

ZHI-DE DENG

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EDUCATION	Ph.D., Electrical Engineering , Columbia University 2013 Dissertation: <i>Electromagnetic Field Modeling of Transcranial Electric & Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive & Subconvulsive Applications</i>
	M.Phil., Electrical Engineering , Columbia University 2011 Graduate concentration in Neuroscience
	M.Eng., Electrical Engineering & Computer Science , MIT 2007 Thesis: <i>Stochastic Chaos and Thermodynamic Phase Transitions: Theory and Bayesian Estimation Algorithms</i>
	S.B., Electrical Science & Engineering , MIT 2007
	S.B., Physics , MIT 2006 Minor in Economics
PROFESSIONAL & ACADEMIC APPOINTMENTS	Senior Associate Scientist (Research Professor equivalent ☑), NIMH 2025 – Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit <i>Director</i> , Computational Neurostimulation Research Program
	Staff Scientist , NIMH 2019 – 2025 Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit <i>Director</i> , Computational Neurostimulation Research Program
	Adjunct Assistant Professor , Duke University School of Medicine 2016 – 2024 Department of Psychiatry & Behavioral Sciences Division of Behavioral Medicine & Neurosciences <i>Network Faculty</i> , Duke Institute for Brain Sciences
	Medical Instructor , Duke University School of Medicine 2014 – 2016 Department of Psychiatry & Behavioral Sciences Division of Brain Stimulation & Neurophysiology <i>KL2 Scholar</i> , Duke Translational Medicine Institute
POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS	Research Fellow , NIMH 2016 – 2019 Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit Richard J. Wyatt Memorial Fellowship for Translational Research
	Postdoctoral Associate , Duke University School of Medicine 2013 – 2014 Department of Psychiatry & Behavioral Sciences Division of Brain Stimulation & Neurophysiology
PREDOCTORAL RESEARCH ASSISTANTSHIPS & INTERNSHIPS	Visiting Graduate Research Assistant , Duke Psychiatry 2010 – 2013
	Graduate Research Assistant , Columbia Psychiatry 2007 – 2010 <i>TL1 Scholar</i> , Irving Institute for Clinical and Translational Research
	Research Assistant , Harvard–MIT Division of Health Sciences & Technology 2005 – 2007
	Executive Intern , Weill Cornell Medicine Anesthesiology Summer 2004
	Internship Coordinator , Children’s Aid Society Summer 2003
	Newsroom Technology Intern , The New York Times Company Summer 2002







AWARDS & HONORS (SELECTED)	Certificate for Top Cited Article	2025
	<i>Bipolar Disorders</i> , International Society for Bipolar Disorders/Wiley	
	Special Act Award	2025
	For outstanding scholarship advancing precision neuromodulation, NIMH	
	NIMH Director's Award	2024
	For outstanding transdisciplinary scientific contributions to advance neuromodulation technologies for the study and treatment of psychiatric disorders	
	Elected to Full Membership	2024
	Sigma Xi, The Scientific Research Honor Society	
	High Five Award	2024
	For excellent preparation for and presentation at the Noninvasive Neuromodulation Unit's Board of Scientific Counselors review, NIMH	
	Scholar, Advanced Research Institute in Geriatric Mental Health	2023–2024
	Dartmouth College, supported by grant from NIH (R25MH068502)	
	Elevated to Senior Membership	2023
	Institute of Electrical and Electronics Engineers (IEEE)	
	Elected to Associate Membership	2023
	American College of Neuropsychopharmacology	
	NIMH Director's Award	2019
	For scientific innovation at the interface of computation and psychiatry	
	Richard J. Wyatt Memorial Fellowship Award for Translational Research	2018
	NIMH Intramural Research Program	
	New Investigator Award	2018
	American Society of Clinical Psychopharmacology	
	Early Career Investigator Travel Fellowship Award	2018
	Society of Biological Psychiatry	
	Research Colloquium for Junior Investigators	2018
	American Psychiatric Association	
	Alies Muskin Career Development Leadership Program	2018
	Anxiety & Depression Association of America	
	NARSAD Young Investigator Award	2017
	Brain & Behavior Research Foundation	
	Career Development Institute for Psychiatry	2017
	Stanford University/University of Pittsburgh	
	New Investigator Award	2017
	International Society for CNS Clinical Trials and Methodology	
	Certificate for Highly Cited Research	2016
	<i>Brain Stimulation</i> , Elsevier	
	Young Investigator Memorial Travel Award	2015
	American College of Neuropsychopharmacology	
	Scholar, Summer Research Institute in Geriatric Mental Health	2015
	Weill Cornell Medical College, supported by grant from NIH (R25MH019946)	
	Chair's Choice Travel Fellowship Award	2015
	Society of Biological Psychiatry	
	Innovative Research Poster Award	2014
	National Network of Depression Centers	

Best Abstract Award	2010
International Society for ECT and Neurostimulation	
Presidential Award for Outstanding Teaching, Finalist	2010
Columbia University	
CTSA T32 Certificate Award	2009
Columbia University Irving Institute for Clinical and Translational Research	
New York Times College Scholarship	2002–2006
The New York Times Company Foundation	

RESEARCH FOCUS


- ⚡ Neurostimulation: Technology development, computational modeling, stimulus parameter and dose optimization, translational and clinical applications
- ⚡ Computational electromagnetics and bioelectricity
- ⚡ Electrophysiological and neuroimaging biomarker development
- ⚡ Nonlinear dynamics of physiological systems





RESEARCH OUTPUT SUMMARY


-  **65** Refereed journal articles
-  **18** Refereed conference proceedings & technical letters
-  **17** Refereed reviews, protocols, & consensus papers
-  **10** Book chapters
-  **5** Editorials, commentaries, & correspondences
-  **9** IPs (4 granted U.S. patents, 3 pending, 2 unconverted provisional)
- + **174** Abstracts


REFEREED JOURNAL ARTICLES



* Denotes first, joint first, or senior author











A. V. Peterchev, **Z.-D. Deng**, C. Sikes-Keilp, E. C. Feuer, M. A. Rosa, and S. H. Lisanby, “Optimal frequency for seizure induction with electroconvulsive therapy and magnetic seizure therapy in nonhuman primates,” *Biological Psychiatry: Global Open Science*, vol. 5, no. 3, 100471, May 2025.
DOI: 10.1016/j.bpsgos.2025.100471; PMCID: PMC11722405; Data available 





S. M. McClintock, **Z.-D. Deng**, M. M. Husain, V. J. Thakkar, E. Bernhardt, R. D. Weiner, B. Lubner, and S. H. Lisanby, “Comparing the neurocognitive effects of right-unilateral ultra-brief pulse electroconvulsive therapy and magnetic seizure therapy for the treatment of major depressive episode,” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 10, no. 2, pp. 175–185, Feb. 2025.
DOI: 10.1016/j.bpsc.2024.10.016; PMID: 39515580
 Journal cover
 Media coverage: *Brain & Behavior Research Foundation*  | *UT Southwestern News Release*, Jan. 2025. 

Z. Qi, G. M. Noetscher, A. Miles, K. Weise, T. R. Knösche, C. R. Cadman, A. R. Potashinsky, K. Liu, W. A. Wartman, G. Nunez Ponasso, M. Bikson, H. Lu, **Z.-D. Deng**, A. R. Nummenmaa, and S. N. Makaroff, “Enabling electric field model of microscopically realistic brain,” *Brain Stimulation*, vol. 18, no. 1, pp. 77–93, Jan./Feb. 2025.
DOI: 10.1016/j.brs.2024.12.1192; PMCID: PMC11867869; Data available 

N. I. Hasan, M. Dannhauer, D. Wang, **Z.-D. Deng**, and L. J. Gomez, “Real-time computation of brain E-field for enhanced transcranial magnetic stimulation neuronavigation and optimization,” *Imaging Neuroscience*, vol. 3, imag_a_00412, Jan. 2025.
DOI: 10.1162/imag_a_00412; Code available 

-  First Place in Best Student Paper (awarded to N. I. Hasan), *International Applied Computational Electromagnetics Society Symposium*, 2024.
-  Third Place in Best Student Paper (awarded to N. I. Hasan), *Photonics and Electromagnetics Research Symposium*, 2024.

- B. Lubner, L. Beynel, **Z.-D. Deng**, L. G. Appelbaum, T. Jones, A. Harrison, D. L. K. Murphy, E. Lo, R. A. McKinley, and S. H. Lisanby, "Site- and frequency-specific enhancement of visual search performance with online individual alpha frequency (IAF) repetitive transcranial magnetic stimulation (rTMS) to the inferior frontal junction," *Cerebral Cortex*, vol. 34, no. 9, bhae371, Sep. 2024.
DOI: 10.1093/cercor/bhae371; PMID: PMC11405677
- M. Teferi, H. Gura, M. Patel, A. Casalvera, K. G. Lynch, W. Makhoul, **Z.-D. Deng**, D. J. Oathes, Y. I. Sheline, and N. L. Balderston, "Intermittent theta-burst stimulation to the right dorsolateral prefrontal cortex may increase potentiated startle in healthy individuals," *Neuropsychopharmacology*, vol. 49, no. 10, pp. 1619–1629, Sep. 2024.
DOI: 10.1038/s41386-024-01871-w; PMID: PMC11319663
- N. Khadka, **Z.-D. Deng**, S. H. Lisanby, M. Bikson, and J. A. Camprodon, "Computational models of high-definition electroconvulsive therapy (ECT) for focal or multitargeting treatment," *The Journal of ECT*, online ahead of print, Aug. 2024.
DOI: 10.1097/YCT.0000000000001069; PMID: 39185880
- * M. Dib, J. D. Lewine, C. C. Abbott, and **Z.-D. Deng**, "Electroconvulsive therapy modulates loudness dependence of auditory evoked potentials: A pilot MEG study," *Frontiers in Psychiatry*, vol. 15, 1434434, Aug. 2024.
DOI: 10.3389/fpsy.2024.1434434; PMID: PMC11345267
- H. Nguyen, C. Q. Li, S. Hoffman, **Z.-D. Deng**, Y. Yang, and H. Lu, "Ultra-high frequency repetitive TMS at subthreshold intensity induces suprathreshold motor response via temporal summation," *Journal of Neural Engineering*, vol. 21, no. 4, 046044, Aug. 2024.
DOI: 10.1088/1741-2552/ad692f; PMID: PMC11307324
- L. Beynel, H. Gura, Z. Rezaee, E. C. Ekpo, **Z.-D. Deng**, J. O. Joseph, P. Taylor, B. Lubner, and S. H. Lisanby, "Lessons learned from an fMRI-guided rTMS study on performance in a numerical Stroop task," *PLOS ONE*, vol. 19, no. 5, e0302660, May 2024.
DOI: 10.1371/journal.pone.0302660; PMID: PMC11073721; Code available 
- S. K. Kar, A. Agrawal, A. Silva-dos-Santos, Y. Gupta, and **Z.-D. Deng**, "The efficacy of transcranial magnetic stimulation in the treatment of obsessive-compulsive disorder: An umbrella review of meta-analyses," *CNS Spectrums*, vol. 29, no. 2, pp. 109–118, Apr. 2024.
DOI: 10.1017/S1092852923006387; PMID: PMC11524532
- * B. Kadriu, **Z.-D. Deng**, C. Kraus, J. N. Johnston, A. Figtman, I. D. Henter, S. Kasper, and C. A. Zarate, Jr., "The impact of body mass index on clinical features of bipolar disorder: A STEP-BD study," *Bipolar Disorder*, vol. 26, no. 2, pp. 160–175, Mar. 2024.
DOI: 10.1111/bdi.13370; PMID: PMC10839568
 Top Cited Article, awarded by Wiley, 2025.
 Media coverage: *Psychiatric Times*, Feb. 2024. 
- * P. L. Robins, S. N. Makaroff, M. Dib, S. H. Lisanby, and **Z.-D. Deng**, "Electric field characteristics of rotating permanent magnet stimulation," *Bioengineering*, vol. 11, no. 3, 258, Mar. 2024.
DOI: 10.3390/bioengineering11030258; PMID: PMC10968657
 Part of Special Issue: *Electric, Magnetic, and Electromagnetic Fields in Biology and Medicine: From Mechanisms to Biomedical Applications* 
 Trainee Travel Award (awarded to P. L. Robins), *NIMH Fellows' Scientific Training Day*, 2023.
- * **Z.-D. Deng**, B. Lubner, S. M. McClintock, R. D. Weiner, M. M. Husain, and S. H. Lisanby, "Clinical outcomes of magnetic seizure therapy vs electroconvulsive therapy for major depressive episode: A randomized clinical trial," *JAMA Psychiatry*, vol. 81, no. 3, pp. 240–249, Mar. 2024.
DOI: 10.1001/jamapsychiatry.2023.4599; PMID: PMC10701670
 Commentary: vol. 81, no. 7, pp. 736–737, Jul. 2024.  Reply: pp. 737–738. 

Media coverage: *Psychiatric News*, Feb. 2024.  | *MedPage Today*, Feb. 2024.  | *Brain & Behavior Research Foundation*, Jan. 2024.  | *NIMH Research Highlight*, Dec. 2023. 

- * C. C. Abbott, J. Miller, D. Farrar, M. Argyelan, M. Lloyd, T. Squillaci, B. Kimbrell, S. Ryman, T. R. Jones, J. Upston, D. K. Quinn, A. V. Peterchev, E. Erhardt, A. Datta, S. M. McClintock, and **Z.-D. Deng**, “Amplitude-determined seizure-threshold, electric field modeling, and electroconvulsive therapy antidepressant and cognitive outcomes,” *Neuropsychopharmacology*, vol. 49, no. 4, pp. 640–648, Mar. 2024.


DOI: 10.1038/s41386-023-01780-4; PMID: PMC10876627

 Research highlight commentary: pp. 635–636. 

W. A. Wartman, K. Weise, M. Rachh, L. Morales, **Z.-D. Deng**, A. Nummenmaa, and S. N. Makaroff, “An adaptive h-refinement method for the boundary element fast multipole method for quasi-static electromagnetic modeling,” *Physics in Medicine and Biology*, vol. 69, no. 5, 055030, Feb. 2024.

DOI: 10.1088/1361-6560/ad2638; PMID: PMC10902857; Data available 

 Part of Special Issue: *Electromagnetic Modeling for Brain Stimulation* 

 Third Place in International Student Competition (awarded to W. A. Wartman), *Brain & Human Body Modeling Conference*, 2023.

M. Argyelan, **Z.-D. Deng**, O. T. Ousdal, L. Olteidal, B. Angulo, M. Baradits, A. J. Spitzberg, U. Kessler, A. Sartorius, A. Dols, K. L. Narr, R. Espinoza, J. A. van Waarde, I. Tendolkar, P. van Eijndhoven, G. A. van Wingen, A. Takamiya, T. Kishimoto, M. B. Jorgensen, A. Jorgensen, O. B. Paulson, A. Yroni, P. Péran, C. Soriano-Mas, N. Cardoner, M. Cano, L. van Diermen, D. Schrijvers, J.-B. Belge, L. Emsell, F. Bouckaert, M. Vandenbulcke, M. Kiebs, R. Hurlmann, P. C. R. Mulders, R. Redlich, U. Dannlowski, E. Kavakbasi, M. D. Kritzer, K. K. Ellard, J. A. Camprodon, G. Petrides, A. K. Malhotra, and C. C. Abbott, “Electroconvulsive therapy-induced volumetric brain changes converge on a common causal circuit in depression,” *Molecular Psychiatry*, vol. 29, no. 2, pp. 229–237, Feb. 2024.



DOI: 10.1038/s41380-023-02318-2; PMID: PMC11116108; Code available 


S. N. Makaroff, Z. Qi, M. Rachh, W. A. Wartman, K. Weise, G. M. Noetscher, M. Daneshzand, **Z.-D. Deng**, L. Greengard, and A. R. Nummenmaa, “A fast direct solver for surface-based whole-head modeling of transcranial magnetic stimulation,” *Scientific Reports*, vol. 13, no. 1, 18657, Oct. 2023.

DOI: 10.1038/s41598-023-45602-5; PMID: PMC10618282; Code available 

- * **Z.-D. Deng**, P. L. Robins, M. Dannhauer, L. M. Haugen, J. D. Port, and P. E. Croarkin, “Optimizing TMS coil placement approaches for targeting the dorsolateral prefrontal cortex in depressed adolescents: An electric field modeling study,” *Biomedicine*, vol. 11, no. 8, 2320, Aug. 2023.

DOI: 10.3390/biomedicine11082320; PMID: PMC10452519

 Part of Special Issue: *Emerging Trends in Brain Stimulation* 

 First Place in International Student Competition (awarded to P. L. Robins), *Brain & Human Body Modeling Conference*, 2022.









C. Kraus, A. Kautzky, V. Watzal, A. Gramser, B. Kadriu, **Z.-D. Deng**, L. Bartova, C. A. Zarate, Jr., R. Lanzenberger, D. Souery, S. Montgomery, J. Mendlewicz, J. Zohar, G. Fannelli, A. Serretti, and S. Kasper, “Body mass index and clinical outcomes in individuals with major depressive disorder: Finding from the GSRD European Multicenter Database,” *Journal of Affective Disorder*, vol. 335, pp. 349–357, Aug. 2023.

DOI: 10.1016/j.jad.2023.05.042; PMID: PMC10502963

M. Teferi, W. Makhoul, **Z.-D. Deng**, D. J. Oathes, Y. Sheline, and N. L. Balderston, “Continuous theta-burst stimulation to the right dorsolateral prefrontal cortex may increase potentiated startle in healthy individuals,” *Biological Psychiatry: Global Open Science*, vol. 3, no. 3, pp. 470–479, Jul. 2023.

DOI: 10.1016/j.bpsgos.2022.04.001; PMID: PMC10382694

- J. Miller, T. Jones, J. Upston, **Z.-D. Deng**, S.M. McClintock, E. Erhardt, D. Farrar, and C.C. Abbott, “Electric field, ictal theta power, and clinical outcomes in electroconvulsive therapy,” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 8, no. 7, pp. 760–767, Jul. 2023.
DOI: 10.1016/j.bpsc.2023.03.001; PMID: PMC10329999
- A. Guillen, C.C. Abbott, **Z.-D. Deng**, Y. Huang, P. Pascoal-Faria, D.Q. Truong, and A. Datta, “Impact of modeled field of view in electroconvulsive therapy current flow simulations,” *Frontiers in Psychiatry*, vol. 14, 1168672, May 2023.
DOI: 10.3389/fpsy.2023.1168672; PMID: PMC10232815
☐ Part of Research Topic: *Translational Approaches in Neurostimulation Research: Challenges and Opportunities for Neuropsychiatry* ☐
- M. Alawi, P.F. Lee, **Z.-D. Deng**, Y.K. Goh, and P.E. Croarkin, “Modelling the differential effects of age on transcranial magnetic stimulation induced electric fields,” *Journal of Neural Engineering*, vol. 20, no. 2, 026016, Mar. 2023.
DOI: 10.1088/1741-2552/ac9a76; PMID: PMC10278869
- X. Chen, R. Ma, W. Zhang, G.Q. Zeng, Q. Wu, A. Yimiti, X. Xia, J. Cui, Q. Liu, X. Meng, J. Bu, Q. Chen, Y. Pan, N.X. Yu, S. Wang, **Z.-D. Deng**, A.T. Sack, M. McLaughlin, and X. Zhang, “Alpha oscillatory activity is causally linked to working memory retention,” *PLOS Biology*, vol. 21, no. 2, e3001999, Feb. 2023.
DOI: 10.1371/journal.pbio.3001999; PMID: PMC9983870
- Z. Fu, C.C. Abbott, J. Miller, **Z.-D. Deng**, S.M. McClintock, M.S.E. Sendi, J. Sui, and V.D. Calhoun, “Cerebro-cerebellar functional neuroplasticity mediates the effect of electric field on electroconvulsive therapy outcomes,” *Translational Psychiatry*, vol. 13, no. 1, 43, Feb. 2023.
DOI: 10.1038/s41398-023-02312-w; PMID: PMC9902462; Code available <>
- * S.N. Makaroff, H. Nguyen, Q. Meng, H. Lu, A.R. Nummenmaa, and **Z.-D. Deng**, “Modeling transcranial magnetic stimulation coils with magnetic cores,” *Journal of Neural Engineering*, vol. 20, no. 1, 016028, Jan. 2023.
DOI: 10.1088/1741-2552/acae0d; PMID: PMC10481791; Code available <>
- S. Qi, V.D. Calhoun, D. Zhang, J. Miller, **Z.-D. Deng**, K.L. Narr, Y. Sheline, S.M. McClintock, R. Jiang, X. Yang, J. Upston, T. Jones, J. Sui, and C.C. Abbott, “Links between electroconvulsive therapy responsive and cognitive impairment multimodal brain networks in late-life major depressive disorder,” *BMC Medicine*, vol. 20, no. 1, 477, Dec. 2022.
DOI: 10.1186/s12916-022-02678-6; PMID: PMC9733153; Code available <>
- H. Li, **Z.-D. Deng**, D. Oathes, and Y. Fan, “Computation of transcranial magnetic stimulation electric fields using self-supervised deep learning,” *NeuroImage*, vol. 264, 119705, Dec. 2022.
DOI: 10.1016/j.neuroimage.2022.119705; PMID: PMC9854270
- A. Richie-Halford, M. Cieslak, L. Ai, S. Caffarra, S. Covitz, A.R. Franco, I.I. Karipidis, J. Kruper, M. Milham, B. Avelar-Pereira, E. Roy, V.J. Sydnor, J.D. Yeatman, The Fibr Community Science Consortium [including **Z.-D. Deng**], T.D. Satterthwaite, and A. Rokem, “An analysis-ready and quality controlled resource for pediatric brain white-matter research,” *Scientific Data*, vol. 9, no. 1, 616, Oct. 2022.
DOI: 10.1038/s41597-022-01695-7; PMID: PMC9556519; Code available ⓘ Data available ⓘ
- J. Miller, T. Jones, J. Upston, **Z.-D. Deng**, S.M. McClintock, S. Ryman, D. Quinn, and C.C. Abbott, “Ictal theta power as an electroconvulsive therapy safety biomarker: A pilot study,” *The Journal of ECT*, vol. 38, no. 2, pp. 88–94, Jun. 2022.
DOI: 10.1097/YCT.0000000000000812; PMID: PMC10680084


- H. Bagherzadeh, Q. Meng, **Z.-D. Deng**, H. Lu, E. Hong, Y. Yang, and F.-S. Choa, “Angle-tuned coils: Attractive building blocks for TMS with improved depth–spread performance,” *Journal of Neural Engineering*, vol. 19, no. 2, 026059, May 2022.
DOI: 10.1088/1741-2552/ac697c; PMID: PMC10644970
- B. Luber, S.W. Davis, **Z.-D. Deng**, D. Murphy, A. Martella, A.V. Peterchev, and S.H. Lisanby, “Using diffusion tensor imaging to effectively target TMS to deep brain structures,” *NeuroImage*, vol. 249, 118863, Apr. 2022.
DOI: 10.1016/j.neuroimage.2021.118863; PMID: PMC8851689
 Part of Special Issue: *Neuromodulation and Neuroimaging for Targeted Brain Networks Interrogation* 
 Media coverage: *NIMH Research Highlight*, Mar. 2022. 
- * **Z.-D. Deng**, M. Argyelan, J. Miller, D.K. Quinn, M. Lloyd, T.R. Jones, J. Upston, E. Erhardt, S.M. McClintock, and C.C. Abbott, “Electroconvulsive therapy, electric field, neuroplasticity, and clinical outcomes,” *Molecular Psychiatry*, vol. 27, no. 3, pp. 1676–1682, Mar. 2022.
DOI: 10.1038/s41380-021-01380-y; PMID: PMC9095458
 Commentary: vol. 27, no. 9, pp. 3571–3572, Sep. 2022.   Reply: vol. 29, no. 10, pp. 3289–3290, Oct. 2024. 
- N.L. Balderston, J.C. Beer, D. Seok, W. Makhoul, **Z.-D. Deng**, T. Girelli, M. Teferi, N. Smyk, M. Jaskir, D.J. Oathes, and Y.I. Sheline, “Proof of concept study to develop a novel connectivity-based electric-field modelling approach for individualized targeting of transcranial magnetic stimulation treatment,” *Neuropsychopharmacology*, vol. 47, no. 2, pp. 588–598, Jan. 2022.
DOI: 10.1038/s41386-021-01110-6; PMID: PMC8674270
- S.H. Lisanby, S.M. McClintock, W.V. McCall, R.G. Knapp, C.M. Cullum, M. Mueller, **Z.-D. Deng**, A.A. Teklehaimanot, M.V. Rudorfer, E. Bernhardt, G. Alexopoulos, S.H. Bailine, M.C. Briggs, E.T. Geduldig, R.M. Greenberg, M.M. Husain, S. Kaliora, V. Latoussakis, L.S. Liebman, G. Petrides, J. Prudic, P.B. Rosenquist, S. Sampson, K.G. Tobias, R.D. Weiner, R.C. Young, C.H. Kellner, Prolonging Remission in Depressed Elderly (PRIDE) Work Group, “Longitudinal neurocognitive effects of combined electroconvulsive therapy (ECT) and pharmacotherapy in major depressive disorder in older adults: Phase 2 of the PRIDE study,” *American Journal of Geriatric Psychiatry*, vol. 30, no. 1, pp. 15–28, Jan. 2022.
DOI: 10.1016/j.jagp.2021.04.006; PMID: PMC8595359
- B. Kadriu, C.A. Farmer, P. Yuan, L.T. Park, **Z.-D. Deng**, R. Moaddel, I.D. Henter, B. Shovestul, E.D. Ballard, C. Kraus, P.W. Gold, R. Machado-Vieira, and C.A. Zarate, Jr., “The kynurenine pathway and bipolar disorder: Intersection of the monoaminergic and glutamatergic systems and immune response,” *Molecular Psychiatry*, vol. 26, no. 8, pp. 4085–4095, Aug. 2021.
DOI: 10.1038/s41380-019-0589-8; PMID: PMC7225078
- A. Takamiya, F. Bouckaert, M. Laroy, J. Blommaert, A. Radwan, A. Khatoun, **Z.-D. Deng**, M. McLaughlin, W. Van Paesschen, F.-L. De Winter, J. Van den Stock, S. Sunaert, P. Sienaert, M. Vandenbulcke, and L. Emsell, “Biophysical mechanisms of electroconvulsive therapy-induced volume expansion in the medial temporal lobe: A longitudinal *in vivo* human imaging study,” *Brain Stimulation*, vol. 14, no. 4, pp. 1038–1047, Jul./Aug. 2021.
DOI: 10.1016/j.brs.2021.06.011; PMID: PMC8474653
- E.A. Fridgeirsson, **Z.-D. Deng**, D. Denys, J.A. van Waarde, and G.A. van Wingen, “Electric field strength induced by electroconvulsive therapy is associated with clinical outcome,” *NeuroImage: Clinical*, vol. 30, 102581, Feb. 2021.
DOI: 10.1016/j.nicl.2021.102581; PMID: PMC7895836

- P. J. C. Suen, S. Doll, M. C. Batistuzzo, G. Busatto, L. B. Razza, F. Padberg, E. Mezger, L. Bulubas, D. Keeser, **Z.-D. Deng**, and A. R. Brunoni, "Association between tDCS computational modeling and clinical outcomes in depression: Data from the ELECT-TDCS trial," *European Archives of Psychiatry and Clinical Neuroscience*, vol. 271, no. 1, pp. 101–110, Feb. 2021.
DOI: 10.1007/s00406-020-01127-w; PMID: PMC8100980
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- P. Rohde, P. L. Robins, Z. Rezaee, **Z.-D. Deng**, E. Jones, W. T. Regenold, and S. H. Lisanby, “A feasibility study of transcranial electric stimulation (TEST) for treatment resistant depression investigating the necessity of seizure in electroconvulsive therapy,” *NIH Postbac Poster Day*, 2023.
- B. Lubner, S. Davis, **Z.-D. Deng**, D. Murphy, A. V. Peterchev, and S. H. Lisanby, “Targeting deep brain structures with TMS using diffusion tensor imaging,” *Brain Stimulation*, vol. 16, no. 1, p. 180, 2023.
- W. Wartman, A. Miles, G. Hartwigsen, T. Knösche, **Z.-D. Deng**, and K. Weise, “How important are extracerebral brain compartments for TES, TMS, and ECT modeling predictions?” *Brain Stimulation*, vol. 16, no. 1, p. 138, 2023.

- *✎ M. Dannhauer and **Z.-D. Deng**, “Optimizing the placements of multielectrode tES montages from EEG dipole modeling,” *Brain Stimulation*, vol. 16, no. 1, pp. 136–137, 2023.
- ✎ J. Ferreira, L. Morales, R. Lemdiasov, H. Lu, **Z.-D. Deng**, and S.N. Makaroff, “TMS coil and TMS coil array designer with fast multipole method,” *Brain Stimulation*, vol. 16, no. 1, p. 136, 2023.
- A. Guillen, C. C. Abbott, **Z.-D. Deng**, D. Truong, and A. Datta, “Impact of modeled field of volume in ECT current flow simulations,” *Brain Stimulation*, vol. 16, no. 2, p. 10, 2023.
- * **Z.-D. Deng**, M. Hynd, Z. Rezaee, A. R. Brunoni, and S. H. Lisanby, “Sham response in transcranial magnetic stimulation depression trials is increasing over time,” *Neuropsychopharmacology*, vol. 47, supplement, p. 199, 2022.
- * H. Gura, E. Feuer, C. Abboud Chalhoub, S. Awasthi, M. Noh, B. Lubner, and S. H. Lisanby, and **Z.-D. Deng**, “Effect of intertrain interval on theta burst induced changes in motor cortical excitability,” Program No. 752.18. *Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience*, 2022.
- E. Jones, **Z.-D. Deng**, Z. Rezaee, F. Mukhtar, E. Feuer, P. Rohde, P. L. Robins, W. T. Regenold, and S. H. Lisanby, “Innovative electroconvulsive therapy: Individualized Low Amplitude Seizure Therapy,” *American Psychiatric Nurses Association Annual Conference*, 2022.
- 🏆 Poster Award (awarded to the Noninvasive Neuromodulation Unit), *NIMH 75th Anniversary Event*, 2023.
- *✎ P. L. Robins and **Z.-D. Deng**, “Comparison of coil localization approaches and induced electric fields in depressed adolescents receiving repetitive transcranial magnetic stimulation,” *NIMH IRP Fellows’ Scientific Training Day*, 2022.
- *✎ P. L. Robins, M. Dannhauer, L. M. Haugen, J. D. Port, P. E. Croarkin, and **Z.-D. Deng**, “Comparison of coil localization approaches and induced electric fields in depressed adolescents receiving repetitive transcranial magnetic stimulation,” *Brain & Human Body Modeling Conference*, 2022.
- 🏆 First Place in International Student Competition (awarded to P. L. Robins)
- M. Argyelan, C. C. Abbott, **Z.-D. Deng**, B. Wade, GEMRIC Consortium, G. Petrides, and A. Malhotra, “Personalizing electroconvulsive therapy with electrical field modeling,” *Biological Psychiatry*, vol. 91, no. 9, p. S210, 2022.
- *✎ C. C. Abbott, S. M. McClintock, M. Argyelan, and **Z.-D. Deng**, “Individualizing electroconvulsive therapy (ECT) amplitude to improve clinical outcomes,” *Biological Psychiatry*, vol. 91, no. 9, pp. S54–S55, 2022.
- *✎ **Z.-D. Deng**, S. M. McClintock, M. Husain, and S. H. Lisanby, “Depressive symptom dimensions and response trajectories in electroconvulsive therapy and magnetic seizure therapy,” *Biological Psychiatry*, vol. 91, no. 9, p. S21, 2022.
- E. C. Feuer, **Z.-D. Deng**, A. V. Peterchev, C. Sikes-Keilp, M. A. Rosa, and S. H. Lisanby, “Effects of stimulus frequency and individualized current amplitude on EEG and EMG characteristics in electroconvulsive therapy and magnetic seizure therapy,” *International Society for ECT and Neurostimulation Annual Meeting*, 2022; also presented at *NIH Julius Axelrod Symposium*, 2022.

INTELLECTUAL
PROPERTY

- C. C. Abbott, **Z.-D. Deng**, J. Upston, T. Jones, and A. Datta, “Systems and methods for electroconvulsive therapy,” WO 2024/148196 A1, filed Jul. 11, 2024. ☑
- Z.-D. Deng**, J. Kim, G. R. Dold, B. A. Pritchard, R. H. Schor, and S. H. Lisanby, “Systems and methods for adjustable current individualized stimulation therapy,” U.S. Provisional Patent Application 63/656,515, filed Jun. 5, 2024.

- Z.-D. Deng**, B. A. Pritchard, J. Kim, G. R. Dold, R. H. Schor, and S. H. Lisanby, “Systems and methods for multichannel individualized stimulation therapy,” WO 2024/215761 A1, filed Apr. 10, 2024. ☐
- C. C. Abbott, A. Datta, J. Upston, T. Jones, and **Z.-D. Deng**, “Systems and methods for amplitude-determined seizure titrations and electric field modeling in electroconvulsive therapy,” U.S. Provisional Patent Application 63/516,371, filed Jul. 28, 2023. Not converted to non-provisional.
- S. N. Makarov, G. M. Noetscher, V. S. Makarov, and **Z.-D. Deng**, “Whole body non-contact electrical stimulation device with variable parameters,” U.S. Patent 10,551,449, Feb. 4, 2020, assigned to NEVA Electromagnetics, LLC. ☐
- C.-S. Poon and **Z.-D. Deng**, “Systems and methods for detecting a physiological abnormality in a patient by using cardiac or other chaos in combination with non-increasing parasympathetic modulation,” U.S. Patent 9,737,258, Aug. 22, 2017, assigned to MIT. ☐
- A. V. Peterchev and **Z.-D. Deng**, “Transcranial magnetic stimulation coil with electronically switchable active and sham modes,” U.S. Provisional Patent Application 61/525,922, filed Aug. 22, 2011. Not converted to non-provisional.
- A. V. Peterchev, S. H. Lisanby, and **Z.-D. Deng**, “Methods, apparatus, and systems for magnetic stimulation,” U.S. Patent 9,295,853, Mar. 29, 2016, assigned to The Trustees of Columbia University in the City of New York. ☐
- A. V. Peterchev, S. H. Lisanby, and **Z.-D. Deng**, “Methods, apparatus, and systems for magnetic stimulation,” U.S. Patent 8,801,589, Aug. 12, 2014, assigned to The Trustees of Columbia University in the City of New York. ☐

ONGOING
RESEARCH
SUPPORT

ADEPT: Adaptive trial for the treatment of depression associated with concussion using repetitive transcranial magnetic stimulation protocols

Congressionally Directed Medical Research Programs Award TP220072 2024–
Role: Intramural NIH collaborator; PI: D. L. Brody
This study aims to compare different types of TMS that may alleviate depressive symptoms in US military service members with a history of concussion.

Charge-based brain modeling engine with boundary element fast multipole method

NIH/NIMH R01 MH130490 2023.07–2028.05
Role: Intramural NIH collaborator; PI: S. N. Makaroff
This project seeks to create a new brain modeling engine that employs boundary element and fast multipole methods to achieve superior spatial resolution and accuracy in electro-magnetic modeling.

Novel electric-field modeling approach to quantify changes in resting state functional connectivity following theta burst stimulation

NIH/NIMH U01 MH130447 2022.09–2027.06
Role: Intramural NIH collaborator; PI: N. L. Balderston
This study aims to develop a model using whole-brain estimates of the TMS-induced electric field to predict changes in resting state functional connectivity following neuro-modulatory TMS, and validate this model in a large cohort of healthy volunteers receiving multiple doses of either intermittent or continuous theta burst stimulation.

Development of a novel, scalable, neurobiologically-guided transcranial magnetic stimulation protocol for the treatment of cannabis use disorder

Centre for Addiction and Mental Health, Toronto, ON, Canada 2023.02–
Role: Consultant; PI: V. M. Tang
This proof-of-concept clinical trial will evaluate the feasibility and tolerability of a 4-week course of rTMS to the prefrontal cortex and insula as a treatment for cannabis use disorder.

PENDING RESEARCH SUPPORT	<i>Deciphering mechanisms of ECT outcomes and adverse effects (DECODE)</i>	NIH/NIMH R01 MH128686/MH128690/MH128691/MH128692	2022.08 – 2027.05
	Role: Intramural NIH collaborator; mPIs: Sheline, Narr, Espinoza, McClintock, Abbott		
	This multi-site prospective study aims to study the mechanism of ECT-induced anti-depressant benefits and cognitive adverse effects to determine optimal ECT dose.		
	<i>ECT amplitude titration for improved clinical outcomes in late-life depression</i>	NIH/NIMH R61/R33 MH125126	2021.02 – 2026.01
	Role: Intramural NIH collaborator; PI: C. C. Abbott		
	This study uses titrated amplitude ECT, individualized based on seizure threshold, to improve clinical response while minimizing cognitive impairment in geriatric depression.		
	<i>Transdiagnostic trial to reduce default mode network connectivity in bipolar depression and major depressive disorder with accelerated iTBS</i>	NIH	2025
	Role: Intramural NIH collaborator; PI: Y. I. Sheline		
	<i>Electromagnetic brain stimulation modeling at the synaptic level</i>	NIH R21	2025.02
	Role: Intramural NIH collaborator; PI: S. N. Makaroff		
COMPLETED RESEARCH SUPPORT	<i>Improving ECT clinical outcomes through seizure- and model-guided stimulation parameters</i>	NIH UG3/UH3	2024.10
	Role: mPI; collaborating PIs: C. C. Abbott, A. Datta		
	<i>Development of high-density theta burst TMS technology and initial testing in humans</i>	NIH UG3/UH3	2024.09
	Role: Intramural NIH collaborator; PI: H. Lu		
	<i>Improving the optimization of TMS coil placement with precise calculation of electric fields and robust computation of personalized functional networks</i>	NIH/NIMH R01	2024.10
	Role: Intramural NIH collaborator; PI: Y. Fan		
	<i>Targeting the causal depression network with electroconvulsive therapy</i>	NIH/NIMH R33/R61	2024.02
	Role: Intramural NIH collaborator; PI: M. Argyelan		
	<i>Development of a next generation ECT system: PRecision Optimally Targeted ECT</i>	NIH/NIMH UG3/UH3	2024.06
	Role: Intramural NIH collaborator; PI: C. C. Abbott		
	<i>Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders</i>	NIH/NIMH R61/R33 MH120188	2020.05 – 2023.04
	Role: Intramural NIH collaborator; mPIs: A. N. Voineskos, D. M. Blumberger		
	This study uses advanced brain imaging, and compare different brain stimulation techniques, to determine whether targeting the dorsomedial prefrontal cortex can engage social cognitive brain circuitry in people with schizophrenia spectrum disorders.		
	<i>ECT pulse amplitude and medial temporal lobe engagement</i>	NIH/NINDS U01 MH111826	2016.09 – 2020.07
	Role: Co-I; PI: C. C. Abbott		
	This study explores the impact of targeted hippocampal engagement with varying levels of electroconvulsive therapy current amplitude in elderly patients with clinical, neuropsychological and neuroimaging assessments.		
	<i>Individualized low amplitude seizure therapy (iLAST)</i>	Brain & Behavior Research Foundation Young Investigator Award 26161	2018.06 – 2020.06
	Role: PI		
	This study aims to develop a novel form of seizure therapy for depression that avoids the neurocognitive side effects of electroconvulsive therapy by using computational modeling		

to direct multi-electrode configurations that provide targeted and individualized dosing.

Fast-Fail Trials: Mood and Anxiety Spectrum Disorders (FAST-MAS)

NIMH 271201200006I-3-27100003-1

2016.06 – 2017.12

Role: Data analyst; PI: A. D. Krystal

The goal of this project is to establish the kappa opiate receptor occupancy and mu opiate receptor effects after two weeks of daily dosing with the investigational agent LY2456302, which has been demonstrated to be a selective kappa opiate receptor antagonist.

Transcranial direct current stimulation as a treatment for acute fear

NIH/NIMH R21 MH106772

2015.04 – 2017.01

Role: Co-I; PI: A. D. Krystal

This study investigates the utility of transcranial direct current stimulation to engage a target neural circuit, which could serve as the basis for developing better therapies for those suffering from acute fear related difficulties.

Individualized optimally-targeted seizure therapy

NIH/NCATS KL2 TR001115

2014.07 – 2016.06

Role: PI; Training Grant PI: R. M. Califf

This award from the Duke Translational Medicine Institute prepares the fellow for a successful career as a multidisciplinary independent researcher. The goal of the project is to develop a novel individualized neurotargeted seizure therapy.

Safety and feasibility of low amplitude electroconvulsive therapy

Duke University School of Medicine, Pilot fund

2015.03 – 2016.06

Role: PI

This study evaluates whether neurocognitive side effects of electroconvulsive therapy can be improved by reducing the current pulse amplitude.

Prolonging Remission In Depressed Elderly (PRIDE)

NIH/NIMH U01 MH084241

2009.04 – 2016.03

Role: Data analyst; PI: S. H. Lisanby

This study evaluates the efficacy and neurocognitive effects of combined electroconvulsive and pharmacotherapy in prolonging remission in elderly patients with major depression.

Low field magnetic stimulation coil design

Tal Medical

2015.04 – 2016.06

Role: Co-I; PI: A. V. Peterchev

This project develops a novel coil system for low field magnetic stimulation.

Concurrent cognitive behavioral therapy and transcranial magnetic stimulation in obsessive-compulsive disorder

American Psychiatric Association Research Scholarship

2015.11 – 2016.06

Role: Acting PI; Grantee: Y. Hu

The purpose of this pilot study is to evaluate the feasibility of repetitive transcranial magnetic stimulation of the supplementary motor area concurrently with elements of exposure and response prevention in patients with obsessive-compulsive disorder.

Evoked potentials as markers of ketamine-induced cortical plasticity in patients with major depressive disorder

Janssen Research & Development, LLC

2014.01 – 2015.12

Role: Co-I; PI: A. D. Krystal

This open-label trial evaluates the utility of somatosensory, motor, and transcranial magnetic stimulation-based evoked potentials as markers of cortical plasticity in response to a single intravenous infusion of ketamine in patients with depression.

Translational research evaluating neurocognitive memory processes

NIH/NIMH K23 MH087739

2013.07 – 2014.06

Role: Postdoctoral fellow; PI: S. M. McClintock

This study informs the cognitive component processes underlying memory impairment

after electroconvulsive therapy.

Magnetic seizure therapy for the treatment of depression

Stanley Medical Research Institute

2005.07 – 2011.07

Role: Postdoctoral fellow; PI: S. H. Lisanby

This two-center, randomized, double-blind controlled trial compares the antidepressant efficacy and side effects of magnetic seizure therapy and electroconvulsive therapy.

Rational dosing for electric and magnetic seizure therapy

NIH/NIMH R01 MH091083

2010.07 – 2015.12

Role: Graduate research assistant, contributed to grant writing; PI: S. H. Lisanby

This study aims to optimize stimulus parameters of electric and magnetic seizure therapy through computational modeling and preclinical studies of seizure induction.

Field shaping and coil design for transcranial magnetic stimulation

NIH/NCRR TL1 RR024158

2008.07 – 2009.06

Role: PI; Training Grant PI: H. N. Ginsberg

This award from the Columbia University Irving Institute for Clinical and Translational Research supports clinical research training for predoctoral students in the basic sciences. The goal of the project is to develop novel coil design for transcranial magnetic stimulation.

Development of a novel TMS device with controllable pulse shape

NIH/NIBIB R21 EB006855

2007.08 – 2008.06

Role: Graduate research assistant; PI: A. V. Peterchev

This project develops an efficient transcranial magnetic stimulation device that produces nearly rectangular pulses with adjustable amplitude, width, and directionality.

Nonlinear analysis of heart rate variability

NIH/NHLBI R01 HL079503

2005.11 – 2007.05

Role: Graduate research assistant; PI: C.-S. Poon

This project develops advanced nonlinear estimation and adaptive control algorithms for the modeling and analysis of the cardiovascular system.

PROFESSIONAL
PRESENTATIONS
SUMMARY

 **29** Invited seminars & webinars
 **7** Grand rounds
 **43** Conference talks & workshops

INVITED
SEMINARS &
WEBINARS

International Society for ECT and Neurostimulation Webinar Upcoming 2025
Multichannel Individualized Stimulation Therapy (MIST): Engineering precision in ECT

NIMH Intramural Research Program Investigators' Seminar 2025
Reading tells: Using facial expression analysis to track emotional states in depression

IEEE Magnetism and EMBS Chapters 2025

Virginia Commonwealth University Mechanical & Nuclear Engineering Department Seminar
Recent advances in transcranial magnetic stimulation: Devices, modeling, and applications

University of Texas Southwestern, Department of Psychiatry 2025
From models to medicine: Advancing precision neuromodulation through engineering

UCSF Department of Psychiatry & Behavioral Sciences 2025
Engineering precision in neuromodulation: Computational models to clinical applications

International Symposium on Novel Neuromodulation Techniques 2024
Model-driven brain stimulation treatments

University of Pittsburgh, Geriatric Psychiatry Neuroimaging Laboratory 2024
The full spectrum: Electromagnetic brain stimulation from minimal to maximal intensity

University of Texas Southwestern, Center for Depression Research and Clinical Care 2023
Advancements in computational neurostimulation for depression treatment optimization

and technology development


University of Pittsburgh, Department of Psychiatry <i>Computational neurostimulation: Treatment optimization and technology development</i>	2023
National Center of Neuromodulation for Rehabilitation, MUSC <i>Model-driven design for brain stimulation therapies</i> 	2022
International Network of tES-fMRI Webinar <i>Electric field modeling and optimization approaches for individualized targeting</i>	2022
NIMH Intramural Research Program Investigators' Seminar <i>Seizure therapies: The next generation</i>	2022
Brown University/Butler Hospital, Department of Psychiatry & Human Behavior <i>Computational model driven design for brain stimulation</i>	2021
University of Pennsylvania, Center for Neuromodulation in Depression and Stress <i>Electromagnetic brain stimulation from low to high intensity</i>	2021
VA Boston Healthcare System, Boston University School of Medicine Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar <i>Precision neurostimulation: History, physics, computational modeling, and engineering</i>	2020
Medical University of Vienna, Neuroimaging Lab <i>Precision seizure therapy</i>	2020
International Symposium on Advancing Stimulation Precision Medicine of Brain Disorders, Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resonance <i>Rational design of precision seizure therapy</i>	2019
Mount Sinai Icahn School of Medicine, Depression and Anxiety Center <i>Rational design of individualized noninvasive brain stimulation</i>	2019
NIMH Intramural Research Program Investigators' Seminar <i>Computational neurostimulation: Engineering better brain stimulation therapies</i>	2018
UCLA Brain Mapping Center <i>Computational neurostimulation: Engineering better brain stimulation therapies</i>	2018
UCLA Semel Institute for Neuroscience and Human Behavior Neuromodulation Division <i>Modeling and design for magnetic stimulation</i>	2018
USC Mark and Mary Stevens Neuroimaging and Informatics Institute <i>Computational neurostimulation</i>	2018
NIDA, Neuroimaging Research Branch <i>Advances in transcranial magnetic stimulation technology</i>	2016
Mayo Clinic College of Medicine, Department of Molecular Pharmacology Neurobiology of Alcoholism and Drug Addiction Lab <i>Transcranial magnetic stimulation technology development</i>	2016
Mayo Clinic College of Medicine, Department of Neurologic Surgery Neural Engineering Lab <i>Optimizing transcranial magnetic stimulation</i>	2016
NIMH, Experimental Therapeutics & Pathophysiology Branch <i>Engineering better electromagnetic brain stimulation therapies</i>	2016
Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences Chair's round: <i>Fundamentals of transcranial electric and magnetic stimulation dosing</i>	2015
Weill Cornell Medical College, Department of Biomedical Engineering <i>Transcranial magnetic stimulation: Pulse source, coil design, & concurrent neuroimaging</i>	2015

	Duke University, Department of Biomedical Engineering <i>Modeling and coil design considerations for transcranial magnetic stimulation</i>	2014
GRAND ROUNDS	Barrow Neurological Institute, Phoenix, AZ <i>Innovating neurostimulation: From treatment optimization to next-generation technology</i>	Upcoming 2025
	Advanced Research Institute Grand Rounds in Mental Health and Aging Research <i>Advancing neurostimulation treatment optimization and technology innovation</i>	2023
	Westmead Hospital, Sydney, Australia <i>Advances in neuromodulation: Electroconvulsive therapy</i>	2020
	Clinical TMS Society <i>Transcranial magnetic stimulation: Physics, devices, and modeling</i>	2018
	University of New Mexico, Department of Psychiatry & Behavioral Sciences <i>Toward individualized electroconvulsive therapy for treatment of depression</i>	2017
	Central Regional Hospital, Butner, NC <i>Individualized seizure therapy</i>	2015
	Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences <i>Toward next generation seizure therapy</i>	2015
CONFERENCE TALKS & WORKSHOPS	Bergen Workshop of the Global ECT-MRI Collaboration <i>Computational approaches to ECT: How electric field modeling guides treatment</i>	Upcoming 2025
	American Neuropsychiatric Association Annual Meeting <i>Advancing personalized seizure therapy: Magnetic seizure therapy and Multichannel Individualized Stimulation Therapy</i> Part of Program Committee Symposium: <i>Interventional neuropsychiatry: From mechanisms to clinical decision making</i>	2025
	International Brain Stimulation Conference <i>Multichannel Individualized Stimulation Therapy: A targeted approach to optimize ECT</i> Part of symposium: <i>ECT reimagined: Precision, prediction, and personalized care</i> ✂ Accepted for presentation, unable to attend due to government travel restrictions	2025
	IEEE Brain Discovery & Neurotechnology Workshop, University of Illinois Chicago <i>A model-driven approach to personalized neuromodulation treatment</i>	2024
	NIMH Workshop on The Placebo Effect: Key Questions for Translational Research <i>Challenges and strategies in implementing effective sham stimulation for noninvasive brain stimulation trials</i> 📄	2024
	International Society for Magnetic Resonance in Medicine Annual Meeting <i>TMS devices and modeling</i> Part of workshop: <i>From basics to applications: MRI of neuromodulation using TMS and FUS</i>	2024
	Brain and Human Body Modeling Conference <i>Effects of low intensity magnetic stimulation</i>	2023
	International Conference of the IEEE Engineering in Medicine and Biology Society <i>Modeling of TMS and ECT in the treatment of depression</i> Part of panel: <i>Computational analysis of non-invasive neuromodulation constructs: Brain & spine</i>	2023
	ADAA Anxiety and Depression Conference <i>Modeling and dose optimization for TMS and ECT</i> Part of panel: <i>Parsing through syndromic heterogeneity in youths with mental illness to identify neurocircuit mechanisms and develop novel treatments</i>	2023
	International Society for Magnetic Resonance in Medicine <i>Modeling of TMS</i> 📄 Part of workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, & biomarker development</i>	2022

Bergen Workshop of the Global ECT–MRI Collaboration <i>ECT device development</i> 	2022
Brain and Human Body Modeling Conference <i>ECT, electric field, neuroplasticity, and clinical outcomes</i> Part of panel: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i>	2022
European Conference of Brain Stimulation in Psychiatry <i>Symptom dimensions and response trajectories in ECT and MST</i> Part of panel: <i>Beyond clinical syndromes: Understanding mechanisms of neuromodulation from a dimensional perspective</i>	2022
Society of Biological Psychiatry Annual Meeting <i>Depressive symptom dimensions in seizure therapy</i> Part of panel: <i>Dimensional approaches to device neuromodulation</i>	2022
Global ECT–MRI Collaboration Young Researchers Collective <i>ECT, electric field, neuroplasticity, and clinical outcomes</i>	2022
American Academy of Child and Adolescent Psychiatry Annual Meeting <i>Introduction to computational psychiatry</i> Part of panel: <i>Recent work with contemporary computational methods and artificial intelligence to advance the practice of child and adolescent psychiatry</i>	2021
European College of Neuropsychopharmacology Congress <i>Precision neurostimulation: Electroconvulsive therapy</i> Part of panel: <i>Neurobiology of rapid mood changes</i>	2021
Society for Brain Mapping & Therapeutics Annual Congress <i>Advances in electroconvulsive therapy for treatment of depression</i>	2021
International College of Neuropsychopharmacology Virtual World Congress <i>Next generation seizure therapy and neuromodulation</i>	2021
European Conference of Brain Stimulation in Psychiatry <i>Electric field modeling to inform ECT dosing and device development</i> Part of panel: <i>What can we learn from ECT: Insights from the GEMRIC consortium</i>	2020
University of Minnesota Non-Invasive Brain Stimulation Workshop <i>Use of individual electric field models in clinical research</i> 	2020
NYC Neuromodulation Online Discussant, <i>Noninvasive vagus nerve stimulation applied to stress management, opioid withdrawal, and neurocognitive disorders</i>	2020
American Society of Clinical Psychopharmacology Annual Meeting <i>Advancing seizure therapy: Rational design for precision outcomes</i> Part of panel: <i>New developments in neurostimulation</i>  Accepted for presentation, conference was canceled due to COVID-19	2020
American College of Neuropsychopharmacology Annual Meeting <i>Rational design of precision seizure therapy</i> Part of panel: <i>Precision neurostimulation for treatment of psychiatric disorders</i>	2019
International College of Neuropsychopharmacology Meeting <i>Individualized seizure therapy: Reinventing ECT</i> Part of workshop: <i>Neurobiological and clinical characterization, and treatment development for treatment resistant depression</i>	2019
International Brain Stimulation Conference <i>Individualized electroconvulsive therapy for treatment of depression</i> Part of panel: <i>Individualized brain stimulation: Addressing heterogeneity across modalities</i>	2019
Bergen Workshop of the Global ECT–MRI Collaboration <i>Electric field modeling for electroconvulsive therapy</i>	2018

Joint NYC Neuromodulation Conference & NANS Summer Series <i>Optimizing high-density stimulation arrays for brain targeting</i>	2018
Neuropsychiatric Drug Development Summit <i>Targeted intermittent device delivered interventions will ultimately prove superior to maintenance treatment with drugs for brain disorders</i>	2018
International Conference of the IEEE Engineering in Medicine and Biology Society <i>Electric field induced by TMS: Applications in depression and anxiety</i> Part of panel: <i>Computational human models for brain stimulation</i>	2018
American Psychiatric Association Annual Conference <i>Individualized neurotargeted seizure therapy: Reinventing ECT</i> Part of Presidential Symposium: <i>ECT in the era of new brain stimulation treatments</i>	2018
ADAA Anxiety and Depression Conference <i>Individualized neurotargeted seizure therapy: Reinventing ECT</i> Part of panel: <i>Personalized medicine for treatment resistant depressed patients: Novel strategies to optimize treatment with antidepressant medications, ketamine, and ECT</i>	2018
NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop <i>Use of individual electric field models in clinical research</i> 	2017
NYC Neuromodulation Conference <i>Low field magnetic stimulation</i>	2017
NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications <i>Effect of anatomical variability on electric field characteristics of tES</i>	2016
International Society for ECT and Neurostimulation Annual Meeting Workshop: <i>Spatial targeting with transcranial magnetic stimulation</i>	2015
International Conference of the IEEE Engineering in Medicine and Biology Society <i>TMS in the presence of deep brain stimulation implants: Induced electrode currents</i> <i>ECT in the presence of deep brain stimulation implants: Electric field effects</i>	2010
Annual National Predoctoral Clinical Research Training Program Meeting <i>Coil design for deep-brain transcranial magnetic stimulation</i>	2009
TRANSFORM Research Day, Irving Institute for Clinical and Translational Research <i>Electromagnetic field shaping and coil design for transcranial brain stimulation</i>	2009
International Conference of the IEEE Engineering in Medicine and Biology Society <i>Coil design considerations for deep brain transcranial magnetic stimulation</i>	2008
Annual Meeting of the Society for Neuroscience <i>Heart rate variability is more chaotic in REM than NREM sleep in children</i>	2006
International Conference of the IEEE Engineering in Medicine and Biology Society <i>Heart rate variability in pediatric obstructive sleep apnea</i>	2006

TEACHING &
MENTORING
APPOINTMENTS

Lecturer, NIH	
National Institute of Mental Health <i>Basic Training Course on Transcranial Magnetic Stimulation</i>  <i>fMRI Course</i>	2020 Summer 2017
National Institute of Neurological Disorders and Stroke <i>Clinical Neuroscience Program Lecture Series</i>	2017, 2019
Research Mentor, University of Maryland, College Park Fischell Department of Bioengineering Capstone project: <i>Detection of brain-to-brain synchrony for improved psychotherapy</i>	2018–2019

Faculty, Duke University

Department of Psychology & Neuroscience

Research Independent Study

2016

Matching Undergraduates to Science and Engineering Research Program

2015–2016

Biosciences Collaborative for Research Engagement

2015–2016

Department Psychiatry & Behavioral Sciences

Visiting Fellowship in Electroconvulsive Therapy (CME accredited)

2015

Visiting Fellowship in Transcranial Magnetic Stimulation (CME accredited) 2014–2016**Teaching Assistant, Columbia University**

Department of Electrical Engineering

Analog Systems in VLSI (graduate level)

Spring 2010

The Digital Information Age

Fall 2009

Recitation Instructor, Columbia University Mailman School of Public Health

Department of Biostatistics

Biostatistics (graduate level)

Fall 2009

Teaching Assistant, MIT

Concourse Program

Multivariable Calculus

Fall 2003–2006

Differential Equations

Spring 2004–2007

**MENTORING
SUMMARY**

	5 Junior faculty
	2 Research fellows & postdoctoral fellows
	1 Sponsored thesis
	4 Thesis examination committees
	2 Graduate students
	6 Post-baccalaureate fellows
	11 Undergraduate students
	6 Interns

**JUNIOR
FACULTY
ADVISORY**

D. C. Farrar, M.D., Ph.D., University of New Mexico School of Medicine	2025–
Project: “CEASE-LD: Cortical Excitability, Adequacy of Seizures, and Efficacy in Late-life Depression with ECT”	
S. K. Conroy, M.D., Ph.D., Indiana University School of Medicine	2024–
Project: “Targeting the medial prefrontal cortex with theta burst stimulation to reduce negative self-referential processing in major depression”	
S. M. Hare, Ph.D., University of Maryland School of Medicine	
NIH/NIMH K01 MH133116	2024–2029
Project: “Cognitive and neural correlates of TMS motor intracortical inhibition in schizophrenia”	
S. H. Siddiqi, M.D., Brigham & Women’s Hospital	
NIH/NIMH K23 MH121657	2020–2025
Project: “Personalized circuit-based neuromodulation targets for depression”	
🏆 Klerman Prize for Exceptional Clinical Research, <i>Brain & Behavior Research Foundation</i> , 2022.	
N. L. Balderston, Ph.D., University of Pennsylvania Perelman School of Medicine	
NIH/NIMH K01 MH121777	2019–2023
Project: “Examining the mechanisms of anxiety regulation using a novel, sham-controlled, fMRI-guided rTMS protocol and a translational laboratory model of anxiety”	
🏆 Klerman Prize for Exceptional Clinical Research, <i>Brain & Behavior Research Foundation</i> , 2021.	

RESEARCH FELLOWS & POSTDOCS	S. Dey, Ph.D., NIMH Visiting Postdoctoral Fellow	2024 –
	M. Dannhauer, Ph.D., NIMH Research Fellow	2022 – 2024
	Career progression: Assistant Professor, Computer Science, East Carolina University	
SPONSORED THESES	G. Asturias, Psychology & Neuroscience, Duke University	2015 – 2017
	Undergraduate honors thesis: “Effect of repetitive transcranial magnetic stimulation on the structural and functional connectome in patients with major depressive disorder.” Available: <i>DukeSpace</i> , HDL: 10161/14299	
	🎓 Graduated with Distinction	
	Career progression: Medical student, Stanford University School of Medicine	
THESIS EXAMINATION COMMITTEES	S. J. Bolland, Biomedical Engineering, University of Western Australia	2025
	Ph.D. dissertation: “A comparative study of transcranial magnetic stimulation induced electrical field distributions in neural tissue: A translational pipeline for finite element method analysis using MRI modalities.” Sponsor: J. Rodger.	
	D. Tang, Electrical & Computer Engineering, Worcester Polytechnic Institute	2025
	M.S. thesis: “Computational and experimental approaches to brain stimulation: TMS simulation, coil measurement, and neural structure analysis.” Sponsor: S. N. Makaroff.	
	W. A. Wartman, Electrical & Computer Engineering, Worcester Polytechnic Institute	2024
	Ph.D. dissertation: “Adaptive mesh refinement for quasistatic electromagnetic modeling of brain stimulation and recording methods.” Sponsor: S. N. Makaroff.	
	D. Q. Troung, Biomedical Engineering, CUNY City College	2019
	Ph.D. dissertation: “Translational modeling of non-invasive electrical stimulation.” Sponsor: M. Bikson. Available: <i>CUNY Academic Works</i> , URL: https://academicworks.cuny.edu/cc_etds_theses/774	
GRADUATE STUDENTS	E. Bharti, Ph.D. candidate, NIH–Cambridge Scholars Program	2024 –
	M. Kshirsagar, M.S., Biomedical Engineering, Duke University	2012
	Career progression: Consultant, Deloitte Consulting	
POSTBACS	P. L. Robins, B.A., NIMH Intramural Research Training Award (IRTA) Fellow	2021 – 2024
	🎓 Trainee Travel Award, NIMH Intramural Research Program, 2023.	
	🎓 First Place in Student Competition, <i>Brain & Human Body Modeling Conference</i> , 2022.	
	Career progression: TMS administrator, Columbia Associates	
	M. R. Hynd, B.S., NIMH IRTA Fellow	2020 – 2022
	Career progression: Ph.D. student, University of North Carolina at Chapel Hill	
	S. Awasthi, B.S., NIMH IRTA Fellow	2018 – 2020
	Career progression: Medical student, Stanford University School of Medicine	
	M. M. Noh, S.B., NIMH IRTA Fellow	2018 – 2019
	Career progression: Medical student, University of Cincinnati College of Medicine	
	J. Thomas, M.S., NIMH IRTA Fellow	2017 – 2019
	Career progression: Program officer, National Academies of Sciences, Engineering, & Medicine	
	M. Velez Afanador, B.S., NIMH IRTA Fellow	2016 – 2019
	🎓 Outstanding Poster Award, <i>NIH Postbac Poster Day</i> , 2018.	
	Career progression: Medical student, Howard University College of Medicine	
UNDERGRADS	D. T. Weaver, Biology, Duke University	2016
	Career progression: M.D./Ph.D. student, Case Western Reserve University	
	E. F. Salgado, Psychology & Neuroscience, Duke University	2016
	🎓 Graduated with Distinction	
	Career progression: Ph.D. student, Indiana University–Purdue University Indianapolis	

	Z. Feng, Biomedical Engineering and Biology, Duke University Career progression: Medical student, University of Colorado School of Medicine	2015 – 2016
	M. L. Glidewell, Biomedical Engineering, Duke University Career progression: Senior strategy consultant, IBM	2015 – 2016
	W. Lim, Biomedical Engineering, Duke University Career progression: Medical student, Texas A&M College of Medicine	2015 – 2016
	F. M. Mercer, Gender, Sexuality and Feminist Studies, Duke University Career progression: Analyst, Morgan Stanley	2015 – 2016
	E. Shinder, Biology, Duke University 🏆 Graduated with Distinction Career progression: Medical student, Stony Brook School of Medicine	2015 – 2016
	E. P. Vienneau, Biomedical Engineering, Duke University 🏆 Howard G. Clark Award for Excellence in Research Career progression: Ph.D. student, Vanderbilt University	2015 – 2016
	S. H. Lee, Biomedical Engineering, Duke University Career progression: Manager, Strategy & Operations, Tempus Labs	2015
	R. Shah, Psychology & Neuroscience, Duke University Career progression: Medical student, Yale School of Medicine	2015
	J. R. Lilien, Electrical & Computer Engineering, Duke University 🏆 Walter J. Seeley Scholastic Award Career progression: Machine learning engineer, Amazon	2014 – 2016
INTERNS	W. H. Lohr, Ph.D. cand., Biomedical Engineering, Virginia Commonwealth University	2025
	M. Dib, Biomedical Engineering, University of Maryland, College Park Supervised as a summer intern at the NIH, provided ongoing mentorship during academic terms, including advising Capstone design project Career progression: Medical student, Weill Cornell Medicine	2018 – 2019
	E. Chung, Psychology, University of Maryland, College Park	2017
	A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University Career progression: Ph.D. student, Penn State University	Summer 2017
	C. M. Prevost, Biomedical Engineering, Clemson University Career progression: Medical student, University South Carolina School of Medicine Greenville	Summer 2015
	J. V. McCall, Biomedical Engineering, North Carolina State University Career progression: Ph.D. student, North Carolina State University	Summer 2013
PROFESSIONAL SOCIETIES MEMBERSHIP	IEEE , Engineering in Medicine and Biology Society Senior Member (2023 –), Member (2013 – 2023), Student Member (2004 – 2013)	2004 –
	American College of Neuropsychopharmacology , Associate Member	2023 –
	Biomedical Engineering Society , Member	2021 –
	American Society of Clinical Psychopharmacology , Member	2019 –
	<i>Past memberships:</i> Anxiety and Depression Association of America, Member International Society for CNS Clinical Trials and Methodology, Member Organization for Human Brain Mapping, Member Society for Industrial and Applied Mathematics, Student Member Society for Neuroscience, Student Member American Physical Society, Student Member	2017 – 2018 2017 – 2019 2014 – 2019 2008 – 2012 2005 – 2012 2004 – 2009

PROFESSIONAL COMMITTEES & ADVISORY ROLES	Advisory Board, Center for Multiscale Bioelectromagnetic Studies of the Brain Department of Electrical & Computer Engineering, Worcester Polytechnic Institute	2025 –
	Board Member, The Global ECT–MRI Research Collaboration (GEMRIC)	2025 –
	Contributor, Non-Invasive Brain Stimulation (NIBS)-BIDS extension proposal Collaborated on extending the Brain Imaging Data Structure (BIDS) specification to establish standardized data and metadata storage guidelines for the NIBS field 	2023 –
	Early Career Committee, American Society of Clinical Psychopharmacology	2023 – 2027
	Technology Committee, American Society of Clinical Psychopharmacology	2023 – 2025
	Technology Task Force, American Society of Clinical Psychopharmacology	2020 – 2023
INSTITUTIONAL SERVICE	Judge, NIH Fellows Award for Research Excellence Competition	2025
	Educational Counselor, MIT	2022 – 2025
	NIH Research Workforce Diversity and Equity Outreach Special Interest Group	2023 – 2025
	Judge, NIMH Training Day Three-Minute Talks competition	2022
	Judge/Lead Judge, NIH Postbac Poster Day	2017 – 2019
	NIH Noninvasive Brain Stimulation Special Interest Group	2017 – 2025
GRANT REVIEW	Reviewer, NIH BluePrint MedTech Program	2021 –
	Reviewer, NIH Center for Scientific Review Biophysics of Neural Systems Study Section	2021.10
	Reviewer, Duke Institute for Brain Sciences, Research Incubator Awards	2018, 2021
EDITORIAL ROLES	Editorial Board Member, <i>Brain Stimulation</i>	2025 –
	Deputy Editor, <i>Transcranial Magnetic Stimulation</i>	2024 –
	Associate Editor, <i>Frontiers in Psychiatry</i> Sections: Neurostimulation, Neuroimaging	2022 –
	Co-Editor on Research Topic: <i>How Does Brain Stimulation Work? Neuroversion and Other Putative Mechanisms of Action</i> 	2024
	Review Editor, <i>Frontiers in Psychology</i> Sections: Addictive Behaviors, Consciousness Research	2022 –
	Review Editor, <i>Frontiers in Psychiatry</i> Sections: Neurostimulation, Neuroimaging	2016 – 2022
	Guest Associate Editor, <i>Frontiers in Pharmacology: Neuropharmacology</i> Co-Editor on Research Topic: <i>Neurobiology of Rapid Mood Changes</i> 	2020
	Guest Editor, <i>Physics in Medicine and Biology</i> Special Issue: <i>Electromagnetic Modeling for Brain Stimulation</i> 	2024
	<i>Ad hoc</i> journal reviewer <i>AIP Advances</i> <i>American Journal of Psychiatry</i> <i>Asian Journal of Psychiatry</i> <i>Australasian Physical and Engineering Sciences in Medicine</i> <i>Biological Psychiatry</i> <i>BioMedical Engineering OnLine</i> <i>BMJ Mental Health</i>	2010 –

Brain Research Bulletin
Brain Sciences
Brain Stimulation
Cerebral Cortex
Chaos, Solitons & Fractals
Clinical EEG and Neuroscience
Clinical Neurophysiology
CNS Spectrums
Computational and Mathematical Methods in Medicine
Computer Methods and Programs in Biomedicine
Computer Methods in Biomechanics and Biomedical Engineering
Cortex
European Psychiatry
Frontiers in Cell and Developmental Biology
Frontiers in Medicine: Intensive Care Medicine and Anesthesiology
Frontiers in Neurology: Applied Neuroimaging
Frontiers in Neuroscience: Brain Imaging Methods
IEEE Antennas and Propagation Magazine
IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology
IEEE Transactions on Biomedical Engineering
IEEE Transactions on Neural Systems & Rehabilitation Engineering
IEEE Transactions on Magnetics
Imaging Neuroscience
Journal of ECT
Journal of Neural Engineering
Journal of Neuroscience Methods
Journal of Psychiatric Research
JoVE
Medical & Biological Engineering & Computing
Medical Hypotheses
Nature Mental Health
NeuroImage; NeuroImage Clinical
Neuromodulation: Technology at the Neural Interface
Neuroscience Letters
PLOS ONE
Scientific Reports
Translational Psychiatry

Reviewer, conference proceedings and abstracts 2008 –

International Conference of the IEEE Engineering in Medicine and Biology Society
 IEEE/EMBS International Conference on Neural Engineering
 IEEE/EMBS International Conference on Biomedical and Health Informatics
 Biomedical Engineering Society Annual Meeting

CONFERENCE & WORKSHOP ORGANIZATION	Brain and Human Body Modeling Conference 2023 Organizing committee, and judge in student competition Chair of panel: <i>New modeling methods: Spinal cord stimulation and novel stimulation</i> Chair of panel: <i>Development and assessment of modeling methods</i> American Society of Clinical Psychopharmacology Annual Meeting 2023 Program review subcommittee International Brain Stimulation Conference 2023 Chair of symposium: <i>Insights and challenges in preclinical models of TMS: Multimodal investigations across animal species</i> Chair of symposium: <i>Advanced computational modeling and optimization methods for non-</i>
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invasive brain stimulation

	International Congress of Clinical Neurophysiology	2022
	Chair of panel: <i>Towards optimized TMS targeting approaches</i>	
	Brain and Human Body Modeling Conference	2022
	Organizing committee	
	Chair of panel: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i>	
	American Society of Clinical Psychopharmacology Annual Meeting	2019
	Chair of panel: <i>Treatment-resistant mood disorders across the lifespan: Novel therapeutics</i>	
	International Conference of the IEEE Engineering in Medicine and Biology Society	2018
	Chair of panel: <i>Computational human models for brain stimulation</i>	
	NYC Neuromodulation Conference	2018
	Director of preconference workshop: <i>Computational modeling in neuromodulation: Tools for engineers, clinicians, and researchers</i>	
COMMUNITY INVOLVEMENT, OUTREACH, & SCIENCE ADVOCACY	Producer, <i>Psychopharm Today</i> podcast 	2024–
	Hosted by the American Society of Clinical Psychopharmacology	
	Mental Health Association of Maryland	2020
	Presentation: <i>Fundamentals of transcranial brain stimulation</i>	
	ASCP Early Career Workshop	2021
	Presentation: <i>Engaging presentation strategies for any audience</i>	
	Jewish Social Service Agency	2020
	Presentation: <i>Basics of brain stimulation devices: What are they and how do they work</i>	
	Exhibitor, USA Science & Engineering Festival	2020
	☒ Event was canceled due to COVID-19	
	University of Pennsylvania, Wharton Undergraduate Health Care Club	2019
	Presentation: <i>Research in mental health treatment</i>	
	Judge, MIT Hacking Medicine: DC Grand Hack	2019
	NIH High School Scientific Training and Enrichment Program	2019
	Presentation: <i>Bioelectricity and brain stimulation</i>	
	NIH Take Your Child to Work Day	2019
	Presentation: <i>How to fool your brain</i>	
	UCLA, CruX Neurotech Organization	2019
	Presentation: <i>Neuromodulation in psychiatry</i>	
PROFESSIONAL DEVELOPMENT & CONTINUING EDUCATION	University of Pennsylvania, Wharton Undergraduate Health Care Club	2018
	Presentation: <i>Technology and the future of mental health treatment</i>	
	Innovation Leader, Psychiatry Innovation Lab, American Psychiatric Association	2016
	Duke Translational Medicine Institute, Undergraduate Research Society	2016
	Presentation: <i>Engineering meets psychiatry</i>	
	Duke Psychiatry, Mood Disorders Support and Education Group	
	Presentation: <i>Brain stimulation treatments for severe mood disorders</i>	2016
	Presentation: <i>New frontiers in treatments for mood disorders</i>	2015
	Mid-Level Leadership Program, NIH	2023
	Diversity and Inclusion Certificate Program, NIH	2021–2022

Non-invasive Transcranial Brain Stimulation Course, Danish Research Centre for Magnetic Resonance, Copenhagen University Hospital Hvidovre	2019
AFNI+SUMA Training Workshop, NIH	2018
Health Disparities Research Curriculum, Duke Translational Medicine Institute	2015–2016
Tackling the Challenges of Big Data, MIT Professional Education Program	2015
Clinical Research Training Program, Duke University	2014–2015
Transcranial magnetic stimulation administration certified, Columbia University Irving Medical Center/New York State Psychiatric Institute	2009
Basic Life Support, American Heart Association	Recertified 2023.07

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