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**Major professional interests**

Random lasers, mesoscopic transport of photons, semiconductor microcavity lasers, UV photonic crystal light sources.

**Education**

Ph.D.	Stanford University	1997
	Major: Applied Physics. Minor: Electrical Engineering	
M.A.	Princeton University	Mechanical & Aerospace Engineering
		1992
B.S.	Peking University	Physics
		1990

**Predoctoral awards and fellowships**

Karel Urbanek Graduate Fellowship	1997
Zonta International Foundation Amelia Earhart Fellowship	1992
Grumman Graduate Prize	1991
Guang-Hua Fellowship	1989

**Postdoctoral recognitions**

APS DLS Distinguished Traveling Lecturer	2008
Fellow of American Physical Society	2007
Fellow of Optical Society of America	2007
Maria Goeppert-Mayer Award from American Physical Society	2006
Friedrich Wilhelm Bessel Research Award from Alexander von Humboldt Foundation	2005
Outstanding Young Researcher Award from Overseas Chinese Physics Association	2004
National Science Foundation CAREER Award	2001
Alfred P. Sloan Fellow	2000
David and Lucile Packard Fellow	1999

**Employment**

Professor of Applied Physics and Physics Yale University	Jan. 2008 – Present
Professor of Physics Northwestern University	Sept. 2007 – Dec. 2007
Associate Professor of Physics Northwestern University	Sept. 2002 – Aug. 2007
Assistant Professor of Physics Northwestern University	Sept. 1997 – Aug. 2002

**Patent**

S. Pau, H. Cao, Y. Yamamoto, "Exciton Polariton Light Emitting Diode", US Patent No.

5,877,509, 1999.

### Book and book chapters

Y. Yamamoto, F. Tassone, and H. Cao, “Semiconductor Cavity Quantum Electronics”, Springer-Verlag, 2000.

H. Cao, “Random Lasers with Coherent Feedback”, in “Optical Properties of Nanostructured Random Media”, ed. V. M. Shalaev, Springer-Verlag, 2002.

H. Cao, “Lasing in Disordered Media”, in “Progress in Optics”, ed. E. Wolf, North-Holland, vol. 45, 317-370 (2003).

H. Cao, “Lasing in Random Media,” Chap. 11 in “Tutorials in Complex Photonic Media”, ed. M. A. Noginov, M. W. McCall, G. Dewar, and N. I. Zheludev, Eds., SPIE Press, Bellingham, WA, 301–358 (2009).

### Review articles

1. H. Cao, “Lasing in Random Media”, *Waves in Random Media*, vol. 13, pp. R1-R39, June 2003.
2. H. Cao, “Random lasers: development, features, and applications”, *Opt. Photon. News*, vol. 16, pp. 24-29, Jan. 2005.
3. H. Cao, “Review on Latest developments in random lasers with coherent feedback”, *J. Phys. A: Math. Gen.*, vol. 38, pp. 10497-10535, Nov. 2005.

### Journal papers

1. C. Q. Cao, H. Cao, “The Effect of Dissipation of Plasmas on Spontaneous Radiation Intensity of Ionized Atom”, *J. Phys. B*, vol. 26, p. 3959-3973, Nov. 1993.
2. H. Cao, D. DiCicco, S. Suckewer, “Quenching A-coefficient by Photons in a Short Discharge Tube”, *J. Phys. B*, vol. 26, p. 4057-4064, Nov. 1993.
3. H. Cao, J. M. Jacobson, G. Björk, S. Pau and Y. Yamamoto, “Observation of Dressed-Exciton Oscillating Emission over a Wide Wavelength Range in a Semiconductor Microcavity”, *Appl. Phys. Lett.*, vol. 66, p. 1107-1109, Feb. 1995.
4. J. M. Jacobson, H. Cao, S. Pau, G. Björk and Y. Yamamoto, “Observation of Exciton-Polariton Oscillating Emission in a Semiconductor Microcavity”, *Phys. Rev. A*, vol. 51, p. 2542-2544, Mar. 1995.
5. S. Pau, G. Björk, J. Jacobson, H. Cao and Y. Yamamoto, “Stimulated Emission of Microcavity Dressed Exciton and Suppression of Phonon Scattering”, *Phys. Rev. B*, vol. 51, p. 7090-7100, Mar. 1995.
6. H. Cao, and C. Q. Cao, “Spontaneous Radiation by a three-level atom in a dissipative medium”, *J. Phys. B.*, vol. 28, p. 979-988, Mar. 1995.
7. S. Pau, G. Björk, J. M. Jacobson, H. Cao, and Y. Yamamoto, “Microcavity Exciton Polariton Splitting in the Linear Regime”, *Phys. Rev. B*, vol. 51, p. 14437-14447, May 1995.
8. H. Cao, G. Klimovitch, G. Björk and Y. Yamamoto, “Direct creation of excitons in a quantum well by electron resonant tunneling”, *Phys. Rev. Lett.*, vol. 75, p. 1146-1149, Aug. 1995.
9. H. Cao, G. Klimovitch, G. Björk, and Y. Yamamoto, “Theory of direct creation of quantum-well excitons by hole-assisted electron resonant tunneling”, *Phys. Rev. B*, vol. 52, p. 12184-12190, Oct. 1995.
10. G. Björk, S. Pau, J. M. Jacobson, H. Cao and Y. Yamamoto, “Excitonic Superradiance to Exciton-

- polariton Crossover and the Pole Approximation”, *Phys. Rev. B*, vol. 52, p. 17310-17320, Dec. 1995.
11. C. Q. Cao, H. Cao, and W. Long, “Multipole Radiation in an Inhomogeneous Dispersive Medium with Spherical Symmetry”, *J. Phys. B.*, vol. 28, p. 5343-5357, Dec. 1995.
  12. G. Björk, S. Pau, J. M. Jacobson, H. Cao and Y. Yamamoto, “Effect of Dephasing on Excitonic Superradiance and Exciton Cavity Polaritons”, *J. Opt. Soc. Am. B*, vol. 13, p. 1069-1077, May 1996.
  13. S. Pau, G. Björk, H. Cao, E. Hanamura, and Y. Yamamoto, “Theory of Inhomogeneous Microcavity Polariton Splitting”, *Solid State Commun.*, vol. 98, p. 781-784, June 1996.
  14. H. Cao, S. Pau, Y. Yamamoto, and G. Björk, “Exciton-Polariton Ladder in a Semiconductor Microcavity”, *Phys. Rev. B.*, vol. 54, p. 8083-8086, Sept. 1996.
  15. S. Pau, H. Cao, J. Jacobson, G. Björk, and Y. Yamamoto, “Observation of Laser-Like Transition in Microcavity Exciton Polariton System”, *Phys. Rev. A.*, vol. 54, R1789-1792, Sept. 1996.
  16. S. Pau, G. Björk, H. Cao, R. Huang and Y. Yamamoto, “LO Phonon enhanced Microcavity Polariton Emission”, *Phys. Rev. B*, vol. 55, p. R1942-1945, Jan. 1997.
  17. C. Q. Cao, H. Cao, and K. Qin, “Modification of Einstein A Coefficient in Dissipative Gas Medium”, *Phys. Lett. A*, vol. 226, p. 135-142, Feb. 1997.
  18. G. Klimovitch, G. Björk, H. Cao and Y. Yamamoto, “Selective Resonant Tunneling into Micro Cavity Exciton-Polariton State”, *Phys. Rev. B.*, vol. 55, p. 7078-7083, Mar. 1997.
  19. H. Cao, G. Klimovitch, G. Björk and Y. Yamamoto, “Tunneling Spectroscopy for Quantum Well Excitons”, *Appl. Phys. Lett.*, vol. 70, p. 1986-1988, Apr. 1997.
  20. H. Cao, S. Pau, J. M. Jacobson, G. Björk, Y. Yamamoto, and A. Imamoglu, “Transition from a Microcavity Exciton Polariton to a Photon Laser”, *Phys. Rev. A*, vol. 55, p. 4632-4635, June 1997.
  21. C. Q. Cao, W. Long, and H. Cao, “The Local Field Correction Factor for Spontaneous Emission”, *Phys. Lett. A*, vol. 232, p. 15-24, July 1997.
  22. H. Cao, S. Jiang, S. Machida, Y. Takiguchi, Y. Yamamoto, “Collapse and Revival of Exciton-Polariton Oscillation in a Semiconductor Microcavity”, *Appl. Phys. Lett.*, vol. 71, p. 1461-1463, Sept. 1997.
  23. R. Huang, H. Cao, Y. Yamamoto, “Measurement of the Intensity and Phase of Microcavity Exciton-Polariton Emission in the Linear and Nonlinear Regimes”, *Phys. Rev. B*, vol. 56, p. 9217-9220, Oct. 1997.
  24. S. Jiang, S. Machida, Y. Takiguchi, H. Cao, and Y. Yamamoto, “Wide band AC balanced homodyne detection of weak coherent pulses”, *Opt. Commun.*, vol. 145, p. 91-94, Jan. 1998.
  25. H. Cao, J. Y. Wu, H. C. Ong, J. Y. Dai, and R. P. H. Chang, “Second Harmonic Generation in Laser Ablated Zinc Oxide Thin Films”, *Appl. Phys. Lett.*, vol. 73, p. 572-574, Aug. 1998.
  26. S. Jiang, S. Machida, Y. Takiguchi, Y. Yamamoto, and H. Cao, “Direct time-domain observation of transition from strong to weak coupling in a semiconductor microcavity”, *Appl. Phys. Lett.*, vol. 73, p. 3031-3033, Nov. 1998.
  27. H. Cao, Y. G. Zhao, H. C. Ong, S. T. Ho, J. Y. Dai, J. Y. Wu, and R. P. H. Chang, “Ultraviolet Lasing in Resonators Formed by Scattering in Semiconductor Polycrystalline Films”, *Appl. Phys. Lett.*, vol. 73, p. 3656-3658, Dec. 1998.
  28. H. Cao, Y. Zhao, S. T. Ho, E. W. Seelig, Q. H. Wang, R. P. H. Chang, “Random Laser Action in Semiconductor Powder”, *Phys. Rev. Lett.*, vol. 82, p. 2278-2281, Mar. 1999.

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31. C. Q. Cao, and H. Cao, "Line Profile and Additional Broadening in a Dissipative Medium", *J. Opt. B: Quantum Semiclass Opt.*, vol. 1, p. 325-331, June 1999.
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35. H. Cao, J. Y. Xu, S.-H. Chang, and S. T. Ho, "Transition from Amplified Spontaneous Emission to Laser Action in Strongly Scattering Media", *Phys. Rev. E.*, vol. 61, p. 1985-1989, Feb. 2000.
36. Y. X. Liu, C. Q. Cao, H. Cao, "Effect of the exciton-exciton interaction on resonance fluorescence of excitons in a quantum well", *Phys. Rev. A.*, vol. 61, p. 23,802-23,808, Feb. 2000.
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40. H. Cao, J. Y. Xu, W. H. Xiang, Y. Ma, S.-H. Chang, S. T. Ho, and G. S. Solomon, "Optically Pumped InAs Quantum Dot Microdisk Lasers", *Appl. Phys. Lett.*, vol. 76, p. 3519-3521, June 2000.
41. G. T. Kiehne, M. Z. Lin, G. Wang, W. H. Xiang, H. Cao, J. B. Ketterson, "A pulser for Medium-Frequency Modulated Direct-current Reactive Sputter Deposition of Insulators", *Rev. Sci. Instrum.*, vol. 71, p. 2560-2562, June 2000.
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44. H. Cao, Y. Ling, J. Y. Xu, C. Q. Cao, and P. Kumar, "Photon Statistics of Random Lasers with Resonant Feedback", *Phys. Rev. Lett.*, vol. 86, p. 4524-4527, May 2001.
45. K. J. Luo, J. Y. Xu, H. Cao, Y. Ma, S. H. Chang, S. T. Ho, and G. S. Solomon, "Ultrafast dynamics of InAs/GaAs quantum-dot microdisk lasers", *Appl. Phys. Lett.*, vol. 78, pp. 3397-3399, May 2001.
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50. J. K. Wei, W. Long, C. Q. Cao, and H. Cao, “Quantum stochastic trajectory theory of a microsuperradiant laser”, *Phys. Lett. A*, vol. 291, pp. 208-214, Dec. 2001.
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57. S.-H. Chang, H. Cao, and S.T. Ho, “Cavity Formation and Light Propagation in Partially Ordered and Completely Random One-Dimensional Systems”, *IEEE J. Quant. Electron.*, vol. 39, pp. 364-374, Feb. 2003.
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- structure in small clusters of spherical particles”, *Phys. Rev. B.*, vol. 68, 085111, Aug. 2003.
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  82. C. Q. Cao, X. W. Fu, and H. Cao, “Non-Markovian theory of relativistic electric-dipole spontaneous emission of hydrogen-like atoms”, *J. Opt. B: Quantum Semiclass. Opt.* vol. 7, pp. 43-53, Jan. 2005.

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