Carl Edwin Wieman

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Personal:
Born March 26, 1951, Corvallis, Oregon

Degrees:
Bachelor of Science, Massachusetts Institute of Technology, 1973
Ph.D., Stanford University, 1977

Appointments:
Assistant Research Scientist, Department of Physics, University of Michigan, 1977-1979
Assistant Professor of Physics, University of Michigan, 1979-84
Associate Professor of Physics, University of Colorado, 1984-87
Fellow, JILA, 1985-present
Professor of Physics, University of Colorado, 1987-1997
Chair, JILA, 1993-1995
Distinguished Professor, University of Colorado, 1997-present
Director, Science Education Initiative, University of Colorado, 2006-present
Professor of Physics, University of British Columbia, 2007-present
Director, Carl Wieman Science Education Initiative, University of British Columbia, 2007-present

Current major service positions
Chair, Editorial Advisory Board, Physics Review: Physics Education Research
Member NAS/NRC Board on Science Education, (founding Chair, 2004-2009)
Member, Advisory Board, National Math & Science Initiative
Member, Presidential Advisory Board, Research Corporation for Science Advancement
Chair, Advisory Board, Excellence centre for Science and Mathematics Education, King Saud University, Saudi Arabia
Large number of other advisory and program boards and committees

Honors and Awards:

1. Physics Research
   E. O. Lawrence Award in Physics (DOE), 1993
   Davisson-Germer Prize (APS) 1994
   Einstein Medal for Laser Science (Society for Opt. and Quant. Elect.), 1995
   Richtmyer Memorial Lecture Award (Am. Assoc. of Physics Teachers), 1996
   Fritz London Prize in Low Temperature Physics, 1996 (IUPAP)

Newcomb Cleveland Prize (AAAS), 1996
King Faisal International Prize for Science 1997
Award for Science (Bonfils-Stanton Foundation) 1997
Lorentz Medal (Royal Netherlands Academy of Arts and Sciences) 1998
R. W. Wood Prize (Optical Society of America) 1999
Schawlow Prize for Laser Science (American Physical Society) 1999
Benjamin Franklin Medal in Physics (Franklin Institute) 2000
Nobel Prize in Physics 2001

> Nobel Prize Citation: "For the achievement of Bose-Einstein condensation in dilute gases of alkali atoms, and for early fundamental studies of the properties of the condensates"

Vollum Award for Distinguished Accomplishment in Science and Technology, Reed College, 2009

2. Education

NSF Director's Award for Distinguished Teaching Scholars 2001
Presidential Teaching Scholar, University of Colorado, 2004
US Professor of the Year, the Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education, 2004
MERLOT Editor's Choice Award for Exemplary Online Resources, 2006
Oersted Medal, American Association of Physics Teachers, 2007

3. Honorary Memberships and Fellowships

National Academy of Sciences, elected 1995
American Academy of Arts & Sciences, elected 1998
European Academy of Sciences, elected 2004
National Academy of Education, elected 2008

Hertz Foundation Fellow, 1973-1977
Sloan Research Fellowship, 1984
Guggenheim Fellowship, 1990-1991
Fellow of the American Physical Society, 1990
Distinguished Research Lectureship, 1996-97 (University of Colorado)
Frew Fellowship (Australian Academy of Science) 1998
Cherwell-Simon Lecturer, (Oxford University) 1999
Phi Beta Kappa Visiting Scholar 1999-2000

4. Honorary degrees

Doctorate of Science (Honorary), University of Chicago, 1997
Doctorate of Science (Honorary), Ohio State, 2005
Doctorate of Science (Honorary), Willamette University, 2007
Doctorate of Science (Honorary), North Carolina State University, 2008

Professional Associations:
Optical Society of America
American Physical Society
American Association of Physics Teachers
Canadian Association of Physicists
National Academy of Science
National Academy of Education

Patents:
S. Chu, W. Swann and C. Wieman, "Frequency standard using an atomic fountain of optically trapped atoms", Patent #5,338,930, August 16, 1994.

M. S. E. Stephens, P. A. Roos, C. E. Wieman and E. A. Cornell, “Laser sensor using optical feedback-induced frequency modulation,” Patent #5,808,743, September 15, 1998.

C. E. Wieman, Z.-T. Lu, K. L. Corwin and C. Hand, “Stable Wavelength Diode Laser using the Zeeman Shift in an Atomic Vapor,” Patent # 6,009,111, December 28, 1999.

Publications:
1. T. W. Hansch, S. A. Lee, R. Wallenstein and C. Wieman, "Doppler-free two- photon spectroscopy of hydrogen 1s-2s," Phys. Rev. Lett. **34**, 307(1975).

2. B. Brown, G. Henry, R. Keopcke and C. Wieman, "High-resolution measurement of the response of an isolated bubble domain to pulsed magnetic fields," IEEE Trans. Magnetics **11**, 1391 (1975).

3. C. E. Wieman and T. W. Hansch, "Doppler-free laser polarization spectroscopy," Phys. Rev. Lett. **36**, 1170 (1976).

4. R. Feinberg, T. Hansch, A. Schawlow, R. Teets and C. Wieman, "Laser polarization spectroscopy of atoms and molecules," Opt. Comm. **18**, 227 (1976).

5. Wieman and T. Hansch, "Precision measurement of the ground state Lamb shift in hydrogen and deuterium," in *Laser Spectroscopy III, Proceedings of the Third International Conference*, Jackson Lake Lodge, Wyoming, USA (J. L. Hall and J. L. Carlsten, Eds., Springer-Verlag), pp. 39-43 (1977).

6. R. Teets and C. Wieman, "Polarization spectroscopy," Focus on Science (Coherent Radiation) **1**, 1 (1977).

7. C. E. Wieman, "Search for parity violation in atomic hydrogen," in *Proceedings of the 1979 Cargese Workshop on Neutral Current Interactions in Atoms* (W. L. Williams, Ed., 1980).

8. C. E. Wieman and T. W. Hansch, "Precision measurement on the 1s Lamb shift and of the

1s-2s isotope shift of H and D," Phys. Rev. A **22**, 192 (1980).

9. D. Shiner and C. E. Wieman, "Current work on two photon excitation in a hydrogen beam for measurement of the Rydberg constant and me/mp," in *Precision Measurement and Fundamental Constants II* (B. N. Taylor and W. D. Phillips, Eds., Natl. Bur. Stand. Spec. Publ. 617 (1984).

10. S. L. Gilbert and C. E. Wieman, "An easily constructed high vacuum valve," Rev. Sci. Instr. **53**, 1627 (1982).

11. C. E. Wieman and S. L. Gilbert, "Laser frequency stabilization using mode interference from a reflecting reference interferometer," Opt. Lett. **7**, 480 (1982).

12. S. L. Gilbert, R. Watts and C. E. Wieman, "Hyperfine structure measurement of the 7s state of cesium," Phys. Rev. A **27**, 581 (1983).

13. R. N. Watts, S. L. Gilbert and C. E. Wieman, "Precision measurement of the Stark shift of the 6s-7s transition in atomic cesium," Phys. Rev. A **27**, 2769 (1983).

14. C. E. Wieman, "Lineshapes in nonlinear spectroscopy," in *Quantum Metrology and Fundamental Constants* (G. Cutler and A. Lucas, Eds., Plenum Press, 1983).

15. C. E. Wieman, "Laser spectroscopy of hydrogen and the measurement of the fundamental constants," in *Quantum Metrology and Fundamental Constants* (G. Cutler and A. Lucas, Eds., Plenum Press, 1983).

16. C. E. Wieman, "Polarization spectroscopy," in *Laser Based Ultrasensitive Spectroscopy* (R. A. Keller, Ed., SPIE Press, 1983).

17. S. L. Gilbert, R. N. Watts and C. E. Wieman, "Measurement of the 6s$\rightarrow$7s M1 transition in cesium with the use of crossed electric and magnetic fields," Phys. Rev. A **29**, 137 (1984).

18. S. L. Gilbert, M. C. Noecker, and C. E. Wieman, "Absolute measurement of the photoionization cross section of the excited 7s state of cesium," Phys. Rev. A **29**, 3150 (1984).

19. R. N. Watts and C. E. Wieman, "Stopping atoms with diode lasers," in *Laser Spectroscopy VII, Proceedings of the Seventh International Conference,* Hawaii, June 24-28, 1985 (T. W. Hansch and Y. R. Shen, Eds., Springer-Verlag, 1985), pp. 20-21.

20. C. E. Wieman, S. Gilbert, R. Watts and M. C. Noecker, "Atomic parity violation using the crossed beam interference technique," *in Laser Spectroscopy VII, Proceedings of the Seventh International Conference, Hawaii*, June 24-28, 1985 (T. W. Hansch and Y. R. Shen, Eds., Springer-Verlag, 1985), pp. 37-40.

21. S. L. Gilbert, M. C. Noecker, R. N. Watts and C. E. Wieman, "Measurement of parity

nonconservation in atomic cesium," Phys. Rev. Lett. **55**, 2680 (1985).

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23. R. N. Watts and C. E. Wieman, "Manipulating atomic velocities using diode lasers," Opt. Lett. **11**, 291 (1986).

24. S. L. Gilbert and C. E. Wieman, "Atomic-beam measurement of parity nonconservation in cesium," Phys. Rev. A **34**, 792 (1986).

25. D. E. Pritchard, E. L. Raab, V. Bagnato, R. N. Watts and C. E. Wieman, "Light traps using spontaneous forces," Phys. Rev. Lett. **57**, 310 (1986).

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28. D. W. Sesko and C. E. Wieman, "A high frequency Fabry-Perot phase modulator," Appl. Opt. **26**, 1663 (1987).

29. C. E. Wieman, M. C. Noecker, B. P. Masterson and J. Cooper, "Asymmetric line shapes for weak transitions in strong standing wave fields," Phys. Rev. Lett. **58**, 1738 (1987).

30. C. E. Wieman, "Parity nonconservation in atoms," (Physics News of 1986) Physics Today **40**, S.24 (1987).

31. C. E. Tanner, B. P. Masterson and C. E. Wieman, "Atomic beam collimation using a laser diode with a self-locking power-buildup cavity," Opt. Lett. **13**, 357 (1988).

32. D. Sesko, C. G. Fan and C. E. Wieman, "Production of a cold atomic vapor using diode-laser cooling," J. Opt. Soc. Am. B **5**, 1225 (1988).

33. C. E. Tanner and C. E. Wieman, "Precision measurement of the Stark shift in the $6S_{1/2} \rightarrow 6P_{3/2}$ cesium transition using a frequency-stabilized laser diode," Phys. Rev. A **38**, 162 (1988).

34. C. E. Wieman, "Parity (Quantum Mechanics)," in *1989 McGraw-Hill Encyclopedia of Science and Technology* (McGraw-Hill, 1988), 274.

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45. T. G. Walker, D. W. Sesko, C. Monroe and C. Wieman, "Collisional loss mechanisms in light-force atom traps," in *Proceedings, Sixteenth International Conference on the Physics of Electronic and Atomic Collisions,* (A. Dalgarno et al., Eds., Am. Instit. Phys., New York, 1990), pp. 593-598.

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62. S. L. Gilbert and C. E.Wieman, "Laser cooling and trapping for the masses," Optics &

Photonics News **4**, pp. 8-10 (1993).

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69. L. Young, W. Hill III, S. Sibener, S. D. Price, C. E. Tanner, C. E. Wieman and S. R. Leone, "Precision lifetime measurements of Cs $6p^2P_{1/2}$ and $6p^2P_{3/2}$ by single photon counting," Phys. Rev. A **50**, pp. 2174-2181 (1994).

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71. C. Wieman, G. Flowers and S. Gilbert, "Inexpensive laser cooling and trapping experiment for undergraduate laboratories," A. J. Phys. **63**, pp. 317-330 (1995).

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75. D. Cho, C. S. Wood, S. C. Bennett, B. P. Masterson, C. E. Tanner and C. E. Wieman "Particle astrophysics, atomic physics and gravitation," in *Proceedings 14th Moriond*

Workshop, J. Tran Thanh Van, (G. Fontaine and E. Hinds, Eds., 1995), pp. 325-329.

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84. P. A. Roos, M. Stephens and C. E. Wieman, "Laser vibrometer using optical feedback-induced frequency modulation for a single mode laser diode," Applied Optics **35**, pp. 6754-6761 (1996).

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Bose-Einstein Condensation," Phys. Rev. A **57**, pp. 2030-2036 (1998).

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