Coleman S.** Quantum Sine-Gordon equation as massive thirring model. *Phys. Review D Part. & Fields* 11(8):2088-97, 1975.

43. 61 **Gaillard M K, Lee B W & Rosner J L.** The search for charm. *Rev. Mod. Physics* 47(2):277-310, 1975.

44. 21 **Knapp B *et al.*** Photoproduction of narrow resonances. *Phys. Rev. Letters* 34(16):1040-43, 1975.

45. 19 **Knapp B *et al.*** Dimuon production by neutrons. *Phys. Rev. Letters* 34(16):1044-47, 1975.

46. 11 **Leggett A J.** Theoretical description of new phases of liquid HE-3. *Rev. Mod. Physics* 47(2):331-414, 1975.

47. 15 **Abrams *et al.*** Decay of psi (3684) into psi (3095). *Phys. Rev. Letters* 34(18):1181-83, 1975.

48. 15 **Boyarski A M *et al.*** Quantum numbers and decay widths of psi (3095). *Phys. Rev. Letters* 34(2):1357-60, 1975.

49. 12 **Liao P F & Bjorkholm J E.** Direct observation of atomic energy level shifts in two-photon absorption. *Phys. Rev. Letters* 34(1):1-4, 1975.