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D. Finkelstein and J. Rubinstein, "Connection between Spin, Statistics, and Kinks", <i>J. Math. Phys.</i> 9 (1968) 1762-1779	107
Y. Aharonov and D. Böhm, "Significance of Electromagnetic Potentials in the Quantum Theory", <i>Phys. Rev.</i> 115 (1959) 485-491	125
J. M. Leinaas and J. Myrheim, "On the Theory of Identical Particles", <i>Il Nuovo Cimento</i> 37 (1977) 1-23	132
2. The Last Bastion of Rationality	157
J. Goldstone and F. Wilczek, "Fractional Quantum Numbers on Solitons", <i>Phys. Rev. Lett.</i> 47 (1981) 986-989	159

	F. Wilczek, "Magnetic Flux, Angular Momentum, and Statistics", <i>Phys. Rev. Lett.</i> 48 (1982) 1144–1146	163
	F. Wilczek, "Quantum Mechanics of Fractional-Spin Particles", <i>Phys. Rev. Lett.</i> 49 (1982) 957–959	166
3.	Foundations	171
	D. P. Arovas, R. Schrieffer, F. Wilczek and A. Zee, "Statistical Mechanics of Anyons", <i>Nucl. Phys.</i> B251 (1985) 117–126	173
	Y. S. Wu, "General Theory for Quantum Statistics in Two Dimensions", <i>Phys. Rev. Lett.</i> 52 (1984) 2103–2106	183
	A. S. Goldhaber and R. Mackenzie, "Are Cyons Really Anyons?", <i>Phys. Lett.</i> B214 (1988) 471–474	187
	A. S. Goldhaber, R. Mackenzie and F. Wilczek, "Field Corrections to Induced Statistics", <i>Mod. Phys. Lett.</i> A4 (1989) 21–31	191
	J. Fröhlich and P.-A. Marchetti, "Quantum Field Theory of Anyons", <i>Lett. Math. Phys.</i> 16 (1988) 347–358	202
	A. M. Polyakov, "Fermi-Bose Transmutations Induced by Gauge Fields", <i>Mod. Phys. Lett.</i> A3 (1988) 325–328	214
4.	Anyons in Model Field Theories	221
	F. Wilczek and A. Zee, "Linking Numbers, Spin, and Statistics of Solitons", <i>Phys. Rev. Lett.</i> 51 (1983) 2250–2252	222
	A. N. Redlich, "Parity Violation and Gauge Noninvariance of the Effective Gauge Field Action in Three Dimensions", <i>Phys. Rev.</i> D29 (1984) 2366–2374	225
	Y.-H. Chen and F. Wilczek, "Induced Quantum Numbers in some 2 + 1 Dimensional Models", <i>Int. J. Mod. Phys.</i> B3 (1989) 117–128	234
5.	Anyons in the Quantized Hall Effect	249
	B. I. Halperin, "Statistics of Quasiparticles and the Hierarchy of Fractional Quantized Hall States", <i>Phys. Rev. Lett.</i> 52 (1984) 1583–1586 (Erratum: <i>Phys. Rev. Lett.</i> 52 (1984) 2390)	251
	D. Arovas, J. R. Schrieffer and F. Wilczek, "Fractional Statistics and the Quantum Hall Effect", <i>Phys. Rev. Lett.</i> 53 (1984) 722–723	256

S. M. Girvin and A. H. MacDonald, "Off-Diagonal Long-Range Order, Oblique Confinement, and the Fractional Quantum Hall Effect", <i>Phys. Rev. Lett.</i> 58 (1987) 1252–1255	258
R. B. Laughlin, "Fractional Statistics in the Quantum Hall Effect"	262
Chiral Spin States	307
V. Kalmeyer and R. B. Laughlin, "Equivalence of the Resonating-Valence-Bond and Fractional Quantum Hall States", <i>Phys. Rev. Lett.</i> 59 (1987) 2095–2098	308
X.-G. Wen, F. Wilczek and A. Zee, "Chiral Spin States and Superconductivity", <i>Phys. Rev.</i> B39 (1989) 11413–11423	312
Anyon Superconductivity	325
R. B. Laughlin, "The Relationship between High-Temperature Superconductivity and the Fractional Quantum Hall Effect", <i>Science</i> 242 (1988) 525–533	326
R. B. Laughlin, "Superconducting Ground State of Noninteracting Particles Obeying Fractional Statistics", <i>Phys. Rev. Lett.</i> 60 (1988) 2677–2680	335
A. L. Fetter, C. B. Hanna and R. B. Laughlin, "Random-Phase Approximation in the Fractional-Statistics Gas", <i>Phys. Rev.</i> B39 (1989) 9679–9681	339
Y.-H. Chen, F. Wilczek, E. Witten and B. I. Halperin, "On Anyon Superconductivity", <i>Int. J. Mod. Phys.</i> B3 (1989) 1001–1067	342
Some Recent Directions	411
G. S. Canright and S. M. Girvin, "Anyons, the Quantum Hall Effect, and Two-Dimensional Superconductivity", <i>Int. J. Mod. Phys.</i> B3 (1989) 1943–1963	413
D.-H. Lee and M. P. A. Fisher, "Anyon Superconductivity and the Fractional Quantum Hall Effect", <i>Phys. Rev. Lett.</i> 63 (1989) 903–906 (Erratum: <i>Phys. Rev. Lett.</i> 63 (1989)	434
D.-H. Lee and C. L. Kane, "Boson-Vortex-Skyrmion Duality, Spin-Singlet Fractional Quantum Hall Effect, and Spin-1/2 Anyon Superconductivity", <i>Phys. Rev. Lett.</i> 64 (1990) 1313–1317	439
T. Einarsson, "Fractional Statistics on a Torus", <i>Phys. Rev. Lett.</i> 64 (1990) 1995–1998	444