

Curriculum Vitae - **Kenneth B. Bader, Ph.D.**



CONTACT INFORMATION

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ACADEMIC APPOINTMENTS

2005-2006 Graduate Teaching Assistant, Department of Physics, University of Mississippi, Oxford, MS
2006-2011 Graduate Research Assistant, Department of Physics, University of Mississippi, Oxford, MS
2011-2016 Postdoctoral Fellow, Department of Internal Medicine, University of Cincinnati
2016- Assistant Professor, Department of Radiology, University of Chicago

Ph.D.-Granting Committee, Program, Institute, and Center Appointments

2016- Committee on Medical Physics
2017- Associate Member, University of Chicago Comprehensive Cancer Center

ACADEMIC TRAINING

2000-2005 B.S., Department of Physics. Grand Valley State University, Allendale, MI
2005-2007 M.A., Department of Physics. University of Mississippi, Oxford, MS
2007-2011 Ph.D., Department of Physics. University of Mississippi, Oxford, MS
2011-2016 Postdoctoral Fellow, Department of Internal Medicine, University of Cincinnati, Cincinnati, OH

SCHOLARSHIP

(a) Peer-reviewed publications in the primary literature, exclusive of abstracts:

1. Samuel A. Hendley, Viktor Bollen, Jonathan Paul, and **Kenneth B. Bader**, "In vitro assessment of histotripsy liquefaction with passive cavitation imaging in elastic media," *Physics in Medicine and Biology* **64**(14): Article Number 145019, 2019. doi: 10.1088/1361-6560/ab25a6
2. **Kenneth B. Bader**, Samuel A. Hendley, Gregory J. Anthony, Viktor Bollen, "Observation and modulation of the dissolution of histotripsy-induced bubble clouds with high frame rate plane wave imaging," *Physics in Medicine and Biology* **64**(11): Article Number 115012. doi: 10.1088/1361-6560/ab1a64
3. Gregory J. Anthony, Viktor Bollen, Tatjana Antic, Steffen Sammet, and **Kenneth B. Bader**, "Assessment of histotripsy-induced liquefaction with diagnostic ultrasound and magnetic resonance imaging *in vitro* and *ex vivo*," *Physics in Medicine and Biology* **64**(9): Article Number 095023, 2019. doi: 10.1088/1361-6560/ab143f
4. **Kenneth B. Bader**, Eli Vlasisavljevich, Adam D. Maxwell, "For whom the bubble grows: Histotripsy bubble dynamics," *Ultrasound in Medicine and Biology* **45**(5): 1056-1080, 2019. doi: 10.1060/j.ultrasmedbio.2018.10.035
5. Gregory J. Anthony, **Kenneth B. Bader**, James Wang, Marta Zamora, Allison Ostdiek, Tatjana Antic, Sascha Krueger, Steffen Weiss, William C. Trogler, Sarah L. Blair, Andrew C. Kummel, Steffen Sammet, "MRI-guided transurethral insonation of silica-shelled phase-shift emulsions in the prostate with an advanced navigation platform," *Medical Physics* **46**(2): 774-788, 2019. doi: 10.1002/mp.13279.
6. **Kenneth B. Bader** and Viktor Bollen, "The influence of gas diffusion on bubble persistence in shock-scattering histotripsy," *Journal of the Acoustical Society of America*, **143**(6): EL481-EL486, 2018. doi: 10.1121/1.5043081

7. **Kenneth B. Bader**, "The influence of medium elasticity on the prediction of histotripsy-induced bubble expansion and erythrocyte viability," *Physics in Medicine and Biology*, **63**(9): Article Number 095010, 2018. doi: 10.1088/1361-6560/aab79b
8. **Kenneth B. Bader**, Kevin J. Haworth, Christy K. Holland, "Post hoc analysis of passive cavitation imaging for classification of histotripsy-induced liquefaction *in vitro*," *IEEE Transactions on Medical Imaging*, **37**(1): 106-115, 2018. doi: 10.1109/TMI.2017.2735238
9. Himanshu Shekhar, **Kenneth B. Bader**, Shenwen Huang, Tao Peng, Shaoling Huang, David D. McPherson, Christy K. Holland, "In vitro thrombolytic efficacy of echogenic liposomes loaded with tissue plasminogen activator and octafluoropropane gas," *Physics in Medicine and Biology*, **62**(2): 517-538, 2017. doi: 10.1088/1361-6560/62/2/517
10. Kevin J. Haworth, **Kenneth B. Bader**, Kyle T. Rich, Christy K. Holland, T. Douglas Mast, "Quantitative frequency-domain passive cavitation imaging," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, **64**(1): 177-191, 2017. doi: 10.1109/TUFF.2016.2620492
11. **Kenneth B. Bader**, Kevin J. Haworth, Himanshu Shekhar, Adam D. Maxwell, Tao Peng, David D. McPherson, Christy K. Holland, "Efficacy of histotripsy combined with rt-PA *in vitro*," *Physics in Medicine and Biology*, **61**(14): 5253-5274, 2016. doi: 10.1088/0031-9155/61/14/5253
12. **Kenneth B. Bader**, Michael J. Crowe, Jason L. Raymond, Christy K. Holland, "The effect of frequency-dependent attenuation on predicted histotripsy waveforms in tissue mimicking phantoms," *Ultrasound in Medicine and Biology*, **42**(7): 1701-1705, 2016. doi: 10.1016/j.ultrasmedbio.2016.02.010
13. **Kenneth B. Bader**, Christy K. Holland, "Predicting the growth of nanoscale nuclei by histotripsy pulses," *Physics in Medicine and Biology*, **61**(7): 2947-2966, 2016. doi: 10.1088/0031-9155/61/7/2947
14. **Kenneth B. Bader**, Guillaume Bouchoux, Christy K. Holland, Tao Peng, Melvin E. Klegerman, David D. McPherson, "Thrombolytic efficacy and enzymatic activity of rt-PA-loaded echogenic liposomes," *Journal of Thrombosis and Thrombolysis* **40**(2): 144-155, 2015. doi: 10.1007/s11239-015-1204-8
15. **Kenneth B. Bader**, Matthew J. Gruber, Christy K. Holland, "Shaken and stirred: Mechanisms of ultrasound-enhanced thrombolysis," *Ultrasound in Medicine and Biology* **41**(1): 187-196, 2015. doi: 10.1016/j.ultrasmedbio.2014.08.018
16. Matthew J. Gruber, **Kenneth B. Bader**, Christy K. Holland, "Cavitation thresholds of contrast agents in an *in vitro* human clot model exposed to 120-kHz ultrasound," *Journal of the Acoustical Society of America* **135**(2): 646-653, 2014. doi: 10.1121/1.4843175
17. Jason L. Raymond, Kevin J. Haworth, **Kenneth B. Bader**, Kirthi Radhakrishnan, Joseph K. Griffin, Shao-Ling Huang, David D. McPherson, Christy K. Holland, "Broadband attenuation measurements of phospholipid-shelled ultrasound contrast agents," *Ultrasound in Medicine and Biology* **40**(2): 410-421, 2014. doi: 10.1016/j.ultrasmedbio.2013.09.018
18. Kirthi Radhakrishnan, **Kenneth B. Bader**, Kevin J. Haworth, Jonathan A. Kopechek, Jason L. Raymond, Shao-Ling Huang, David D. McPherson, Christy K. Holland, "Relationship between cavitation and loss of echogenicity from ultrasound contrast agents," *Physics in Medicine and Biology* **58**(18): 6541-6563, 2013. doi: 10.1088/0031-9155/58/18/6541
19. **Kenneth B. Bader**, Christy K. Holland, "Gauging the likelihood of stable cavitation from ultrasound contrast agents," *Physics in Medicine and Biology* **58**(1): 127-144, 2013. doi: 10.1088/0031-9155/58/1/127

20. Guillaume Bouchoux, **Kenneth B. Bader**, Joseph J. Korfhagen, Jason L. Raymond, Shivashankar Ravishankar, Todd A. Abruzzo, Christy K. Holland, "Experimental validation of a finite-difference model for the prediction of transcranial ultrasound fields based on CT images." *Physics in Medicine and Biology* **57**(23): 8005-8022, 2012. doi: 10.1088/0031-9155/57/23/8005
21. **Kenneth B. Bader**, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "The effect of static pressure on the strength of inertial cavitation events," *Journal of the Acoustical Society of America* **132**(4): 2286-2291, 2012. doi: 10.1121/1.4750494
22. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "The effect of static pressure on the inertial cavitation threshold," *Journal of the Acoustical Society of America* **132**(2): 728-737, 2012. doi: 10.1121/1.4733539

(b) Peer-reviewed works in 'non-traditional' outlets:

No works in non-traditional outlets

(c) Peer-reviewed works accepted or in press

1. Viktor Bollen, Samuel A. Hendley, Jonathan D. Paul, Adam D. Maxwell, Kevin J. Haworth, Christy K. Holland, **Kenneth B. Bader**, "In vitro thrombolytic efficacy of single- and five-cycle histotripsy pulses and rt-PA," *Ultrasound in Medicine and Biology* (In Press).

(d) Non-peer-reviewed original articles

1. **Kenneth B. Bader**, Paul G. Severino, Samuel A. Hendley, Gregory A. Anthony, Viktor Bollen, "High Frame Rate Imaging to Enhance the Dissolution of Histotripsy-Induced Bubble Clouds," *Proceedings of the IEEE International Ultrasonic Symposium*, Glasgow, UK, October 2019. (In Press)
2. **Kenneth B. Bader**, Christy Holland, "Development of a hybrid finite difference solution of the fast nearfield method as a boundary condition for focused sources," 20th International Symposium on Nonlinear Acoustics, Lyon, France, June 2015. *AIP Conference Proceedings* **1685**: 070005. doi: 10.1063/1.4934442
3. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "Inertial cavitation threshold dependence on static pressure," 159th Meeting of the Acoustical Society of America, Baltimore, MD, USA, April 2010. *Proceedings of Meetings on Acoustics*, **9**: 045002. doi: 10.1121/1.3486533

(e) Books:

N/A

(f) Book chapters:

1. **Kenneth B. Bader**, Guillaume Bouchoux, Christy K. Holland, "Sonothrombolysis," In *Therapeutic Ultrasound*, J. Escoffe, Ed. (Springer, NY), 2016. pp. 339-362.

(g) Other works that are publicly available

2016 "Histotripsy standards and lysis of deep vein thrombi," Research Update from the Focused Ultrasound Foundation: <http://www.fusfoundation.org/news/1723-research-update-histotripsy-standards-and-lysis-of-deep-vein-thrombi>

(h) Clinical trials that are ongoing and unpublished

No ongoing or unpublished clinical trials

(i) Works in review, in preparation, etc. not yet publicly available

No drafts currently available

FUNDING

(a) Past:

1. Source: Focused Ultrasound Foundation, Grant Number 319R1
PI: K. Bader
Title: *The Development of Standards to Regulate Microbubble Cloud Formation During Histotripsy Pulses*
Total direct costs: \$107,512.
Annual salary recovery or effort: 100%
Project period: 8/1/2014-12/31/2015
2. Source: UChicago Institute for Translational Medicine via NIH/NCI, Grant Number K12CA139160
PI: K. Bader
Title: *Multimodal imaging of histotripsy-triggered phase shift emulsions for focal ablation of prostate cancer*
Total Direct Costs: \$100,000.
Annual salary recovery or effort: 75%
Project period: 7/1/2017-12/15/2017

(b) Current:

1. Source: NIH/NHLBI, Grant Number R01HL133334
PI: K. Bader
Title: *Chronic thrombus ablation with histotripsy and thrombolytics*
Total direct costs: \$711,751.
Annual salary recovery or effort: 30%
Project period: 12/15/2017-11/30/2022
2. Source: Departments of Radiology, Medicine, University of Chicago
PI: K. Bader
Title: *Imaging metrics to identify lytic resistant venous thrombosis*
Total direct costs: \$120,000.
Annual salary recovery or effort: 10%
Project period: 8/29/2019-6/30/2020
3. Source: University of Chicago Comprehensive Cancer Center
PI: K. Bader
Title: *Oxygen-guided histotripsy for hypoxic tumor ablation and radiosensitization*
Total direct costs: \$60,000.
Annual salary recovery or effort: 0%
Project period: 6/5/2019-5/31/2020

(c) Pending:

1. Source: American Cancer Society, Grant Number 647377
PI: K. Bader
Title: *Multimodal imaging to guide histotripsy hypoxic tumor ablation*
Total direct costs: \$656,696.
Annual salary recovery or effort: 20%
Project period: 7/15/2020-6/30/2024

HONORS, PRIZES, AND AWARDS

- 2004 Student Summer Scholars program, Grand Valley State University
- 2004 Third place poster competition, Michigan space grant consortium
- 2004 Seed grant program, Michigan space grant consortium
- 2005 Reporter Award, Society of Physics Students
- 2005-2011 Barnard Fellowship, Physics Department, University of Mississippi
- 2006 Physical Acoustics Summer School Scholarship, Acoustical Society of America
- 2010 Distinguished Alumnus-in-Residence, Grand Valley State University
- 2015 Young Investigator Travel Grant, Acoustical Society of America
- 2016 Excellence in Outreach Award, Sigma Xi
- 2016-2018 Outstanding Reviewer, *Physics in Medicine and Biology*
- 2017 Travel Award, Academy for Radiology and Biomedical Imaging Research Academic Council
- 2018 Early Career Travel Subsidy, Acoustical Society of America
- 2019 Distinguished Leader in Diversity and Inclusion, University of Chicago

INVITED SPEAKING

- 2011 Research seminar, "The effect of static pressure on the inertial cavitation threshold and collapse strength," University of Cincinnati, Cincinnati, OH
- 2012 Research seminar, "Thrombolysis and the stably cavitating bubble," University of Mississippi, Oxford, MS
- 2012 Invited Speaker, "Gauging the likelihood of stable cavitation from ultrasound contrast agents," Meeting of the Acoustical Society of America, Kansas City, MO
- 2014 Research seminar, "The use of ultrasound contrast agents for nucleating stable cavitation," National Institutes of Health, Bethesda, MD
- 2015 Research Seminar, "Towards regulatory guidelines for shock scattering histotripsy," University of Oxford, Oxford, UK
- 2015 Invited speaker, "Microbubble pumps: Ultrasound Theragnostic Agents," Meeting of the Acoustical Society of America, Jacksonville, FL
- 2016 Invited speaker, "Passive cavitation imaging as a predicative metric for histotripsy ablation," Meeting of the Acoustical Society of America, Honolulu, HI
- 2017 Research Seminar, "Image guidance for histotripsy," University of Illinois, Urbana-Champaign, Urbana-Champaign, IL
- 2018 Research Seminar, "Passive cavitation imaging for monitoring histotripsy-enhanced thrombolysis," Vanderbilt University, Nashville, TN
- 2018-2019 Invited Speaker, "Ultrasound safety: What you should know about therapeutic ultrasound," Radiological Society of North America, Chicago, IL
- 2019 Research Seminar, "Passive cavitation imaging for monitoring histotripsy-enhanced thrombolysis," Regional Meeting of the Acoustical Society of America, Chicago, IL
- 2019 Invited Speaker, "Pre-clinical models of Cancer," American Institute of Ultrasound in Medicine, Orlando, FL
- 2019 Invited Speaker, "Histotripsy-enhanced thrombolysis," Meeting of the Acoustical Society of America, Louisville, KY
- 2019 Invited Speaker, "Ultrasound technology and instrumentation," American Association of Physicists in Medicine, San Antonio, TX
- 2019 Invited Speaker, "Multi-modal assessment of histotripsy liquefaction," Meeting of the Acoustical Society of America, San Diego, CA

INVITED, ELECTED, OR APPOINTED EXTRAMURAL SERVICE

- 2015-2018 Live Streaming Committee, Acoustical Society of America
- 2018- Standards Committee, Acoustical Society of America
- 2019- Bioeffects Committee, American Institute of Ultrasound in Medicine
- 2017- Ultrasound Subcommittee. American Association of Physicists in Medicine.

2014- Member Advisory Editorial Board, *Ultrasound in Medicine and Biology*
Various Manuscript reviewer for Ultrasound in Medicine and Biology, Journal of the Acoustical Society of America, Ultrasonics, IEEE Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on Medical Imaging, Physics in Medicine and Biology, Journal of Thrombosis and Thrombolysis, Applied Physics Letters, and Journal of Ultrasound in Medicine
Various Grant referee for Focused Ultrasound Foundation, Kentucky Science and Engineering Research Foundation

PROFESSIONAL SOCIETIES

Elected or invited membership:

Sigma Xi
Sigma Pi Sigma
Academic Council of Early Career Investigators in Imaging

Other:

Acoustical Society of America
National Research Mentoring Network
American Association of Physicists in Medicine
Radiological Society of North America
American Institute of Ultrasound in Medicine

EDUCATION

The College (B.A., B.S.):

2019 Guest lecturer, PHYS 26000 "Fluid Dynamics"
2020 Phys 123000, "General Physics III", Spring Quarter, 2 lecturers, 2 laboratories, one discussion section, 24 students
2017- Undergraduate research mentor

Graduate programs (Ph.D.):

2017 MPHY 37400, "Charles E. Metz Special Topics Course: Fundamentals of molecular imaging,"
1 lecture, no laboratories or discussion sections.
Number of students: 10

2017 MPHY 38600, "Physics of Medical Imaging I,"
2 lectures, no laboratories or discussion sections.
Number of students: 4

2017- MPHY 38700, "Physics of Medical Imaging II,"
4 lectures, 2 laboratories, no discussion sections.
Number of students: ~ 6

2016- Graduate research mentor

Pritzker School of Medicine (M.D.):

N/A

Graduate medical education (residency and clinical fellowships):

(a) Didactic
2017- Lecture on ultrasound for Radiology Fellows
2 lectures
Number of fellows: ~ 30

(b) Clinical
N/A

Continuing medical education:

- 2019 Lecture on "Ultrasound Physics and Technology" as part of "Diagnostic Physics Review Course", American Association of Physicists in Medicine Annual Meeting, San Antonio, TX
- 2019- Lecture on "What you need to know about therapeutic Ultrasound" as part of "Evolving Perspectives on Ultrasound Safety", Radiological Society of North America Annual Meeting, Chicago, IL

Research trainees:

(a) High school students and teachers

- 2018 Rene Maldonado.
Jones College Prep, UCCCC EYES Fellow.
Currently undergraduate student, University of Illinois-Chicago

(b) Undergraduate (B.A., B.S.)

- 2019- Erin Snoddy. Swarthmore College
AAPM DREAM Fellow
- 2019- Paul Severino. University of Chicago
SURFBOARD Fellow
- 2019- Camille Johnson. University of Chicago
FUS Foundation Fellow
- 2019 Sidney Trotter. Chicago State University
FUS Foundation Fellow
- 2018 Lily Mansfield. University of Chicago
- 2018 Hunter Thompson. University of Chicago
- 2018 Soo May Wee. University of Chicago
- 2018 Jane Kelleher. University of Chicago
- 2018 Benjamin Wollant. St. Olaf College
AAPM Undergraduate Fellowship
Currently Fulbright Scholar at Ludwig-Maximilians-Universität
- 2018 Jennifer Ramirez. University of Puerto Rico
Leadership Alliance Program
Currently Hanna H. Gray Fellow at University of Puerto Rico
- 2018 Heather Thompson. Berea College

(c) Medical (M.D.)

None

(d) Graduate (Ph.D.)

- 2016-2019 Gregory J. Anthony, Committee on Medical Physics
My Role: Co-Primary Research Adviser
Currently in Medical Physics Residence at Indiana University.
- 2016- Samuel A. Anthony, Committee on Medical Physics
My Role: Primary Research Adviser
Ph.D. expected June 2021.

2017 Adam Hasse, Committee on Medical Physics
My Role: Lab rotation mentor
Still in program

(e) Postdoctoral

2017-2019 Viktor Bollen
Currently Senior Physicist, HistoSonics, Inc. (Ann Arbor, MI).

(e) Other

2019 Russell Frye
UCCCC EYES Fellow
Currently Teacher at Gwendolyn Brook College Academy

SERVICE

University of Chicago

Committee membership:

2017- Graduate Program in Medical Physics

Leadership:

2017- Chair, Diversity and Outreach Committee, Medical Physics

2019- Leader, Image-guided therapies working group, University of Chicago Comprehensive Cancer Center

Other:

2017- Admissions Committee, Medical Physics

2017- Diversity and Outreach Committee, Medical Physics

2019- Awards Committee, Medical Physics

Extramural (not indicated above)

Leadership roles:

2019- Chair, Student Poster Competition, Acoustical Society of America

Other:

2014 Session Chair: Medical Ultrasound. Acoustical Society of America

2015 Session Chair: Sonothrombolysis. Acoustical Society of America

2019- Chair and Organizer: Student Poster Competition, Acoustical Society of America

2020 Session Chair: Adaptive Beamforming. Acoustical Society of America

2020 Session Chair: Machine Learning in Applications to Ultrasound Beamforming. American Institute of Ultrasound in Medicine