

# Karl A. van BIBBER

January 2024

## Education

B.S. Physics MIT (1972)  
B.S. Mathematics MIT (1972)  
Ph.D. Physics MIT (1976)

## Employment

2022-2023 Chairman, Department of Nuclear Engineering, UC Berkeley  
2019-2022 Executive Associate Dean, College of Engineering, UC Berkeley  
2017-2022 Associate Dean for Research, College of Engineering, UC Berkeley  
2012- University of California Berkeley, Professor & Chairman, Nuclear Engineering Faculty, Nuclear Science Division, Lawrence Berkeley National Laboratory  
2012-2017 Executive Director, Nuclear Science & Security Consortium (DOE Center of Excellence)  
2009-2012 Naval Postgraduate School, Vice President & Dean of Research  
1985-2008 Lawrence Livermore National Laboratory  
1985-91 Senior Physicist, E-Div.  
1991-01 Group Leader for High Energy Physics & Accelerator Technology  
1993-99 LLNL Project Leader, SLAC-LBNL-LLNL PEP-II B Factory  
2001-02 Chief Scientist, Physics & Advanced Technologies  
2002-07 Deputy Director, Laboratory Science and Technology Office  
2002-07 Deputy Director Laboratory Directed R&D Program  
2007-08 Chief Scientist, Physical & Life Sciences Directorate  
1980-1985 Stanford University, Assistant Professor of Physics  
1977-1979 Lawrence Berkeley National Laboratory, Postdoctoral Researcher  
1977-1978 University of California Berkeley, Lecturer, Dep't. of Nuclear Engineering  
1976-1977 MIT, Instructor, Department of Physics

## Professional Societies

Fellow, American Physical Society  
Fellow, American Association for the Advancement for Science  
Member, American Nuclear Society

## Professional Recognition

Shankar Sastry Chair of Leadership and Innovation, UC Berkeley (2019-22)  
Navy Superior Civilian Service Award (2012)  
Elected Fellow of the American Association for the Advancement of Science (2007), *"For distinguished contributions to the field of astrophysics and particle accelerator physics, particularly for efforts in the dark matter axion search"*  
*"Karl van Bibber Physics Postdoctoral Research Fellowships"* endowed at Stanford University *Five endowed 2005 by anonymous industrialist donor*  
Elected APS Fellow 2001, *"For his leadership in an ultra-sensitive search for dark-matter axions, and the conception of other elegant experiments for detection of the axion"*  
DOE Deputy Secretary's Award for the B Factory, *on behalf of the LLNL team*, (2000)  
LLNL S&T Award, *with BaBar team for discovery of CP-violation in the B-Meson System* (2002)  
LLNL Director's Distinguished Performance Award for the B Factory (1997)  
Alfred P. Sloan Research Fellowship (1982)  
Phi Beta Kappa (1972)

## Research Activities

Nuclear Physics  
Particle Physics  
Particle Astrophysics  
Nuclear Instrumentation  
Accelerator Science & Technology

## Professional Service *(selected)*

MIT Corporation Visiting Committee - Nuclear Science and Engineering Department, Member (2019 - )  
High Energy Physics Advisory Panel (DOE-NSF, 2015-2018)  
Chair, UC Davis Department of Physics, External Advisory Committee (2018 - )  
Chair, University of Florida, Nuclear Engineering Review Committee (2017)  
Chair, University of Illinois, NPRES Department Review Committee (2014)  
National Ignition Facility (NIF) Discovery Science Technical Review Committee (2017 - )  
Fusion Energy Sciences Advisory Committee (DOE), Strategic Planning Subcommittee (2014)  
Member, Chair\*, Nuclear & Particles Futures Capability Review, LANL (2006, 2010, 2014\*, 2018\*, 2021\*, 2022, 2023)  
Selection Committee, LLNL Director (2014)  
Member, External Advisory Committee, High Energy Program, Université Blaise Pascal, Clermont-Ferrand  
Member, Board of Directors, John & Fannie Hertz Foundation (2011-2014)  
Hertz Foundation Graduate Fellowship Selection Committee (2006-2017)  
Member, Board of Directors, US-Singapore Temesek Defence Sciences Institute (2009-2012)  
Edward Teller Centennial Symposium, Chair, Organizing Committee (2008)  
Executive Committee, Amer. Phys. Soc., CA-NV Section (2008-2011), Chair (2010)  
European Commission VI<sup>th</sup> & VII<sup>th</sup> Framework Program Expert Panel (2002-2011)  
National Science Foundation review panels, multiple (2000-present)  
Department of Energy review panels, multiple (2000-present)  
Lawrence Livermore National Laboratory, Directorate Review Committees, multiple (2012-2014)  
Los Alamos National Laboratory, Chair Capability Review Panels, multiple (2002-present)  
Member, Editorial Board, *The SLAC Beam Line* (1997-2000)  
Member, Board of Directors, Wang NMR, Inc. (1997- 2002)  
Member, SLAC Users Organization Executive Committee (1990-1993)  
Chairman, Executive Committee, LBNL 88" Cyclotron Users Group (1983-1985)  
Phi Beta Kappa Executive Council, Stanford University (1983-1985, President 1984-1985)  
APS Division of Nuclear Physics Program Committee (1980-1982)

## Previous M.S. & Ph.D. students

Prof. Keith Griffioen	(Ph.D. 1984)	<i>Department of Physics, College of William &amp; Mary</i>
Dr. Peter Countryman	(Ph.D. 1988)	<i>Synarc, San Francisco</i>
Dr. S. Darin Kinion	(Ph.D. 2001)	<i>Lawrence Livermore National Laboratory</i>
Dr. Cameron Bates	(Ph.D. 2015)	<i>Los Alamos National Laboratory</i>
Dr. Lucas Brouwer	(Ph.D. 2015)	<i>Lawrence Berkeley National Laboratory</i>
LtJG Austin Lo	(M.S. 2015)	<i>US Navy Nuclear Propulsion Program</i>
Dr. Alexandra Asghari	(Ph.D. 2016)	<i>Exponent, Inc.</i>
Mr. Jaben Root	(M.S. 2016)	<i>Lawrence Livermore National Laboratory</i>
Dr. Patricia Schuster	(Ph.D. 2016)	<i>Intel Corporation</i>
Dr. David Weisz	(Ph.D. 2016)	<i>Lawrence Livermore National Laboratory</i>
Dr. Cory Waltz	(Ph.D. 2016)	<i>Lawrence Livermore National Laboratory</i>
Dr. Albert Yuen	(Ph.D. 2016)	<i>San Francisco startup</i>
Dr. Laurence Lewis	(Ph.D. 2018)	<i>National Nuclear Security Administration</i>
Prof. Nnaemeka Nnamani	(Ph.D. 2019)	<i>Rochester Institute of Technology, NTID</i>
Dr. Mauricio Ayllon Unzueta	(Ph.D. 2019)	<i>NASA Goddard Space Flight Center (April 2020)</i>
Dr. Maria Simanovskaia	(Ph.D. 2020)	<i>Stanford University, Department of Physics</i>
Prof. Samantha Lewis	(Ph.D. 2020)	<i>Wellesley College</i>
Dr. Saad Al Kenany	(Ph.D. 2021)	<i>Lawrence Berkeley National Laboratory</i>

## Current doctoral students & postdocs

Alex Droster  
Heather Jackson  
Mackenzie Wooten  
Aya Keller  
Kwangchae Im  
Drake Brewster  
Dajie Sun (postdoc)  
Johny Echevers (postdoc)

## Publications & Patents

Published more than 160 peer-reviewed articles, edited nine books, awarded one patent.

## Karl van Bibber

Bibliography (January 2024)

<https://orcid.org/0000-0002-1702-1292>

### Patents & Disclosures

Proton Radiography Based on Near-Threshold Cerenkov Radiation, K. van Bibber, F.S. Dietrich, U.S. Patent No. 6,518,580, February 11, 2003

Energy and Efficiency Calibration of Gamma Ray Detectors, David U.L. Yu, Karl A. van Bibber, Lee A. Bernstein, Invention Rpt. No. 4275101-18-0001, DOE S-no. T-116250, Docket no. 18-0001 (2018)

### Publications in Refereed Journals etc.

#### *Books & Book Chapters*

9. Microwave Cavity Searches, in “The Search for Ultralight Bosonic Dark Matter”, Maria Simanovskaia, Karl van Bibber and Gianpaolo Carosi, Springer, October 2022
8. The Search for Ultralight Bosonic Dark Matter, Ed. Derek F. Jackson Kimball, Karl van Bibber, Springer (refereed graduate textbook), Springer, October 2022
7. Microwave Cavities and Detectors for Axion Research – Proceedings of the 2<sup>nd</sup> International Workshop, eds. Gianpaolo Carosi, Gray Rybka, Karl van Bibber, Springer Proc. in Physics 211 (2018)
6. A Cryogenic Axion Dark Matter Experiment (ADMX/ADMX-HF), Gianpaolo Carosi, Karl van Bibber, *Low Temperature Materials and Mechanisms* (Ch.12), CRC Press, Taylor & Francis (2016)
5. The Atom of the Universe: The Life and Work of Georges Lemaître (2015), Dominique Lambert, ed. K. van Bibber
4. Proceedings of the Centennial Symposium on the Scientific Legacy of Edward Teller (May 28, 2008), ed. Stephen B. Libby, K. van Bibber
3. Proceedings of the Workshop “Axions 2010” (January 15-17, 2010; Gainesville, FL), ed. David B. Tanner, K. van Bibber
2. Microwave Cavity Searches, Gianpaolo Carosi and Karl van Bibber, in “Axions: Theory, Cosmology, and Experimental Searches”, Lecture Notes in Physics 741, Springer (2008), eds. Markus Kuster, Georg Raffelt and Berta Beltran
1. Streamer Chambers for Heavy Ions; Karl van Bibber, Andres Sandoval, Heavy Ion Science, Vol. VII, 333, D.A. Bromley, ed., Plenum Press, (1985)

#### *Particle Astrophysics and Cosmology*

59. Tunable wire metamaterials for an axion haloscope, N. Kowitt, R. Balafendiev, D. Sun, M. Wooten, A. Droster, M.A. Gorchak, K. van Bibber, P.A. Belov, Phys. Rev. Applied 20 (2023) 044051, arXiv:2306.15734v1
58. On the use of dielectrics in axion searches with microwave cavities, X. Bai *et al.*, Journal of Instrumentation 18 (2023) P07017, arXiv:2304.06562
57. Electromagnetic modeling and science reach of DMRadio-m<sup>3</sup>, A. AlShirawi *et al.*, arXiv: 2302.14084
56. New Results from HAYSTAC’s Phase II Operation with a Squeezed State Receiver, M.J. Jewell, A.F. Leder, *et al.*, Physical Review D 107 (2023) 072007; arXiv:2301.09721

55. Searching for Dark Matter with Plasma Haloscopes, Alexander J. Millar *et al.*, Physical Review D 107 (2023) 055013
54. Exploration of Wire Array Metamaterials for the Plasma Axion Haloscope, M. Wooten, A. Droster, A. Kenany, D. Sun, S.M. Lewis, and K. van Bibber, Annalen der Physik 2200479 (2023), arXiv:2203.13945v3
53. Introducing DMRadio-GUT, a search for GUT-scale QCD axions, L. Brouwer, *et al.*, <https://arxiv.org/pdf/2203.11246.pdf>, Physical Review D 106 (1 December 2022 online)
52. DMRadio-m<sup>3</sup>: A Search for the QCD Axion Below 1  $\mu\text{eV}$ , L. Brouwer, *et al.*, Physical Review D 106 (2022) 103008, arXiv:2204.13781
51. A Model-Independent Radio Telescope Search for Dark Matter, Aya Keller, Sean O'Brien, Adyant Kamdar, Nicholas Rapidis, Alexander Leder, Karl van Bibber, Astrophysics Journal 927 (2022) 71; arXiv:2112.03439
50. A Quantum-Enhanced Search for Dark Matter Axions, K.M. Backes, D. Palken *et al.*, Nature 590 (2021) 238, arXiv:2008.01853
49. A Symmetric Multi-rod Tunable Microwave Cavity for the HAYSTAC Dark Matter Axion Search, Maria Simanovskaia, Alex Droster, Heather Jackson, Isabella Urdinaran, Karl van Bibber, Reviews of Scientific Instruments 92 (2021) 033305, arXiv:2006.01248
48. An improved analysis framework for axion dark matter searches, D. Palken *et al.*, Phys. Rev. D 101 (2020) 123011, arXiv 2003.08510
47. Characterization of the HAYSTAC axion dark matter search cavity using microwave measurement and simulation techniques, Nicholas M. Rapidis, Samantha M. Lewis, Karl A. van Bibber, Review of Scientific Instruments 90(2) (2019) 024708, Editor's Pick; arXiv:1809.02246
46. Putting the Squeeze on the Axion, Karl van Bibber, Konrad Lehnert and Aaron Chou, Physics Today, June, 2019
45. Results from phase 1 of the HAYSTAC microwave cavity axion experiment, L. Zhong *et al.*, Physical Review D 97 (2018) 092001, arXiv:1803.03690
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43. Design and operational experience of a microwave cavity axion detector in the 20–100  $\mu\text{eV}$  range, S. Al Kenany *et al.*, Nucl. Instr. Meth. Res. Sec. A 854 (2017) 11, arXiv:1611.07123
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39. Cavity design for high-frequency axion dark matter detectors, I. Stern, A.A. Chisholm, J. Hoskins, P. Sikivie, N.S. Sullivan, D.B. Tanner, G. Carosi, K. van Bibber, Rev. Sci. Instr. 86 (2015) 123305

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37. Experimental Searches for Axions and Axion-Like Particles, Peter W. Graham, Igor I. Irastorza, Steven K. Lamoreaux, Axel Lindner, Karl A. van Bibber, *Annual Reviews of Nuclear and Particle Science* 65 (2015) 485, arXiv:1602:00039
36. Future Directions in the Microwave Cavity Search for Dark Matter Axions, T.M. Shokair *et al.*, *International Journal of Modern Physics A* 29, No. 19 (2014), arXiv:1405.3685
35. Conceptual Design of the International Axion Observatory (IAXO), E. Armengaud *et al.* (the IAXO Collaboration), *Journal of Instrumentation* 9 (2014) T05002, arXiv:1401.3233
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20. First Limits on the 3-200 keV X-ray Spectrum of the Quiet Sun using RHESSI, I.G. Hannah, G.J. Hurford, H.S. Hudson, R.P. Lin, K. van Bibber, *Astrophysical Journal Letters*, 659: L77-L80 (2007)

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11. Experimental Constraints on the Axion Dark Matter Halo Density, S. Asztalos *et al.*, *The Astrophysical Journal*, 571:L27-L30 (2002)
10. A Large-Scale Microwave Cavity Search for Dark-Matter Axions, S. Asztalos *et al.*, *Phys. Rev. D* 64 (2001) 092003
9. Searches for Invisible Axions, L. Rosenberg and K. van Bibber, *Physics Reports* 325, no. 1, pp 1-39 (2000)
8. Cryogenic Cavity Detector for the Large-Scale Dark-Matter Axion Search, S. Asztalos *et al.*, *Nucl. Instr. and Meth. A* 444, No. 3, p. 21 (2000)
7. Overview of Experimental Limits on Light Axions, C. Hagmann, K. van Bibber, L.J. Rosenberg, *Review of Particle Properties (Particle Data Group Mini-Review)*, D. Groom *et al.*, *Euro. Phys. J.*, vol. C15, (2000) 1
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5. Searching for Dark Matter Axions, L.J. Rosenberg and K. van Bibber, *Stanford Linear Accelerator Beam Line*, Vol. 27 No. 3, p. 3 (1997)
4. A next-generation cavity microwave experiment to search for dark matter axions, K. van Bibber *et al.*, *Int'l J. of Mod. Phys.* 3 (1995) 33
3. A Large Scale Dark-Matter Axion Search, D.M. Moltz *et al.*, *IEEE Nuclear Science Symposium and Medical Imaging Conference*, pp. 412-416 (1993)
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1. An Experiment to Produce and Detect Light Pseudoscalars, K. van Bibber, N. Dagdeviren, S. Koonin, A.K. Kerman, H.N. Nelson *Phys. Rev. Lett.* 59, 759 (1987)

## *Nuclear Physics*

51. An Integral Experiment on Polyethylene Using Radiative Capture in Indium Foils in a High Flux D-D Neutron Generator, N. Nnamani, K. van Bibber, L.A. Bernstein, J. Vujic, J. Morrell, (*Accepted for publication in Nuclear Science and Engineering, May 2020*)
50. Possible Evidence of Non-statistical Properties in the  $^{35}\text{Cl}(n,p)^{35}\text{S}$  Cross Section, J. C. Batchelder *et al.*, *Phys. Rev. C* 99 (2019) 044612.
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36. Momentum-Transfer Dependence of Nuclear Transparency from the Quasi-Elastic  $^{12}\text{C}(e,e'p)$  Reaction, N.C.R. Makins *et al.*, *Phys. Rev. Lett.* 72(13):1986 (1994)
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32. Neutron Decay from Isoscalar Giant Resonances in  $^{238}\text{U}$ , P.J. Countryman, *et al*, Phys. Rev. C41, 1039 (1990)
31. Measurement of the Proton Elastic Form Factors for  $Q^2=1-3$  (GeV/c) $^2$ , R.C. Walker *et al*, Phys. Lett. 224B, 353 (1989); *ibid.* 240B, 522 (1990)
30. Transition Radii and Sum Rules in (e,e'f), K.A. Griffioen, K. van Bibber, J.R. Calarco, Phys. Rev. Lett. 62 (C), 689 (1989)
29. Precision measurement of  $R = \sigma_L/\sigma_T$  and  $F_2$  in deep-inelastic electron scattering, S. Dasu *et al*, Phys. Rev. Lett. 61, 1061 (1988)
28. Measurements of Transverse Quasielastic Electron Scattering from the Deuteron at High Momentum Transfers, R.G. Arnold *et al*, Phys. Rev. Lett. 61, 806 (1988)
27. Measurement of the difference in  $R = \sigma_L/\sigma_T$  and of  $\sigma^A/\sigma^D$  in deep-inelastic e-D, e-Fe, and e-Au scattering, S. Dasu *et al*, Phys. Rev. Lett. 60, 2591 (1988)
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25. Fragmentation of  $^{16}\text{O}$  Projectiles at 100 MeV per Nucleon, J.D. Silk *et al*, Phys. Rev. C37, 158 (1988)
24. Deuteron Magnetic Form-Factor Measurements at High Momentum Transfer, R.G. Arnold, *et al*, Phys. Rev. Lett. 58, 1723 (1987)
23. Coincidence Electrofission of  $^{238}\text{U}$  at  $q \sim 0.26, 0.40, \text{ and } 0.55 \text{ fm}^{-1}$ , K.A. Griffioen, P.J. Countryman, K.T. Knopfle, K. Van Bibber, M.R. Yearian, J.G. Woodworth, D. Rowley, J.R. Calarco, Phys. Rev. C34, 1375 (1986)
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21. The Inclusive Electrofission of Uranium from 40 - 120 MeV, J.G. Woodworth, D. Rowley, J.D.T. Arruda-Neto, P.J. Countryman, K.A. Griffioen, D.H.H. Hoffmann, K.T. Knopfle, K. van Bibber, M.R. Yearian, J.R. Calarco, Phys. Lett. 153B, 226 (1985)
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19. Intermediate Structure in the  $^{16}\text{O} + ^{16}\text{O}$  System; D. Pocanic, K. Van Bibber, J.S. Dunham, W.A. Seale, F. Sperisen, S.S. Hanna, Phys. Rev. C30, 1520 (1984)
18. Structure in the  $^{12}\text{C} + ^{12}\text{C}$  and  $^8\text{Be} + ^{16}\text{O}$  Fission Width Distribution of  $^{24}\text{Mg}$  observed via the  $^{12}\text{C}(^{16}\text{O},\alpha)^{24}\text{Mg}^* \rightarrow X + Y$ ; A.J. Lazzarini, S.G. Steadman, R.J. Ledoux, A. Sperduto, G.R. Young, K. Van Bibber, E.R. Cosman, Phys. Rev. C27, 1550 (1983)



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