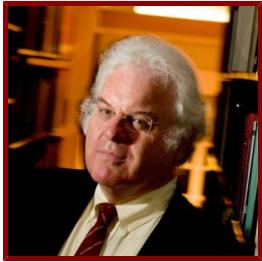


Stanford



Robert Laughlin

Anne T. and Robert M. Bass Professor in the School of Humanities and Sciences
Physics

CONTACT INFORMATION

- **Administrative Contact**

Sybille Katz

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Bio

BIO

Professor Laughlin is a theorist with interests ranging from hard-core engineering to cosmology. He is an expert in semiconductors (Nobel Prize 1998) and has also worked on plasma and nuclear physics issues related to fusion and nuclear-pumped X-ray lasers. His technical work at the moment focuses on “correlated-electron” phenomenology – working backward from experimental properties of materials to infer the presence (or not) of new kinds of quantum self-organization. He recently proposed that all Mott insulators – including the notorious doped ones that exhibit high-temperature superconductivity – are plagued by a new kind of subsidiary order called “orbital antiferromagnetism” that is difficult to detect directly. He is also the author of *A Different Universe*, a lay-accessible book explaining emergent law.

ACADEMIC APPOINTMENTS

- Professor, Physics

ADMINISTRATIVE APPOINTMENTS

- Professor of Applied Physics (Dual Appointment with Physics), Stanford University, (1993-2007)
- Postdoc, AT&T Bell Laboratories, (1979-1981)
- Professor of Physics, Stanford University, (1989- present)

HONORS AND AWARDS

- Onsager Medal, Norwegian University of Science and Technology (2007)
- Doctorate of Letters, University of Maryland (2005)
- Golden Plate, Stanford University (1999)
- Nobel Prize in Physics, Royal Swedish Academy of Sciences (1998)
- Benjamin Franklin Medal for Physics, The Franklin Institute (1998)
- Member, National Academy of Sciences (1994-Present)
- Oliver E. Buckley Prize, American Physical Society (1986)
- E. O. Lawrence Award for Physics, U.S. Department of Energy (1985)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Research Scientist, Lawrence Livermore National Laboratory (1981 - 2004)

- President, Korean Advanced Institute for Science and Technology (2004 - 2006)
- President, Asia-Pacific Center for Theoretical Physics (2004 - 2006)
- Board Member, Science Foundation Ireland (2002 - 2003)

PROGRAM AFFILIATIONS

- Science, Technology and Society

PROFESSIONAL EDUCATION

- Ph.D., Massachusetts Institute of Technology , Physics (1979)
- A.B., University of California at Berkeley , Mathematics (1972)

Teaching

COURSES

2023-24

- Graduate Quantum Mechanics II: PHYSICS 231 (Spr)
- Introduction to Nuclear Energy: PHYSICS 241 (Win)
- Introduction to the Physics of Energy: PHYSICS 240 (Aut)

2022-23

- Graduate Quantum Mechanics II: PHYSICS 231 (Spr)
- Introduction to the Physics of Energy: PHYSICS 240 (Aut)

2021-22

- Introduction to Nuclear Energy: PHYSICS 241 (Win)
- Introduction to the Physics of Energy: PHYSICS 240 (Aut)

2020-21

- Introduction to Nuclear Energy: PHYSICS 241 (Win)
- Introduction to the Physics of Energy: PHYSICS 240 (Aut)

STANFORD ADVISEES

Doctoral (Program)

Hephzibah Akinleye, Sayak Bhattacharjee, Ella Blake, Annie Cheng, Eric Cooper, Isaiah Curtis, Matthew Hurley, Eli Mueller, Avikar Periwal, Tixuan Tan, Haifeng Tang, Jinze Wu, Kaan Yay

Publications

PUBLICATIONS

- **Powering the Future: How We Will (Eventually) Solve the Energy Crisis and Fuel the Civilization of Tomorrow**
Laughlin, R. B.
New York: Basic Books.2011
- **The Crime of Reason**
Laughlin, R. B.
New York: Basic Books.2008
- **Gossamer superconductivity** *PHILOSOPHICAL MAGAZINE*
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● **Looking for a Hero**

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● **A Different Universe: Remaking Physics from the Bottom Down**

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● **Spectroscopy of matter near criticality ANNALS OF PHYSICS**

Bernevig, B. A., Giuliano, D., Laughlin, R. B.
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● **The cup of the hand SCIENCE**

Laughlin, R. B.
2004; 303 (5663): 1475-1477

● **Hiawatha's Valence Bonding Annals of Improbable Research**

Laughlin, R. B.
2004; 10 (6): 8

● **Emergent relativity International Symposium on Frontiers in Science**

Laughlin, R. B.
WORLD SCIENTIFIC PUBL CO PTE LTD.2003: 18–43

● **Emergent Relativity and the Physics of Black Hole Horizons Analog Models of General Relativity**

Chapline, G., Laughlin, R. B., Santiago, D. I.
edited by Visser, M.
Singapore: World Scientific.2003

● **Truth, ownership, and scientific tradition PHYSICS TODAY**

Laughlin, R. B.
2002; 55 (12): 10-11

● **Coordinate representation of the one-spinon one-holon wave function and spinon-holon interaction PHYSICAL REVIEW B**

Bernevig, B. A., Giuliano, D., Laughlin, R. B.
2002; 65 (19)

● **The physical basis of computability COMPUTING IN SCIENCE & ENGINEERING**

Laughlin, R. B.
2002; 4 (3): 27-30

● **The quantum criticality conundrum ADVANCES IN PHYSICS**

Laughlin, R. B., Lonzarich, G. G., Monthoux, P., Pines, D.
2001; 50 (4): 361-365

● **Balanced branching in transcription termination PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA**

Harrington, K. J., Laughlin, R. B., Liang, S.
2001; 98 (9): 5019-5024

● **Spinon attraction in spin-1/2 antiferromagnetic chains PHYSICAL REVIEW LETTERS**

Bernevig, B. A., Giuliano, D., Laughlin, R. B.
2001; 86 (15): 3392-3395

● **Hidden order in the cuprates PHYSICAL REVIEW B**

CHAKRAVARTY, S., Laughlin, R. B., Morr, D. K., Nayak, C.
2001; 63 (9)

● **Quantum phase transitions and the breakdown of classical general relativity PHILOSOPHICAL MAGAZINE B-PHYSICS OF CONDENSED MATTER STATISTICAL MECHANICS ELECTRONIC OPTICAL AND MAGNETIC PROPERTIES**

- Chapline, G., Hohlfeld, E., Laughlin, R. B., Santiago, D. I.
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- **The middle way** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Laughlin, R. B., Pines, D., Schmalian, J., Stojkovic, B. P., Wolynes, P.
2000; 97 (1): 32-37
 - **The theory of everything** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Laughlin, R. B., Pines, D.
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 - **Quantum number fractionalization in antiferromagnets** *Workshop with Learning on Field Theories for Low-Dimensional Condensed Matter Systems*
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 - **Differential light scattering: Probing the sonoluminescence collapse** *PHYSICAL REVIEW E*
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1999; 60 (6): R6303-R6306
 - **Nobel Lecture: Fractional quantization** *REVIEWS OF MODERN PHYSICS*
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 - **A critique of two metals** *ADVANCES IN PHYSICS*
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Laughlin, R. B.
1998; 80 (23): 5188-5191
 - **Parallels Between Quantum Antiferromagnetism and the Strong Interactions** *Proceedings of the Inaugural Conference of the Asia-Pacific Center for Theoretical Physics*
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edited by Cho, Y. M., Hong, J. B., Yang, C. N.
Singapore: World Scientific.1998
 - **Evidence for quasiparticle decay in photoemission from underdoped cuprates** *PHYSICAL REVIEW LETTERS*
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 - **SPIN SUSCEPTIBILITY AND GAP STRUCTURE OF THE FRACTIONAL-STATISTICS GAS** *PHYSICAL REVIEW B*
Levy, J. L., Laughlin, R. B.
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 - **TIME-REVERSAL SYMMETRY-BREAKING IN SUPERCONDUCTORS - A PROPOSED EXPERIMENTAL TEST** *PHYSICAL REVIEW B*
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• **QUANTUM-MECHANICS OF THE FRACTIONAL-STATISTICS GAS - PARTICLE-HOLE INTERACTION** *PHYSICAL REVIEW B*

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• **Fractional Statistics in the Quantum Hall Effect** *Fractional Statistics and Anyon Superconductivity*

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• **QUANTUM-MECHANICS OF THE FRACTIONAL-STATISTICS GAS - HARTREE-FOCK APPROXIMATION** *PHYSICAL REVIEW B*

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• **THEORY OF THE SPIN LIQUID-STATE OF THE HEISENBERG-ANTIFERROMAGNET** *PHYSICAL REVIEW B*

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• **SPIN HAMILTONIAN FOR WHICH QUANTUM HALL WAVEFUNCTION IS EXACT** *ANNALS OF PHYSICS*

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• **DIFFERENTIAL CONDUCTANCE IN 3-DIMENSIONAL RESONANT TUNNELING** *PHYSICAL REVIEW B*

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● **POSITRONIUM TIME-OF-FLIGHT SPECTROSCOPY OF DISSIMILAR METALS PHYSICAL REVIEW B**

Howell, R. H., ROSENBERG, I. J., Fluss, M. J., Goldberg, R. E., Laughlin, R. B.

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● **Dilute Fermi Liquid of Polarons in Copper Oxide Superconductors Novel Superconductivity**

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● **Electrical Resistivity as Quantum Chaos Chaos '87: International Conference on the Physics of Chaos and Systems Far from Equilibrium**

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● **Elemental Theory: The Incompressible Quantum Fluid The Quantum Hall Effect**

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● **MECHANISM OF CURRENT MODULATION BY OPTIC PHONONS IN HETEROJUNCTION TUNNELING EXPERIMENTS PHYSICAL REVIEW B**

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● **OSCILLATIONS IN THE CURRENT-VOLTAGE CHARACTERISTICS OF GAAS-ALGAAS TUNNEL-JUNCTIONS PHYSICAL REVIEW LETTERS**

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● **DESTRUCTION OF THE FRACTIONAL QUANTUM HALL-EFFECT BY DISORDER SURFACE SCIENCE**

Laughlin, R. B.

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● **TEMPERATURE-DEPENDENCE OF INTERATOMIC FORCES IN THE THOMAS-FERMI APPROXIMATION PHYSICAL REVIEW A**

Laughlin, R. B.

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● **ONE DIMENSIONAL POLARON EFFECTS AND CURRENT INHOMOGENEITIES IN SEQUENTIAL PHONON EMISSION PHYSICA B & C**

Hellman, E. S., Harris, J. S., Hanna, C. B., Laughlin, R. B.

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● **SCALING OF CONDUCTIVITIES IN THE FRACTIONAL QUANTUM HALL-EFFECT PHYSICAL REVIEW B**

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- PRIMITIVE AND COMPOSITE GROUND-STATES IN THE FRACTIONAL QUANTUM HALL-EFFECT *SURFACE SCIENCE*
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- QUANTIZED HALL CONDUCTIVITY IN 2 DIMENSIONS *PHYSICAL REVIEW B*
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