

ZHI-DE DENG

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LAST UPDATED February 15, 2025


EDUCATION **Ph.D., Electrical Engineering**, Columbia University 2013
Dissertation: *Electromagnetic Field Modeling of Transcranial Electric & Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive & Subconvulsive Applications*

M.Phil., Electrical Engineering, Columbia University 2011
Graduate concentration in Neuroscience


M.Eng., Electrical Engineering & Computer Science, MIT 2007
Thesis: *Stochastic Chaos and Thermodynamic Phase Transitions: Theory and Bayesian Estimation Algorithms*

S.B., Electrical Science & Engineering, MIT 2007


S.B., Physics, MIT 2006
Minor in Economics


POSTGRADUATE **Research Fellow**, National Institute of Mental Health 2016–2019
TRAINING & Noninvasive Neuromodulation Unit
FELLOWSHIP Experimental Therapeutics & Pathophysiology Branch
APPOINTMENTS  Richard J. Wyatt Memorial Fellowship for Translational Research

Postdoctoral Associate, Duke University School of Medicine 2013–2014
Division of Brain Stimulation & Neurophysiology
Department of Psychiatry & Behavioral Sciences

PROFESSIONAL **Staff Scientist**, NIMH 2019–
& ACADEMIC Noninvasive Neuromodulation Unit
APPOINTMENTS Experimental Therapeutics & Pathophysiology Branch
 *Director*, Computational Neurostimulation Research Program

Adjunct Assistant Professor, Duke University School of Medicine 2016–2024
Division of Behavioral Medicine & Neurosciences
Department of Psychiatry & Behavioral Sciences
Network Faculty, Duke Institute for Brain Sciences

Medical Instructor, Duke University School of Medicine 2014–2016
Division of Brain Stimulation & Neurophysiology
Department of Psychiatry & Behavioral Sciences
 *KL2 Scholar*, Duke Translational Medicine Institute

PREDOCTORAL **Visiting Graduate Research Assistant**, Duke University 2010–2013
RESEARCH **Graduate Research Assistant**, Columbia University 2007–2010
ASSISTANTSHIPS  *TL1 Scholar*, Irving Institute for Clinical and Translational Research
& INTERNSHIPS

Research Assistant, Harvard–MIT Division of Health Sciences & Technology 2005–2007

Executive Intern, Weill Cornell Medicine Anesthesiology Summer 2004

Internship Coordinator, Children's Aid Summer 2003

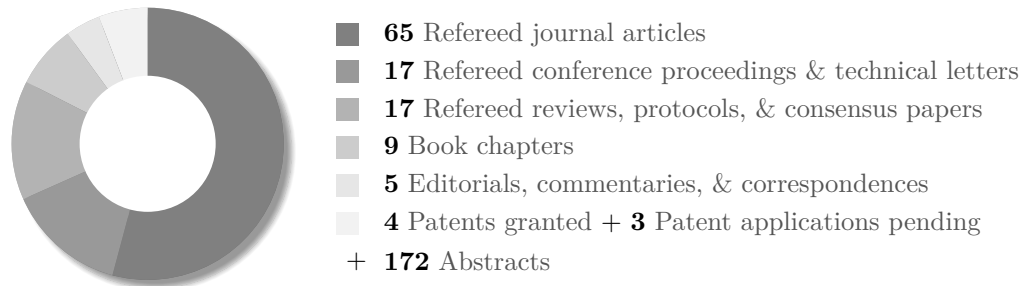
Newsroom Technology Intern, The New York Times Company Summer 2002

AWARDS & HONORS (SELECTED)	NIMH Director's Award	2024
	For outstanding transdisciplinary scientific contributions to advance neuromodulation technologies for the study and treatment of psychiatric disorders, NIMH	
	Elected to Full Membership	2024
	Sigma Xi, The Scientific Research Honor Society	
	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, NIMH	
	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
	NIMH/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
- ⚡ Electrophysiological and neuroimaging biomarker development
- ⚡ Nonlinear dynamics of physiological systems

RESEARCH OUTPUT SUMMARY



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*, in press, Feb. 2025.

DOI: 10.1101/2024.09.28.615333; PMCID: PMC11722405; Data available

S. M. McClintock, **Z.-D. Deng**, M. M. Husain, V. J. Thakkar, E. Bernhardt, R. D. Weiner, B. Luber, 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; PMID: 39710004; 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

Third Place in Best Student Paper (awarded to N. I. Hasan), *Photonics and Electromagnetics Research Symposium*, 2024.

B. Luber, 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; PMCID: 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

 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; PMCID: 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. Yrondi, 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. Hurlemann, 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; PMCID: 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; PMCID: 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,” *Biomedicines*, vol. 11, no. 8, 2320, Aug. 2023.

DOI: 10.3390/biomedicines11082320; PMCID: 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; PMCID: 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; PMCID: 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; PMCID: 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/fpsyt.2023.1168672; PMCID: 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.

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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
⊕ Part of Collection: *Brain Stimulation in Psychiatry* ↗
- C. C. Abbott, D. Quinn, J. Miller, E. Ye, S. Iqbal, M. Lloyd, T. R. Jones, J. Upston, **Z.-D. Deng**, E. Erhardt, and S. M. McClintock, “Electroconvulsive therapy pulse amplitude and clinical outcomes,” *American Journal of Geriatric Psychiatry*, vol. 29, no. 2, pp. 166–178, Jan. 2021.
DOI: 10.1016/j.jagp.2020.06.008; PMID: PMC7744398

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



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- 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.
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- *✎ 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

- 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, **Z.-D. Deng**, J. Upston, T. Jones, and A. Datta, “Systems and methods for electroconvulsive therapy,” WO 2024/148196 A1, Jul. 11, 2024. [↗](#)
- 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 electromagnetic 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 neuromodulatory 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 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.	2022.08 – 2027.05
	<i>ECT amplitude titration for improved clinical outcomes in late-life depression</i> NIH/NIMH R61/R33 MH125126 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.	2021.02 – 2026.01
	<i>Transdiagnostic trial to reduce default mode network connectivity in bipolar depression and major depressive disorder with accelerated iTBS</i> NIH Role: Intramural NIH collaborator; PI: Y. I. Sheline	2025
	<i>Electromagnetic brain stimulation modeling at the synaptic level</i> NIH R21 Role: Intramural NIH collaborator; PI: S. N. Makaroff	2025.02
	<i>Improving ECT clinical outcomes through seizure- and model-guided stimulation parameters</i> NIH UG3/UH3 Role: mPI; collaborating PIs: C. C. Abbott, A. Datta	2024.10
	<i>Development of high-density theta burst TMS technology and initial testing in humans</i> NIH UG3/UH3 Role: Intramural NIH collaborator; PI: H. Lu	2024.09
	<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 Role: Intramural NIH collaborator; PI: Y. Fan	2024.10
	<i>Targeting the causal depression network with electroconvulsive therapy</i> NIH/NIMH R33/R61 Role: Intramural NIH collaborator; PI: M. Argyelan	2024.02
	<i>Development of a next generation ECT system: PRecision Optimally Targeted ECT</i> NIH/NIMH UG3/UH3 Role: Intramural NIH collaborator; PI: C. C. Abbott	2024.06
	<i>Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders</i> NIH/NIMH R61/R33 MH120188 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.	2020.05 – 2023.04
COMPLETED RESEARCH SUPPORT	<i>ECT pulse amplitude and medial temporal lobe engagement</i> NIH/NINDS U01 MH111826 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.	2016.09 – 2020.07
	<i>Individualized low amplitude seizure therapy (iLAST)</i> Brain & Behavior Research Foundation Young Investigator Award 26161 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	2018.06 – 2020.06

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.

GRAND
ROUNDS

Advanced Research Institute Grand Rounds in Mental Health and Aging Research

2023

Advancing neurostimulation treatment optimization and technology innovation

Westmead Hospital, Sydney, Australia

2020

Advances in neuromodulation: Electroconvulsive therapy

Clinical TMS Society

2018

Transcranial magnetic stimulation: Physics, devices, and modeling

University of New Mexico, Department of Psychiatry & Behavioral Sciences

2017

Toward individualized electroconvulsive therapy for treatment of depression

Central Regional Hospital, Butner, NC

2015

Individualized seizure therapy

Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences

2015

Toward next generation seizure therapy

INVITED
SEMINARS

NIMH Intramural Research Program Investigators' Seminar Series

Upcoming 2025

Reading faces: Using facial expression analysis to track emotional states in depression

IEEE Magnetism and EMBS Chapters

Upcoming 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 <i>Engineering precision in neuromodulation: Computational models to clinical applications</i>	2025
University of Pittsburgh, Geriatric Psychiatry Neuroimaging Laboratory <i>The full spectrum: Electromagnetic brain stimulation from minimal to maximal intensity</i>	2024
University of Texas Southwestern, Center for Depression Research and Clinical Care <i>Advancements in computational neurostimulation for depression treatment optimization and technology development</i>	2023
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
NIMH Intramural Research Program Investigators' Seminar Series <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
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 Series <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

CONFERENCE TALKS, WORKSHOPS, & WEBINARS	Weill Cornell Medical College, Department of Biomedical Engineering	2015
	<i>Transcranial magnetic stimulation: Pulse source, coil design, & concurrent neuroimaging</i>	
	Duke University, Department of Biomedical Engineering	2014
	<i>Modeling and coil design considerations for transcranial magnetic stimulation</i>	
	International Society for ECT and Neurostimulation Webinar	Upcoming 2025
	<i>Multichannel Individualized Stimulation Therapy</i>	
	American Neuropsychiatric Association Annual Meeting	Upcoming 2025
	<i>Advancing personalized seizure therapy: Magnetic seizure therapy and Multichannel Individualized Stimulation Therapy</i>	
	Part of panel: <i>Interventional neuropsychiatry: From mechanisms to clinical decision-making</i>	
	International Brain Stimulation Conference	2025
	<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	
	IEEE Brain Discovery & Neurotechnology Workshop, University of Illinois Chicago	2024
	<i>A model-driven approach to personalized neuromodulation treatment</i>	
	International Symposium on Novel Neuromodulation Techniques	2024
	<i>Model-driven brain stimulation treatments</i>	
	NIMH Workshop on The Placebo Effect: Key Questions for Translational Research	2024
	<i>Challenges and strategies in implementing effective sham stimulation for noninvasive brain stimulation trials</i> 	
	International Society for Magnetic Resonance in Medicine Annual Meeting	2024
	<i>TMS devices and modeling</i>	
	Part of workshop: <i>From basics to applications: MRI of neuromodulation using TMS and FUS</i>	
	Brain and Human Body Modeling Conference	2023
	<i>Effects of low intensity magnetic stimulation</i>	
	International Conference of the IEEE Engineering in Medicine and Biology Society	2023
	<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>	
	ADAA Anxiety and Depression Conference	2023
	<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>	
	International Network of tES-fMRI Webinar Series	2022
	<i>Electric field modeling and optimization approaches for individualized targeting</i>	
	International Society for Magnetic Resonance in Medicine	2022
	<i>Modeling of TMS</i> 	
	Part of workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, & biomarker development</i>	
	Bergen Workshop of the Global ECT-MRI Collaboration	2022
	<i>ECT device development</i> 	
	Brain and Human Body Modeling Conference	2022
	<i>ECT, electric field, neuroplasticity, and clinical outcomes</i>	
	Part of panel: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i>	
	European Conference of Brain Stimulation in Psychiatry	2022
	<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>	

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 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
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	2018
<i>Electric field induced by TMS: Applications in depression and anxiety</i>	
Part of panel: <i>Computational human models for brain stimulation</i>	
American Psychiatric Association Annual Conference	2018
<i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>	
Part of Presidential symposium: <i>ECT in the era of new brain stimulation treatments</i>	
ADAA Anxiety and Depression Conference	2018
<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>	
NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop	2017
<i>Use of individual electric field models in clinical research</i> 	
NYC Neuromodulation Conference	2017
<i>Low field magnetic stimulation</i>	
NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications	2016
<i>Effect of anatomical variability on electric field characteristics of tES</i>	
International Society for ECT and Neurostimulation Annual Meeting	2015
Workshop: <i>Spatial targeting with transcranial magnetic stimulation</i>	
International Conference of the IEEE Engineering in Medicine and Biology Society	2010
<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>	
Annual National Predoctoral Clinical Research Training Program Meeting	2009
<i>Coil design for deep-brain transcranial magnetic stimulation</i>	
TRANSFORM Research Day, Irving Institute for Clinical and Translational Research	2009
<i>Electromagnetic field shaping and coil design for transcranial brain stimulation</i>	
International Conference of the IEEE Engineering in Medicine and Biology Society	2008
<i>Coil design considerations for deep brain transcranial magnetic stimulation</i>	
Annual Meeting of the Society for Neuroscience	2006
<i>Heart rate variability is more chaotic in REM than NREM sleep in children</i>	
International Conference of the IEEE Engineering in Medicine and Biology Society	2006
<i>Heart rate variability in pediatric obstructive sleep apnea</i>	

TEACHING &
MENTORING
APPOINTMENTS

Lecturer , NIH	
National Institute of Mental Health	
<i>Basic Training Course on Transcranial Magnetic Stimulation</i> 	2020
<i>fMRI Course</i>	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	2018–2019
Fischell Department of Bioengineering	
Capstone project: <i>Detection of brain-to-brain synchrony for improved psychotherapy</i>	
Faculty , Duke University	
Department of Psychology & Neuroscience	
<i>Research Independent Study</i>	2016
Matching Undergraduates to Science and Engineering Research Program	2015–2016
Biosciences Collaborative for Research Engagement	2015–2016
Department Psychiatry & Behavioral Sciences	

	<i>Visiting Fellowship in Electroconvulsive Therapy</i> (CME accredited)	2015
	<i>Visiting Fellowship in Transcranial Magnetic Stimulation</i> (CME accredited)	2014–2016
	Teaching Assistant , Columbia University	
	Department of Electrical Engineering	
	<i>Analog Systems in VLSI</i> (graduate level)	Spring 2010
	<i>The Digital Information Age</i>	Fall 2009
	Recitation Instructor , Columbia University Mailman School of Public Health	
	Department of Biostatistics	
	<i>Biostatistics</i> (graduate level)	Fall 2009
	Teaching Assistant , MIT	
	Concourse Program	
	<i>Multivariable Calculus</i>	Fall 2003–2006
	<i>Differential Equations</i>	Spring 2004–2007
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 COMMITTEE MEMBERSHIP	S. J. Bolland, 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	
CAREER DEVELOPMENT AWARD 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”	
	🎓 Klernan Prize for Exceptional Clinical Research, <i>Brain & Behavior Research Foundation</i>	


	N. L. Balderston, Ph.D., University of Pennsylvania Perelman School of Medicine NIH/NIMH K01 MH121777 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>	2019 – 2023
RESEARCH FELLOWS & POSTDOCS	S. Dey, Ph.D., NIMH Visiting Postdoctoral Fellow M. Dannhauer, Ph.D., NIMH Research Fellow Career progression: Assistant Professor, Computer Science, East Carolina University	2024 – 2022 – 2024
GRADUATE STUDENTS	E. Bharti, Ph.D. candidate, NIH–Cambridge Scholars Program M. Kshirsagar, M.S., Biomedical Engineering, Duke University Career progression: Consultant, Deloitte Consulting	2024 – 2012
POSTBACS	P. L. Robins, B.A., NIMH Intramural Research Training Award (IRTA) Fellow 🏆 NIMH Intramural Research Program Trainee Travel Award 🏆 First Place in Student Competition, <i>Brain & Human Body Modeling Conference</i> Career progression: TMS administrator, Columbia Associates M. R. Hynd, B.S., NIMH IRTA Fellow Career progression: Ph.D. student, University of North Carolina at Chapel Hill S. Awasthi, B.S., NIMH IRTA Fellow Career progression: Medical student, Stanford University School of Medicine M. M. Noh, S.B., NIMH IRTA Fellow Career progression: Medical student, University of Cincinnati College of Medicine J. Thomas, M.S., NIMH IRTA Fellow Career progression: Program officer, National Academies of Sciences, Engineering, & Medicine M. Velez Afanador, B.S., NIMH IRTA Fellow 🏆 Outstanding Poster Award, <i>NIH Postbac Poster Day</i> Career progression: Medical student, Howard University College of Medicine	2021 – 2024 2023 2022 2020 – 2022 2018 – 2020 2018 – 2019 2017 – 2019 2016 – 2019 2018
UNDERGRADS	D. T. Weaver, Biology, Duke University Career progression: M.D./Ph.D. student, Case Western Reserve University E. F. Salgado, Psychology & Neuroscience, Duke University 🏆 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 M. L. Glidewell, Biomedical Engineering, Duke University Career progression: Senior strategy consultant, IBM W. Lim, Biomedical Engineering, Duke University Career progression: Medical student, Texas A&M College of Medicine F. M. Mercer, Gender, Sexuality and Feminist Studies, Duke University Career progression: Analyst, Morgan Stanley E. Shinder, Biology, Duke University 🏆 Graduated with Distinction Career progression: Medical student, Stony Brook School of Medicine E. P. Vienneau, Biomedical Engineering, Duke University 🏆 Howard G. Clark Award for Excellence in Research Career progression: Ph.D. student, Vanderbilt University	2016 2016 2015 – 2016 2015 – 2016 2015 – 2016 2015 – 2016 2015 – 2016 2015 – 2016 2015 – 2016

	S. H. Lee, Biomedical Engineering, Duke University	2015
	Career progression: Manager, Strategy & Operations, Tempus Labs	
	R. Shah, Psychology & Neuroscience, Duke University	2015
	Career progression: Medical student, Yale School of Medicine	
	J. R. Lilien, Electrical & Computer Engineering, Duke University	2014–2016
	🏆 Walter J. Seeley Scholastic Award	
	Career progression: Machine learning engineer, Amazon	
INTERNS	M. Dib, Biomedical Engineering, University of Maryland, College Park	2018–2019
	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	
	A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University	Summer 2017
	Career progression: Ph.D. student, Penn State University	
	C. M. Prevost, Biomedical Engineering, Clemson University	Summer 2015
	Career progression: Medical student, University South Carolina School of Medicine Greenville	
	J. V. McCall, Biomedical Engineering, North Carolina State University	Summer 2013
	Career progression: Ph.D. student, North Carolina State University	
PROFESSIONAL SOCIETIES MEMBERSHIP	IEEE , Engineering in Medicine and Biology Society	2004–
	Senior Member (2023–), Member (2013–2023), Student Member (2004–2013)	
	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	2017–2018
	International Society for CNS Clinical Trials and Methodology, Member	2017–2019
	Organization for Human Brain Mapping, Member	2014–2019
	Society for Industrial and Applied Mathematics, Student Member	2008–2012
	Society for Neuroscience, Student Member	2005–2012
	American Physical Society, Student Member	2004–2009
COMMITTEES, ADVISORY ROLES, & SPECIAL INTEREST GROUPS	Advisory Board, Center for Multiscale Bioelectromagnetic Studies of the Brain	2025–
	Department of Electrical & Computer Engineering, Worcester Polytechnic Institute	
	Contributor, Non-Invasive Brain Stimulation (NIBS)-BIDS extension proposal	2023–
	Collaborated on extending the Brain Imaging Data Structure (BIDS) specification to establish standardized data and metadata storage guidelines for the NIBS field	
	Early Career Committee, American Society of Clinical Psychopharmacology	2023–2027
	Technology Committee, American Society of Clinical Psychopharmacology	2023–2025
	NIH Research Workforce Diversity and Equity Outreach Special Interest Group	2023–2025
	Technology Task Force, American Society of Clinical Psychopharmacology	2020–2023
	Co-founder & Scientific Advisor, Singula Institute	2017–
	NIH Noninvasive Brain Stimulation Special Interest Group	2017–

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>	2022 –
	Sections: Neurostimulation, Neuroimaging	
	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>	2022 –
	Sections: Addictive Behaviors, Consciousness Research	
	Review Editor, <i>Frontiers in Psychiatry</i>	2016 – 2022
	Sections: Neurostimulation, Neuroimaging	
	Guest Associate Editor, <i>Frontiers in Pharmacology: Neuropharmacology</i>	2020
	Co-Editor on Research Topic: <i>Neurobiology of Rapid Mood Changes</i> ☑	
	Guest Editor, <i>Physics in Medicine and Biology</i>	2024
	Special Issue: <i>Electromagnetic Modeling for Brain Stimulation</i> ☑	
	<i>Ad hoc</i> journal reviewer	2010 –
	<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>	
	<i>Brain Research Bulletin</i>	
	<i>Brain Sciences</i>	
	<i>Brain Stimulation</i>	
	<i>Cerebral Cortex</i>	
	<i>Chaos, Solitons & Fractals</i>	
	<i>Clinical EEG and Neuroscience</i>	
	<i>Clinical Neurophysiology</i>	
	<i>CNS Spectrums</i>	
	<i>Computational and Mathematical Methods in Medicine</i>	
	<i>Computer Methods and Programs in Biomedicine</i>	
	<i>Computer Methods in Biomechanics and Biomedical Engineering</i>	
	<i>Cortex</i>	
	<i>European Psychiatry</i>	
	<i>Frontiers in Cell and Developmental Biology</i>	
	<i>Frontiers in Medicine: Intensive Care Medicine and Anesthesiology</i>	
	<i>Frontiers in Neurology: Applied Neuroimaging</i>	
	<i>Frontiers in Neuroscience: Brain Imaging Methods</i>	
	<i>IEEE Antennas and Propagation Magazine</i>	
	<i>IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology</i>	
	<i>IEEE Transactions on Biomedical Engineering</i>	
	<i>IEEE Transactions on Neural Systems & Rehabilitation Engineering</i>	
	<i>IEEE Transactions on Magnetics</i>	
	<i>Imaging Neuroscience</i>	

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-invasive brain stimulation</i>	
	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	
	Educational Counselor, MIT	2022 –
	Judge, NIMH Training Day Three-Minute Talks competition	2022

	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>	
	University of Pennsylvania, Wharton Undergraduate Health Care Club	2018
	Presentation: <i>Technology and the future of mental health treatment</i>	
	Judge/Lead Judge, NIH Postbac Poster Day	2017 – 2019
	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
PROFESSIONAL DEVELOPMENT & CONTINUING EDUCATION	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