

*Curriculum Vitae*  
**Charles A. Brau**

PERSONAL HISTORY

Born on November 4, 1938; Married ; three children

DEGREES AWARDED

BEP. Cornell University (Engineering Physics), Ithaca, NY	1961
A.M. Harvard University (Engineering), Cambridge, MA	1962
Ph.D. Harvard University (Physics), Cambridge, MA	1964

HONORS and AWARDS

Tau Beta Pi Association	
Sigma Xi	
William Streifer Award for Scientific Achievement (IEEE Lasers and Electro-optics Society)	1995
FEL Prize (Free-electron Laser Conference)	1996

RESEARCH AREAS

Molecular Physics

Nonequilibrium statistical mechanics of gases with internal degrees of freedom. (theoretical). Transfer of vibrational energy from N<sub>2</sub> to CO<sub>2</sub> in CO<sub>2</sub> lasers (theoretical). Dissociative attachment of electrons in F<sub>2</sub>, Cl<sub>2</sub>, HCl, and air (experimental) Spectra of the rare-gas halides, laser action of XeF, MrF, XeCl<sub>2</sub>, and I<sub>2</sub>

Free-electron Lasers

Directed the free-electron laser program at Los Alamos; tapered wigglers, coherent harmonics, gain guiding, energy recovery, laser acceleration, and photoelectric rf injectors (experimental). Directed the W. M. Keck Foundation Free-electron Laser Center at Vanderbilt University; tunable from about 2 to 9  $\mu\text{m}$ ; over 2000 hours of beam time per year to the users; monochromatic X-rays tunable over 14-20 keV (experimental).

Current Research:

Development of extremely high-brightness electron beams using photoelectric field emission; Čerenkov FEL's operating in the far infrared (50-250  $\mu\text{m}$ ). Compton FEL's operating in the ultraviolet (80-400 nm) (experimental)

APPOINTMENTS:

Senior Research Staff Scientist	1965-70
Avco Everett Research Laboratory, Everett, MA	
NATO Postdoctoral Fellow, Kamerlingh-Onnes Laboratory, Leiden, The Netherlands	1970-71

Senior Research Staff Scientist Avco Everett Research Laboratory, Everett, MA	1971-76
Program Manager, Free-Electron Laser, Los Alamos National Laboratory, Los Alamos, NM	1976-87
Sabbatical Leave, Quantum Institute, University of California, Santa Barbara, CA	1987-88
Visiting Scientist, Department of Nuclear Physics Oxford University, Oxford, England	1988
Professor of Physics, Vanderbilt University, Nashville, TN	1988-
Director of the Free-Electron Laser Center, Vanderbilt University, Nashville, TN	1988-95

## Publications

- [1] C. A. Brau. *Free-Electron Lasers*. Academic Press, Boston, MA, 1990.
- [2] C. A. Brau, S. F. Jacobs, and M. O. Scully, editors. *Free-Electron Generators of Coherent Radiation*, Bellingham, WA, 1984. International Society for Optical Engineering. SPIE Vol. 453.
- [3] C. A. Brau. Free electron lasers. *Science*, 239:1115, 1988.
- [4] F. E. Carroll, J. W. Waters, R. H. Traeger, M. H. Mendenhall, W. W. Clark, and C. A. Brau. Production of tunable, monochromatic, X-rays by the Vanderbilt free-electron laser. In *LASE'99*. SPIE, 1999.
- [5] Frank E. Carroll, James W. Waters, Ronald R. Price, Charles A. Brau, Carlton F. Roos, Norman H. Tolk, David R. Pickens, Perry A. Tompkins, and W. Hoyt Stephens. Near-monochromatic X-ray beams produced by the free electron laser and compton backscatter. *Investigative Radiology*, 25:465–471, 1990.
- [6] C. A. Brau. The Vanderbilt University free-electron center. *Nucl. Instrum. & Methods A*, 319:47, 1992.
- [7] F. Amirmahdi, C. Brau, M. Mendenhall, J. R. Engholm, and U. Happek. Electron bunch length measurements at the Vanderbilt FEL. *Nucl. Instrum. & Methods A*, 375:427, 1996.
- [8] C. A. Brau. Needle cathodes as sources of high-brightness electron beams. In R. Bonifacio and W. Barletta, editors, *Towards X-Ray Free-Electron Lasers*, page 277, Woodbury, NY, 1997. AIP.