



# Papers That Shaped Modern High-Energy Physics

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**S**PIRES DATABASE SYSTEM at SLAC is a treasure-chest of information. The most popular database is HEP, a joint project of SLAC and DESY libraries. HEP contains almost 300,000 entries with bibliographic data on articles, preprints, and bulletin-board papers in high-energy physics. Since 1974, HEP has tracked the number of times a published high-energy physics article is cited by later works. If you know the exact reference of an article, it is easy to find how many citations the article has in the HEP database.\* A citation search may often identify important contributions to a scientific field. The citations in HEP are collected from preprints received by the SLAC library. The library receives between 8,000 and 10,000 preprints yearly, and each of the preprints is a potential source of many citations. Note that HEP *does not* register works cited by journal articles which never appeared as preprints.\*\*

\* The database can be accessed and searched on the World Wide Web and via the remote server Qspires. To learn more about the access, write to [qspi@slac.stanford.edu](mailto:qspi@slac.stanford.edu)

\*\* In earlier years, only citations of published journal articles were collected from preprints received by the SLAC library. HEP now also collects citations of bulletin-board papers ('e-prints'). When (and if) a bulletin-board paper is published, citations from the publication phase get added to the citations from the bulletin-board phase.

## HEP Papers with the Most Citations in the HEP (Spire) Database between January 1, 1992 and December 31, 1994

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|------|---|-----|--|
| 1261 | J.J. Hernandez, et al. (Particle Data Group) Review of Particle Properties <i>Phys. Rev.</i> <b>D45</b> , S1 (1992)   | 361 | E. Witten, On String Theory And Black Holes <i>Phys. Rev.</i> <b>D44</b> , 314 (1991)  |
| 575  | J.J. Hernandez, et al. (Particle Data Group) Review of Particle Properties <i>Phys. Lett.</i> <b>B239</b> , 1 (1990)  | 358 | M.A. Shifman, A.I. Vainshtein, V.I. Zakharov, QCD And Resonance Physics <i>Nucl. Phys.</i> <b>B147</b> , 385 (1979)                                  |
| 465  | N. Isgur, M.B. Wise, Weak Decays of Heavy Mesons In Static Quark Approx. <i>Phys. Lett.</i> <b>B232</b> , 113 (1989)  | 330 | E. Witten, Quantum Field Theory and Jones Polynomial <i>Commun. Math. Phys.</i> <b>121</b> , 351 (1989)  |
| 448  | N. Isgur, M.B. Wise, Weak Transition Form Factors Between Heavy Mesons <i>Phys. Lett.</i> <b>B237</b> , 527 (1990)  | 327 | M. Kobayashi, T. Maskawa, CP Violation In Renormalizable Theory of Weak Interaction <i>Prog. Theor. Phys.</i> <b>49</b> , 652 (1973)                 |
| 422  | H.P. Nilles, Supersymmetry, Supergravity And Particle Physics <i>Phys. Rept.</i> <b>110</b> , 1 (1984)  | 323 | Y. Nambu, G. Jona-Lasinio, Dynamical Model Of Elementary Particles <i>Phys. Rev.</i> <b>122</b> , 345 (1961)   |
| 393  | S. Weinberg, A Model of Leptons <i>Phys. Rev. Lett.</i> <b>19</b> , 1264 (1967)   | 322 | M. Jimbo, Q-Difference Analogue of U(G) and Yang-Baxter Equation <i>Lett. Math. Phys.</i> <b>10</b> , 63 (1985)                                      |
| 382  | H.E. Haber, G.L. Kane, The Search For Supersymmetry <i>Phys. Rept.</i> <b>117</b> , 75 (1985)   | 317 | A.A. Belavin, A.M. Polyakov, A.B. Zamolodchikov, Infinite Conformal Symmetry In 2-D Quantum Field Theory <i>Nucl. Phys.</i> <b>B241</b> , 333 (1984) |
| 377  | U. Amaldi, W. de Boer, H. Furstenau, Comparison of Grand Unified Theories With ... Coupling Constants Measured at LEP <i>Phys. Lett.</i> <b>B260</b> , 447 (1991)               | 308 | J. Gasser, H. Leutwyler, Chiral Perturbation Theory to One Loop <i>Ann. Phys.</i> <b>158</b> , 142 (1984)  |
| 373  | T. Sjostrand, M. Bengtsson, Lund Monte Carlo For Jet Fragmentation ... Jetset Version 6.3 <i>Comput. Phys. Commun.</i> <b>43</b> , 367 (1987)                                   | 307 | H. Georgi, An Effective Field Theory For Heavy Quarks at Low Energies <i>Phys. Lett.</i> <b>B240</b> , 447 (1990)                                    |
| 370  | P. Langacker, M-X. Luo, Implications of Precision Electroweak Experiments for M(T), $\rho^0$ , $\sin^2\theta_w$ and Grand Unification <i>Phys. Rev.</i> <b>D44</b> , 817 (1991) | 301 | G. 't Hooft, Computation of Quantum Effects Due to 4-D Pseudoparticle <i>Phys. Rev.</i> <b>D14</b> , 3432 (1976)                                     |

### All-Time Favorites—HEP Papers with the Most Citations in the HEP (Spires) Database at SLAC since 1974

- 4373 S. Weinberg, A Model of Leptons *Phys. Rev. Lett.* **19**, 1264 (1967)
- 2513 S.L. Glashow, J. Iliopoulos, L. Maiani, Weak Interactions With Lepton-Hadron Symmetry *Phys. Rev.* **D2**, 1285 (1970)
- 2399 M. Kobayashi, T. Maskawa, CP Violation in Renormalizable Theory of Weak Interaction *Prog. Theor. Phys.* **49**, 652 (1973)
- 2023 H. Georgi, S.L. Glashow, Unity of All Elementary Particle Forces *Phys. Rev. Lett.* **32**, 438 (1974)
- 1915 S.L. Glashow, Partial Symmetries Of Weak Interactions *Nucl. Phys.* **22**, 579 (1961)
- 1894 K. G. Wilson, Confinement of Quarks *Phys. Rev.* **D10**, 2445 (1974)
- 1610 J. C. Pati, A. Salam, Lepton Number as the Fourth Color *Phys. Rev.* **D10**, 275 (1974)
- 1572 G. Altarelli, G. Parisi, Asymptotic Freedom in Parton Language *Nucl. Phys.* **B126**, 298 (1977)
- 1503 S. Coleman, E. Weinberg, Radiative Corrections as the Origin Of Spontaneous Symmetry Breaking *Phys. Rev.* **D7**, 1888 (1973)
- 1491 H.D. Politzer, Reliable Perturbative Results for Strong Interactions? *Phys. Rev. Lett.* **30**, 1346 (1973)
- 1478 M.A. Shifman, A.I. Vainshtein, V.I. Zakharov, QCD and Resonance Physics *Nucl. Phys.* **B147**, 385 (1979)
- 1474 A.A. Belavin, A.M. Polyakov, A.B. Zamolodchikov, Infinite Conformal Symmetry in 2-D Quantum Field Theory *Nucl. Phys.* **B241**, 333 (1984)
- 1472 G. 't Hooft, Computation of Quantum Effects Due to 4-D Pseudoparticle *Phys. Rev.* **D14**, 3432 (1976)
- 1390 P. Candelas, G. T. Horowitz, A. Strominger, E. Witten, Vacuum Configurations for Superstrings *Nucl. Phys.* **B258**, 46 (1985)
- 1381 G. 't Hooft, Symmetry Breaking Through Bell-Jackiw Anomalies *Phys. Rev. Lett.* **37**, 8 (1976)
- 1371 D.J. Gross, F. Wilczek, Ultraviolet Behavior of Non-Abelian Gauge Theories *Phys. Rev. Lett.* **30**, 1343 (1973)
- 1348 A.M. Polyakov, Quantum Geometry of Bosonic Strings *Phys. Lett.* **B103**, 207 (1981)
- 1341 S.L. Adler, Axial-Vector Vertex in Spinor Electrodynamics *Phys. Rev.* **177**, 2426 (1969)
- 1340 Y. Nambu, G. Jona-Lasinio, Dynamical Model of Elementary Particles *Phys. Rev.* **122**, 345 (1961)
- 1288 E. Eichten, I. Hinchliffe, K. Lane, C. Quigg, Supercollider Physics *Rev. Mod. Phys.* **56**, 579 (1984)
- 1254 G. 't Hooft, M. Veltman, Regularization And Renormalization of Gauge Fields *Nucl. Phys.* **B44**, 189 (1972)
- 1253 J.J. Hernandez, et al. (Particle Data Group), Review of Particle Properties *Phys. Rev.* **D45**, S1 (1992)
- 1250 A. H. Guth, Inflationary Universe: Possible Solution To Horizon and Flatness Problems *Phys. Rev.* **D23**, 347 (1981)
- 1236 A.A. Belavin, A.M. Polyakov, A.S. Schwartz, Yu.S. Tyupkin, Pseudoparticle Solutions of Yang-Mills Equations *Phys. Lett.* **B59**, 85 (1975)
- 1232 A. De Rujula, H. Georgi, S.L. Glashow, Hadron Masses in a Gauge Theory *Phys. Rev.* **D12**, 147 (1975)
- 1220 J.J. Hernandez, et al. (Particle Data Group), Review of Particle Properties *Phys. Lett.* **B239**, 1 (1990)
- 1175 D.J. Gross, J.A. Harvey, E. Martinec, R. Rohm, Heterotic String Theory 1 *Nucl. Phys.* **B256**, 253 (1985)
- 1117 J.J. Aubert, et al., Experimental Observation of a Heavy Particle *J Phys. Rev. Lett.* **33**, 1404 (1974)
- 1100 A. Chodos, R.L. Jaffe, K. Johnson, C.B. Thorn, V.F. Weisskopf, A New Extended Model of Hadrons *Phys. Rev.* **D9**, 3471 (1974)
- 1100 G. 't Hooft, Magnetic Monopoles in Unified Gauge Theories *Nucl. Phys.* **B79**, 276 (1974)

THE FIRST LIST shows the articles most popular in the past three years, while the second displays all-time favorites. Both lists were compiled on December 31, 1994. The all-time list reads like a Who's Who of high-energy physics. Steven Weinberg's article *A Model of Leptons* is by far the most popular work in high-energy physics. The most fruitful period in this field, according to the list, was the early seventies: ten articles from the list were published in just two years, 1973 and 1974. A paper had to have at least 1100 citations to get to the 'all-time' top-30 list. If your paper did not cross this magic boundary, but has more than, say, 250 citations, it is still in a very exclusive company: a study shows that there are only about 180 papers with 500 or more citations in the HEP database, and only about 600 papers with more than 250 citations. Compare this to the total number of published high-energy physics papers, which, according to some estimates, may be close to 100,000.\*

\* An extended version of this article may be found on the World Wide Web, at <http://www-slac.slac.stanford.edu/find/top40.html>.

Hrvoje Galić is a theoretical physicist, working now as a SPIRES specialist in the SLAC library. None of his theoretical works has made it to the top 1000 list.