

ZHI-DE DENG

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EDUCATION	Ph.D., Columbia University Electrical Engineering	2013
	M.Phil., Columbia University Electrical Engineering, graduate concentration in Neuroscience	2011
	M.Eng., Massachusetts Institute of Technology Electrical Engineering & Computer Science	2007
	S.B., Massachusetts Institute of Technology Electrical Science & Engineering	2007
	S.B., Massachusetts Institute of Technology Physics, minor in Economics	2006
ACADEMIC & GOVERNMENT APPOINTMENTS	Senior Associate Scientist (Research Professor equivalent ) National Institute of Mental Health Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit	2025 –
	Staff Scientist National Institute of Mental Health Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit	2019 – 2025
	Adjunct Assistant Professor Duke University School of Medicine Department of Psychiatry & Behavioral Sciences Division of Behavioral Medicine & Neurosciences <i>Faculty Network Member</i> , Duke Institute for Brain Sciences	2016 – 2024
	Medical Instructor Duke University School of Medicine Department of Psychiatry & Behavioral Sciences Division of Brain Stimulation & Neurophysiology	2014 – 2016
RESEARCH PROGRAM LEADERSHIP	Director, Computational Neurostimulation Research Program National Institute of Mental Health Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit	2019 –
POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS	Research Fellow National Institute of Mental Health Experimental Therapeutics & Pathophysiology Branch Noninvasive Neuromodulation Unit	2016 – 2019
	Postdoctoral Associate Duke University School of Medicine Department of Psychiatry & Behavioral Sciences Division of Brain Stimulation & Neurophysiology	2013 – 2014

PREDCTORAL RESEARCH ASSISTANTSHIPS & INTERNSHIPS	Visiting Graduate Research Assistant , Duke Psychiatry	2010 – 2013
	Graduate Research Assistant , Columbia Psychiatry	2007 – 2010
	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: INTERNATIONAL & NATIONAL	Certificate for Top Cited Article <i>Bipolar Disorders</i> , International Society for Bipolar Disorders/Wiley	2025
	Elected to Full Membership Sigma Xi, The Scientific Research Honor Society	2024
	Scholar, Advanced Research Institute in Geriatric Mental Health Dartmouth College, supported by grant from NIH/NIMH R25 MH068502	2023 – 2024
	Elevated to Senior Membership Institute of Electrical and Electronics Engineers (IEEE)	2023
	Elected to Associate Membership American College of Neuropsychopharmacology	2023
	New Investigator Award American Society of Clinical Psychopharmacology	2018
	Early Career Investigator Travel Fellowship Award Society of Biological Psychiatry	2018
	Research Colloquium for Junior Investigators American Psychiatric Association	2018
	Alies Muskin Career Development Leadership Program Anxiety & Depression Association of America	2018
	NARSAD Young Investigator Award Brain & Behavior Research Foundation	2017
	Scholar, Career Development Institute for Psychiatry Stanford University/University of Pittsburgh	2017
	New Investigator Award International Society for CNS Clinical Trials and Methodology	2017
	Certificate for Highly Cited Research <i>Brain Stimulation</i> , Elsevier	2016
	Young Investigator Memorial Travel Award American College of Neuropsychopharmacology	2015
	Scholar, Summer Research Institute in Geriatric Mental Health Weill Cornell Medical College, supported by NIH/NIMH R25 MH019946	2015
	Chair's Choice Travel Fellowship Award Society of Biological Psychiatry	2015
	Innovative Research Poster Award National Network of Depression Centers	2014
	Best Abstract Award International Society for Neurostimulation	2010
	New York Times College Scholarship The New York Times Company Foundation	2002 – 2006

AWARDS & HONORS: INSTITUTIONAL & LOCAL	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	
	High Five Award	2024
	For excellent preparation for and presentation at the Noninvasive Neuromodulation Unit's Board of Scientific Counselors review, NIMH	
	First Place Winner, Science as Art Competition	2022
	NIMH Intramural Research Program Fellows' Scientific Training Day	

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	
KL2 Career Development Award	2014–2016
Duke Translational Medicine Institute, supported by NIH/NCATS KL2 TR001115	
Presidential Award for Outstanding Teaching, Finalist	2010
Columbia University	
CTSA T32 Certificate Award	2008–2009
Columbia University Irving Institute for Clinical and Translational Research, supported by NIH/NCRR TL1 RR024158	

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	66	Refereed original research articles
	22	Refereed conference proceedings & technical notes
	17	Refereed reviews, trial protocols, & consensus papers
	10	Book chapters
	5	Editorials, commentaries, & correspondence
	9	IP filings (4 granted U.S. patents, 3 pending, 2 unconverted provisionals)
	+ 182	Abstracts

REFEREED ORIGINAL RESEARCH 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; PMID: PMC11985115; 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](https://doi.org/10.1016/j.brs.2024.12.1192); PMCID: [PMC11867869](#); Data available 

COMMENTARY: vol. 18, no. 3, pp. 897–899, May/Jun. 2025.   Reply: vol. 18, no. 4, pp. 1150–1152, Jul./Aug. 2025. 

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](https://doi.org/10.1162/imag_a_00412); PMCID: [PMC12319877](#); 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. 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](https://doi.org/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](https://doi.org/10.1038/s41386-024-01871-w); PMCID: [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](https://doi.org/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/fpsyg.2024.1434434](https://doi.org/10.3389/fpsyg.2024.1434434); PMCID: [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](https://doi.org/10.1088/1741-2552/ad692f); PMCID: [PMC11307324](#)

L. Beynel, H. Gura, Z. Rezaee, E. C. Ekpo, **Z.-D. Deng**, J. O. Joseph, P. Taylor, B. Luber, 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](https://doi.org/10.1371/journal.pone.0302660); PMCID: [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](https://doi.org/10.1017/S1092852923006387); PMCID: [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; PMCID: 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; PMCID: PMC10968657

☐ Part of Special Issue: *Electric, Magnetic, and Electromagnetic Fields in Biology and Medicine: From Mechanisms to Biomedical Applications: 2nd Edition* ☐

🏅 Trainee Travel Award (awarded to P. L. Robins), *NIMH Fellows' Scientific Training Day*, 2023.

- * **Z.-D. Deng**, B. Luber, 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; PMCID: PMC10701670

✉ Commentary: vol. 81, no. 7, pp. 736–737, Jul. 2024. ☐ 📞 Reply: pp. 737–738. ☐

📻 Media coverage: *Pyschiatric 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; PMCID: 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. Oltedal, 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. Fanelli, 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/fpsyg.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; PMCID: 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; PMCID: 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; PMCID: 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; PMCID: 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; PMCID: 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](https://doi.org/10.1016/j.neuroimage.2022.119705); PMCID: 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](https://doi.org/10.1038/s41597-022-01695-7); PMCID: 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](https://doi.org/10.1097/YCT.0000000000000812); PMCID: 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](https://doi.org/10.1088/1741-2552/ac697c); PMCID: 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](https://doi.org/10.1016/j.neuroimage.2021.118863); PMCID: 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](https://doi.org/10.1038/s41380-021-01380-y); PMCID: 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](https://doi.org/10.1038/s41386-021-01110-6); PMCID: PMC8674270

S. H. Lisanby, S. M. McClintock, W. V. McCall, R. G. Knapp, C. M. Cullum, M. Mueller, **Z.-D. Deng**, A. A. Teklehaymanot, 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](https://doi.org/10.1016/j.jagp.2021.04.006); PMCID: 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

kynurenone 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](https://doi.org/10.1038/s41380-019-0589-8); PMCID: 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](https://doi.org/10.1016/j.brs.2021.06.011); PMCID: 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](https://doi.org/10.1016/j.nicl.2021.102581); PMCID: 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](https://doi.org/10.1007/s00406-020-01127-w); PMCID: 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](https://doi.org/10.1016/j.jagp.2020.06.008); PMCID: PMC7744398

N. L. Balderston, C. Roberts, E. M. Beydler, **Z.-D. Deng**, T. Radman, B. Luber, S. H. Lisanby, M. Ernst, and C. Grillon, “A generalized workflow for conducting electric field-optimized, fMRI-guided, transcranial magnetic stimulation,” *Nature Protocols*, vol. 15, no. 11, pp. 3595–3614, Nov. 2020.

DOI: [10.1038/s41596-020-0387-4](https://doi.org/10.1038/s41596-020-0387-4); PMCID: PMC8123368; Code available ↗

M. L. Cox, **Z.-D. Deng**, H. Palmer, A. Watts, L. Beynel, J. R. Young, S. H. Lisanby, J. Migaly, and L. G. Appelbaum, “Utilizing transcranial direct current stimulation to enhance laparoscopic technical skills training: A randomized controlled trial,” *Brain Stimulation*, vol. 13, no. 3, pp. 863–872, May/Jun. 2020.

DOI: [10.1016/j.brs.2020.03.009](https://doi.org/10.1016/j.brs.2020.03.009); PMCID: PMC8474665

S. Aronson Fischell, T. J. Ross, **Z.-D. Deng**, B. J. Salmeron, and E. A. Stein, “Transcranial direct current stimulation applied to the dorsolateral and ventromedial prefrontal cortices in smokers modifies cognitive circuits implicated in the nicotine withdrawal syndrome,” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 5, no. 4, pp. 448–460, Apr. 2020.

DOI: [10.1016/j.bpsc.2019.12.020](https://doi.org/10.1016/j.bpsc.2019.12.020); PMCID: PMC7150637

S. H. Lisanby, S. M. McClintock, G. Alexopoulos, S. H. Bailine, E. Bernhardt, M. C. Briggs, C. M. Cullum, **Z.-D. Deng**, M. Dooley, E. T. Geduldig, R. M. Greenberg, M. M. Husain, S. Kaliora, R. G. Knapp, V. Latoussakis, L. S. Liebman, W. V. McCall, M. Mueller, G. Petrides, J. Prudic, P. B. Rosenquist, M. V. Rudorfer, S. Sampson, A. A. Teklehaymanot, K. G. Tobias, R. D. Weiner, R. C. Young, C. H. Kellner, CORE/PRIDE Work Group, “Neurocognitive effects of combined electroconvulsive therapy (ECT) and venlafaxine in geriatric depression: Phase 1 of the PRIDE study,” *American Journal of Geriatric Psychiatry*, vol. 28, no. 3, pp. 304–316, Mar. 2020.

DOI: [10.1016/j.jagp.2019.10.003](https://doi.org/10.1016/j.jagp.2019.10.003); PMCID: PMC7050408

✉ Commentary: pp. 317–319. ↗

N. L. Balderston, E. M. Beydler, C. Roberts, **Z.-D. Deng**, T. Radman, T. Lago, B. Luber, S. H. Lisanby, M. Ernst, and C. Grillon, “Mechanistic link between right prefrontal cortical activity and anxious arousal revealed using transcranial magnetic stimulation in healthy subjects,” *Neuropsychopharmacology*, vol. 45, no. 4, pp. 694–702, Mar. 2020.
DOI: [10.1038/s41386-019-0583-5](https://doi.org/10.1038/s41386-019-0583-5); PMCID: PMC7021903

L.-Z. Yang, W. Zhang, W. Wang, Z. Yang, H. Wang, **Z.-D. Deng**, C. Li, B. Qiu, D.-R. Zhang, R. Cohen Kadosh, H. Li, and X. Zhang, “Neural and psychological predictors of cognitive enhancement and impairment from neurostimulation,” *Advanced Science*, vol. 7, no. 4, 1902863, Feb. 2020.

DOI: [10.1002/advs.201902863](https://doi.org/10.1002/advs.201902863); PMCID: PMC7029648

↗ Journal inside back cover ↗

N. L. Balderston, E. M. Beydler, M. Goodwin, **Z.-D. Deng**, T. Radman, B. Luber, S. H. Lisanby, M. Ernst, and C. Grillon, “Low-frequency parietal repetitive transcranial magnetic stimulation reduces fear and anxiety,” *Translational Psychiatry*, vol. 10, no. 1, 68, Feb. 2020.

DOI: [10.1038/s41398-020-0751-8](https://doi.org/10.1038/s41398-020-0751-8); PMCID: PMC7026136

T. Dufor, S. Grehl, A. D. Tang, M. Doulazmi, M. Traoré, N. Debray, C. Dubacq, **Z.-D. Deng**, J. Mariani, A. M. Lohof, and R. M. Sherrard, “Neural circuit repair by low-intensity magnetic stimulation requires cellular magnetoreceptors and specific stimulation patterns,” *Science Advances*, vol. 5, no. 10, eaav9847, Oct. 2019.

DOI: [10.1126/sciadv.aav9847](https://doi.org/10.1126/sciadv.aav9847); PMCID: PMC6821463

M. Argyelan, L. Oltedal, **Z.-D. Deng**, B. Wade, M. Bikson, A. Joanlanne, S. Sanghani, H. Bartsch, M. Cano, A. M. Dale, U. Damrowski, A. Dols, V. Enneking, R. Espinoza, U. Kessler, K. L. Narr, K. J. Oedagaard, M. L. Oudega, R. Redlich, M. L. Stek, A. Takamiya, L. Emsell, F. Bouckaert, P. Sienraert, J. Pugol, I. Tendolkar, P. van Eijndhoven, G. Petrides, A. K. Malhotra, and C. Abbott, “Electric field causes volumetric changes in the human brain,” *eLife*, vol. 8, e49115, Oct. 2019.

DOI: [10.7554/eLife.49115](https://doi.org/10.7554/eLife.49115); PMCID: PMC6874416; Code available ↗

* L. Beynel, L. G. Appelbaum, B. Luber, C. A. Crowell, S. A. Hilbig, W. Lim, D. Nguyen, N. A. Chrapliwy, S. W. Davis, R. Cabeza, S. H. Lisanby, and **Z.-D. Deng**, “Effects of online repetitive transcranial magnetic stimulation (rTMS) on cognitive processing: A meta-analysis and recommendations for future studies,” *Neuroscience and Biobehavioral Reviews*, vol. 107, pp. 47–58, Dec. 2019.

DOI: [10.1016/j.neubiorev.2019.08.018](https://doi.org/10.1016/j.neubiorev.2019.08.018); PMCID: PMC7654714; Preregistration ✓

S. M. Goetz, S. M. Madhi Alavi, **Z.-D. Deng**, and A. V. Peterchev, “Statistical model of motor-evoked potentials,” *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 27, no. 8, pp. 1539–1545, Aug. 2019.

DOI: [10.1109/TNSRE.2019.2926543](https://doi.org/10.1109/TNSRE.2019.2926543); PMCID: PMC6719775; Code available ↗

T. Popa, L. S. Morris, R. Hunt, **Z.-D. Deng**, S. Horovitz, K. Mente, H. Shitara, K. Baek, M. Hallett, and V. Voon, “Modulation of resting connectivity between the mesial frontal cortex and basal ganglia,” *Frontiers in Neurology*, vol. 10, 587, Jun. 2019.

DOI: [10.3389/fneur.2019.00587](https://doi.org/10.3389/fneur.2019.00587); PMCID: PMC6593304

↗ Part of Research Topic: *Innovative Technologies and Clinical Applications for Invasive and Non-Invasive Neuromodulation: From the Workbench to the Bedside* ↗

M. J. Dubin, I. P. Ilieva, **Z.-D. Deng**, J. Thomas, A. Cochran, K. Kravets, B. D. Brody, P. J. Christos, J. H. Kocsis, C. Liston, and F. M. Gunning, “A double-blind pilot dosing study of low field magnetic stimulation (LFMS) for treatment-resistant depression (TRD),” *Journal of Affective Disorders*, vol. 249, pp. 286–293, Apr. 2019.

DOI: [10.1016/j.jad.2019.02.039](https://doi.org/10.1016/j.jad.2019.02.039); PMCID: PMC6486658

P. E. Croarkin, P. A. Nakonezny, **Z.-D. Deng**, M. Romanowicz, J. L. Vande Voort, D. Doruk Camsari, K. M. Schak, J. D. Port, and C. P. Lewis, “High frequency repetitive TMS for suicidal ideation in adolescents with depression,” *Journal of Affective Disorders*, vol. 239, pp. 282–290, Oct. 2018.

DOI: 10.1016/j.jad.2018.06.048; PMCID: PMC6431788

✉ Part of Special Issue: *Suicide*

B. Wang, M. R. Shen, **Z.-D. Deng**, J. E. Smith, J. J. Tharayil, C. J. Gurrey, L. J. Gomez, and A. V. Peterchev, “Redesigning existing transcranial magnetic stimulation coils to reduce energy: Application to low field magnetic stimulation,” *Journal of Neural Engineering*, vol. 15, no. 3, 036022, Apr. 2018.

DOI: 10.1088/1741-2552/aaa505; PMCID: PMC5929994

S. Grehl, D. Martina, C. Goyenvalle, **Z.-D. Deng**, J. Rodger, and R. M. Sherrard, “*In vitro* magnetic stimulation: A simple stimulation device to deliver defined low intensity electromagnetic fields,” *Frontiers in Neural Circuits*, vol. 10, 85, Nov. 2016.

DOI: 10.3389/fncir.2016.00085; PMCID: PMC5093126

✉ Part of Research Topic: *There’s Method in Our Magnets: Understanding rTMS from Models, Mice and Men*

- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Effects of anatomical variability on electric field characteristics of electroconvulsive therapy and magnetic seizure therapy: A parametric modeling study,” *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 23, no. 1, pp. 22–31, Jan. 2015.

DOI: 10.1109/TNSRE.2014.2339014; PMCID: PMC4289667

J. K. Mueller, E. M. Grigsby, V. Prevosto, F. W. Petraglia, III, H. Rao, **Z.-D. Deng**, A. V. Peterchev, M. A. Sommer, T. Egner, M. L. Platt, and W. M. Grill, “Simultaneous transcranial magnetic stimulation and single-neuron recording in alert non-human primates,” *Nature Neuroscience*, vol. 17, no. 8, pp. 1130–1136, Aug. 2014.

DOI: 10.1038/nn.3751; PMCID: PMC4115015

- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Coil design considerations for deep transcranial magnetic stimulation,” *Clinical Neurophysiology*, vol. 125, no. 6, pp. 1202–1212, Jun. 2014.

DOI: 10.1016/j.clinph.2013.11.038; PMCID: PMC4020988

✉ Part of Special Issue: *Transcranial Brain Stimulation*



Editorial: pp. 1077–1078.

✉ Commentary: vol. 126, no. 7, pp. 1455–1456, Jul. 2015.



✉ Reply: pp. 1456–1457.

- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Controlling stimulation strength and focality in electroconvulsive therapy via current amplitude and electrode size and spacing: Comparison with magnetic seizure therapy,” *The Journal of ECT*, vol. 29, no. 4, pp. 325–335, Dec. 2013.

DOI: 10.1097/YCT.0b013e3182a4b4a7; PMCID: PMC3905244

✉ Best Abstract Award, *International Society for Neurostimulation Annual Meeting*, 2010.

B. Luber, J. Steffner, A. Tucker, C. Habeck, A. V. Peterchev, **Z.-D. Deng**, R. C. Basner, Y. Stern, and S. H. Lisanby, “Extended remediation of sleep deprived-induced working memory deficits using fMRI-guided transcranial magnetic stimulation,” *Sleep*, vol. 36, no. 6, pp. 857–871, Jun. 2013.

DOI: 10.5665/sleep.2712; PMCID: PMC3649828

- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Electric field depth–focality tradeoff in transcranial magnetic stimulation: Simulation comparison of 50 coil designs,” *Brain Stimulation*, vol. 6, no. 1, pp. 1–13, Jan. 2013.

DOI: 10.1016/j.brs.2012.02.005; PMCID: PMC3568257

✉ Journal cover and in Issue Highlights.



Commentary: pp. 14–15.

✉ Highly Cited Research, awarded by Elsevier, 2016.

- W. H. Lee, **Z.-D. Deng**, T.-S. Kim, A. F. Laine, S. H. Lisanby, and A. V. Peterchev, “Regional electric field induced by electroconvulsive therapy in a realistic head model: Influence of white matter anisotropic conductivity,” *NeuroImage*, vol. 59, no. 3, pp. 2110–2123, Feb. 2012.
DOI: 10.1016/j.neuroimage.2011.10.029; **PMCID:** PMC3495594
- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Electric field strength and focality in electroconvulsive therapy and magnetic seizure therapy: A finite element simulation study,” *Journal of Neural Engineering*, vol. 8, no. 1, 016007, Jan. 2011.
DOI: 10.1088/1741-2560/8/1/016007; **PMCID:** PMC3903509
- N. M. Arzeno, **Z.-D. Deng**, and C.-S. Poon, “Analysis of first-derivative based QRS detection algorithms,” *IEEE Transactions on Biomedical Engineering*, vol. 55, no. 2, pp. 478–484, Feb. 2008.
DOI: 10.1109/TBME.2007.912658; **PMCID:** PMC2532677
- REFEREED CONFERENCE PROCEEDINGS & TECHNICAL NOTES**
- Z. Qi, G. Noetscher, A. Miles, K. Weise, T. Knösche; G. Nunez Ponasso, D. Drumm, H. Lu, **Z.-D. Deng**, B. Danskin, M. Bikson, and S. N. Makaroff, “Realistic dense neuropil changes activating thresholds of some neurons during brain stimulation,” *International Conference on Electromagnetics in Advanced Applications – IEEE-APS Topical Conference on Antennas and Propagation in Wireless Communications*, Palermo, Italy, Sep. 2025.
- * S. Dey, E. Bharti, and **Z.-D. Deng**, “Controllability analysis of macaque structural connectome from an edge centric perspective,” *Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Copenhagen, Denmark, Jul. 2025.
DOI: 10.1101/2025.03.07.642125; **PMCID:** PMC12132479
- 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. Nummenmaa, and S. N. Makaroff, “Importance of considering microscopic structures in modeling brain stimulation,” *Brain Stimulation*, vol. 18, no. 4, pp. 1150–1152, Jul./Aug. 2025.
DOI: 10.1016/j.brs.2025.06.003; **PMID:** 40472930
- L. D. Oliver, J. Jeyachandra, E. W. Dickie, C. Hawco, S. Mansour, S. M. Hare, R. W. Buchanan, A. K. Malhotra, D. M. Blumberger, **Z.-D. Deng**, and A. N. Voineskos, “Bayesian Optimization Of NeuroStimulation (BOONStim),” *Brain Stimulation*, vol. 18, no. 2, pp. 112–115, Mar./Apr. 2025.
DOI: 10.1016/j.brs.2025.01.020; **PMID:** 39880158; **Code available**
- N. I. Hasan, M. Dannhauer, D. Wang, **Z.-D. Deng**, and L. J. Gomez, “Real-time computation of E-Field in transcranial magnetic stimulation for neuronavigation and optimization,” in *Proceedings of the 2025 United States National Committee of URSI National Radio Science Meeting (USNC-URSI NRSM)*, Boulder, CO, USA, Jan. 2025, p. 238.
DOI: 10.23919/USNC-URSINRSM66067.2025.10906846
- D. Tang, W. Wartman, A. Nummenmaa, M. Daneshzand, G. M. Noetscher, H. Lu, **Z.-D. Deng**, and S. N. Makaroff, “A BEM-FMM TMS coil designer using MATLAB platform,” *Brain Stimulation*, vol. 18, no. 1, pp. 128–130, Jan./Feb. 2025.
DOI: 10.1016/j.brs.2024.11.011; **PMCID:** PMC12013522; **Code available**
- N. I. Hasan, M. Dannhauer, D. Wang, **Z.-D. Deng**, and L. J. Gomez, “Real-time computation of E-field in transcranial magnetic stimulation for neuronavigation and optimization,” in *Proceedings of the 2024 IEEE 1st Latin American Conference on Antennas and Propagation (LACAP)*, Cartagena de Indias, Colombia, Dec. 2024, pp. 1–2.
DOI: 10.1109/LACAP63752.2024.10876352
- * **Z.-D. Deng**, M. Argyelan, J. Miller, T. R. Jones, J. Upston, S. M. McClintock, and C. C. Abbott, “On assumptions and key issues in electric field modeling for ECT,” *Molecular Psychiatry*, vol. 29, no. 10, pp. 3289–3290, Oct. 2024.
DOI: 10.1038/s41380-024-02567-9; **PMCID:** PMC11449792

N. I. Hasan, M. Dannhauer, D. Wang, **Z.-D. Deng**, and L. J. Gomez, “Real-time computation of E-field for transcranial magnetic stimulation,” in *Proceedings of the 2024 International Applied Computational Electromagnetics Society Symposium (ACES)*, Orlando, FL, USA, May 2024, pp. 1–2.

URL: <https://ieeexplore.ieee.org/document/10580138>

❶ First Place in Student Paper Award (awarded to N. I. Hasan)

M. Alawi, P. F. Lee, Y. K. Goh, **Z.-D. Deng**, and P. E. Croarkin, “Modelling of transcranial magnetic stimulation (TMS) induced fields in different age groups,” in *Proceedings of the 3rd International Conference for Innovation in Biomedical Engineering and Life Sciences (ICIBEL 2019)*, F. Ibrahim, J. Usman, M. Y. Ahmad, and N. Hamzah, Eds., IFMBE Proceedings, vol. 81, Cham, Switzerland: Springer, Jan. 2021, pp. 68–75.

DOI: 10.1007/978-3-030-65092-6_8

- * **Z.-D. Deng** and S. H. Lisanby, “Electric field characteristics of low-field synchronized transcranial magnetic stimulation (sTMS),” in *Proceedings of the 2017 39th International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Jeju, South Korea, Jul. 2017, pp. 1445–1448.

DOI: 10.1109/EMBC.2017.8037106; PMID: 29060150

- * **Z.-D. Deng**, S. M. McClintock, and S. H. Lisanby, “Brain network properties in depressed patients receiving seizure therapy: A graph theoretical analysis of peri-treatment resting EEG,” in *Proceedings of the 2015 37th International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Milan, Italy, Aug. 2015, pp. 2203–2206.

DOI: 10.1109/EMBC.2015.7318828; PMID: 26736728

- * **Z.-D. Deng**, A. V. Peterchev, A. D. Krystal, B. Luber, S. M. McClintock, M. M. Husain, and S. H. Lisanby, “Topography of seizures induced by electroconvulsive therapy and magnetic seizure therapy,” in *Proceedings of the 2013 6th International IEEE/EMBS Conference on Neural Engineering (NER)*, San Diego, CA, USA, Nov. 2013, pp. 577–580.

DOI: 10.1109/NER.2013.6696000

W. H. Lee, **Z.-D. Deng**, A. F. Laine, S. H. Lisanby, and A. V. Peterchev, “Influence of white matter conductivity anisotropy on electric field strength induced by electroconvulsive therapy,” in *Proceedings of the 2011 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Boston, MA, USA, Aug. 2011, pp. 5473–5476.

DOI: 10.1109/IEMBS.2011.6091396; PMID: 22255576

- * **Z.-D. Deng** and A. V. Peterchev, “Transcranial magnetic stimulation coil with electronically switchable active and sham modes,” in *Proceedings of the 2011 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Boston, MA, USA, Aug. 2011, pp. 1993–1996.

DOI: 10.1109/IEMBS.2011.6090561; PMID: 22254725

- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Transcranial magnetic stimulation in the presence of deep brain stimulation implants: Induced electrode currents,” in *Proceedings of the 2010 Annual International Conference of the IEEE Engineering in Medicine and Biology*, Buenos Aires, Argentina, Aug. 2010, pp. 6821–6824.

DOI: 10.1109/IEMBS.2010.5625958; PMID: 21095849

- * **Z.-D. Deng**, D. E. Hardesty, S. H. Lisanby, and A. V. Peterchev, “Electroconvulsive therapy in the presence of deep brain stimulation implants: Electric field effects,” in *Proceedings of the 2010 Annual International Conference of the IEEE Engineering in Medicine and Biology*, Buenos Aires, Argentina, Aug. 2010, pp. 2049–2052.

DOI: 10.1109/IEMBS.2010.5626517; PMID: 21096149

- * W. H. Lee, **Z.-D. Deng**, T.-S. Kim, A. F. Laine, S. H. Lisanby, and A. V. Peterchev, “Regional electric field induced by electroconvulsive therapy: A finite element simulation

study,” in *Proceedings of the 2010 Annual International Conference of the IEEE Engineering in Medicine and Biology*, Buenos Aires, Argentina, Aug. 2010, pp. 2045–2048.

DOI: 10.1109/IEMBS.2010.5626553; PMID: 21096148

- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “Effect of anatomical variability on neural stimulation strength and focality in electroconvulsive therapy (ECT) and magnetic seizure therapy (MST),” in *Proceedings of the 2009 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Minneapolis, MN, USA, Sep. 2009, pp. 682–688.
DOI: 10.1109/IEMBS.2009.5334091; PMID: 19964484
- * **Z.-D. Deng**, A. V. Peterchev, and S. H. Lisanby, “Coil design considerations for deep-brain transcranial magnetic stimulation (dTMS),” in *Proceedings of the 2008 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Vancouver, BC, Canada, Aug. 2008, pp. 5675–5679.
DOI: 10.1109/IEMBS.2008.4650502; PMID: 19164005
- * **Z.-D. Deng**, C.-S. Poon, N. M. Arzeno, and E. S. Katz, “Heart rate variability in pediatric obstructive sleep apnea,” in *Proceedings of the 2006 International Conference of the IEEE Engineering in Medicine and Biology Society*, New York, NY, USA, Aug. 2006, pp. 3565–3568.
DOI: 10.1109/IEMBS.2006.260139; PMID: 17946187
- * N. M. Arzeno, C.-S. Poon, and **Z.-D. Deng**, “Quantitative analysis of QRS detection algorithms based on the first derivative of the ECG,” in *Proceedings of the 2006 International Conference of the IEEE Engineering in Medicine and Biology Society*, New York, NY, USA, Aug. 2006, pp. 1788–1791.
DOI: 10.1109/IEMBS.2006.260051; PMID: 17946480

⊗ Student paper competition finalist (awarded to N. M. Arzeno)

REFEREED
REVIEWS,
TRIAL
PROTOCOLS,
& CONSENSUS
PAPERS

L. M. Oberman, A. I. Penefiel, R. Dieterich, C. T. Phan, Y.-Y. Chou, D. L. Pham, M. M. Adamson, C. E. Hines, Z. Rezaee, **Z.-D. Deng**, H. Pal, S. H. Lisanby, and D. L. Brody, “Adaptive trial for the treatment of depressive symptoms associated with concussion using accelerated intermittent theta burst stimulation (ADEPT): Rationale, design and methods,” *Frontiers in Neurology*, vol. 16, 1605157, Jun. 2025.

DOI: 10.3389/fneur.2025.1605157; PMCID: PMC12202228

⊗ Part of Research Topic: *Neurological and Neuropsychiatric Disorders Affecting Military Personnel and Veterans - Volume II* ⊗

J. R. Young, C. S. Polick, A. M. Michael, M. Dannhauer, J. T. Galla, M. K. Evans, A. Troutman, A. C. Kirby, M. F. Dennis, C. W. Papanikolas, **Z.-D. Deng**, S. D. Moore, E. A. Dedert, M. A. Addicott, L. G. Appelbaum, and J. C. Beckham, “Multimodal smoking cessation treatment combining repetitive transcranial magnetic stimulation, cognitive behavioral therapy, and nicotine replacement in veterans with posttraumatic stress disorder: A feasibility randomized controlled trial protocol,” *PLOS ONE*, vol. 19, no. 9, e0291562, Sep. 2024.
DOI: 10.1371/journal.pone.0291562; PMCID: PMC11379281

- * M. Dannhauer, L. J. Gomez, P. L. Robins, D. Wang, N. I. Hasan, A. Thielscher, H. R. Siebner, Y. Fan, and **Z.-D. Deng**, “Electric field modeling in personalizing transcranial magnetic stimulation interventions,” *Biological Psychiatry*, vol. 95, no. 6, pp. 494–501, Mar. 2024.
DOI: 10.1016/j.biopsych.2023.11.022; PMCID: PMC10922371

⊗ Part of Special Issue: *Transcranial Magnetic Stimulation* ⊗

L. M. Oberman, S. M. Francis, L. Beynel, M. Hynd, M. Jaime, P. L. Robins, **Z.-D. Deng**, J. Stout, J. W. van der Veen, and S. H. Lisanby, “Design and methodology for a proof of mechanism study of individualized neuronavigated continuous theta burst stimulation for auditory processing in adolescents with autism spectrum disorder,” *Frontiers in Psychiatry*, vol. 15, 1304528, Feb. 2024.

DOI: 10.3389/fpsyg.2024.1304528; PMCID: PMC10881663

□ Part of Research Topic: *Women in Psychiatry 2023: Neurostimulation* □

- * **Z.-D. Deng**, P. L. Robins, W. Regenold, P. Rohde, M. Dannhauer, and S. H. Lisanby, “How electroconvulsive therapy works in the treatment of depression: Is it the seizure, the electricity, or both?” *Neuropsychopharmacology*, vol. 49, no. 1, pp. 150–162, Jan. 2024.

DOI: [10.1038/s41386-023-01677-2](https://doi.org/10.1038/s41386-023-01677-2); PMCID: PMC10700353

□ Part of 2024 *Neuropsychopharmacology Reviews: Rapid & Novel Treatments in Psychiatry* □

- A. R. Brunoni, H. Ekhtiari, A. Antal, P. Auvichayapat, C. Baeken, I. M. Benseñor, M. Bikson, P. Boggio, B. Borroni, F. Brighina, J. Brunelin, S. Carvalho, W. Caumo, P. Ciechanski, L. Charvet, V. P. Clark, R. Cohen Kadosh, M. Cotelli, A. Datta, **Z.-D. Deng**, R. De Raedt, D. De Ridder, P. B. Fitzgerald, A. Floel, F. Frohlich, M. S. George, P. Ghobadi-Azbari, S. Goerigk, R. H. Hamilton, S. J. Jaberzadeh, K. Hoy, D. J. Kidgell, A. Khojasteh Zonoozi, A. Kirton, S. Laureys, M. Lavidor, K. Lee, J. Leite, S. H. Lisanby, C. Loo, D. M. Martin, C. Miniussi, M. Mondino, K. Monte-Silva, L. Morales-Quezada, M. A. Nitsche, A. H. Okano, C. S. Oliveira, B. Onarheim, K. Pacheco-Barrios, F. Padberg, E. M. Nakamura-Palacios, U. Palm, W. Paulus, C. Plewnia, A. Priori, T. K. Rajji, L. B. Razza, E. M. Rehn, G. Ruffini, K. Schellhorn, M. Zare-Bidoky, M. Simis, P. Skorupinski, P. Suen, A. Thibaut, L. C. L. Valiengo, M.-A. Vanderhasselt, S. Vanneste, G. Venkatasubramanian, I. R. Violante, A. Wexler, A. J. Woods, and F. Fregni, “Digitalized transcranial electrical stimulation: A consensus statement,” *Clinical Neurophysiology*, vol. 143, pp. 154–165, Nov. 2022.

DOI: [10.1016/j.clinph.2022.08.018](https://doi.org/10.1016/j.clinph.2022.08.018); PMCID: PMC10031774

□ Part of Special Issue: *IFCN-endorsed Guidelines and Consensus Papers* □

- L. Borrione, P. C. Cirillo, L. V. M. Aparicio, B. A. Cavendish, L. Valiengo, D. O. Moura, J. P. de Souza, M. S. Luethi, I. Klein, B. Bariani, J. Gallucci-Neto, P. Suen, F. Padberg, S. Goerigk, M.-A. Vanderhasselt, **Z.-D. Deng**, J. O’Shea, P. A. Lotufo, I. M. Bensenor, and A. R. Brunoni, “A study protocol for an ongoing multi-arm, randomized, double-blind, sham-controlled clinical trial with digital features, using portable transcranial electrical stimulation and internet-based behavioral therapy for major depression disorders: The PSYLECT study,” *Expert Review of Neurotherapeutics*, vol. 22, no. 6, pp. 513–523, Jun. 2022.

DOI: [10.1080/14737175.2022.2083959](https://doi.org/10.1080/14737175.2022.2083959); PMCID: PMC10627342

- W. T. Regenold, **Z.-D. Deng**, and S. H. Lisanby, “Noninvasive neuromodulation of the prefrontal cortex in mental health disorders,” *Neuropsychopharmacology*, vol. 47, no. 1, pp. 361–372, Jan. 2022.

DOI: [10.1038/s41386-021-01094-3](https://doi.org/10.1038/s41386-021-01094-3); PMCID: PMC8617166

□ Part of 2022 *Neuropsychopharmacology Reviews: Prefrontal Cortex* □

- L. Borrione, H. Bellini, L. B. Razza, A. G. Avila, C. Baeken, A.-K. Brem, G. Busatto, A. F. Carvalho, A. Chekroud, Z. J. Daskalakis, **Z.-D. Deng**, J. Downar, W. Gattaz, C. Loo, P. A. Lotufo, M. D. G. M. Martin, S. M. McClintock, J. O’Shea, F. Padberg, I. C. Passos, G. A. Salum, M.-A. Vanderhasselt, R. Fraguas, I. Benseñor, L. Valiengo, and A. R. Brunoni, “Precision non-implantable neuromodulation therapies: A perspective for the depressed brain,” *Brazilian Journal of Psychiatry*, vol. 42, no. 4, pp. 403–419, Jul./Aug. 2020.

DOI: [10.1590/1516-4446-2019-0741](https://doi.org/10.1590/1516-4446-2019-0741); PMCID: PMC7430385

- B. Kadriu, **Z.-D. Deng**, C. Kraus, I. D. Henter, S. H. Lisanby, and C. A. Zarate, Jr., “Not so fast: Recent successes and failures in treating depression,” *Journal of Clinical Psychiatry*, vol. 81, no. 4, 19ac13138, May 2020.

DOI: [10.4088/JCP.19ac13138](https://doi.org/10.4088/JCP.19ac13138); PMCID: PMC7681914

- * **Z.-D. Deng**, B. Luber, N. L. Balderston, M. Velez Afanador, M. M. Noh, J. Thomas, W. C. Altekroose, S. L. Exley, S. Awasthi, and S. H. Lisanby, “Device-based modulation of neurocircuits as a therapeutic for psychiatric disorders,” *Annual Review of Pharmacology and Toxicology*, vol. 60, pp. 591–614, Jan. 2020.

DOI: [10.1146/annurev-pharmtox-010919-023253](https://doi.org/10.1146/annurev-pharmtox-010919-023253); PMCID: PMC8100981

E. Kallioniemi, S. M. McClintock, **Z.-D. Deng**, M. M. Husain, and S. H. Lisanby, “Magnetic seizure therapy: Towards personalized seizure therapy for major depression,” *Personalized Medicine in Psychiatry*, vol. 17–18, pp. 37–42, Nov./Dec. 2019.
DOI: [10.1016/j.pmp.2019.04.003](https://doi.org/10.1016/j.pmp.2019.04.003); PMCID: PMC7442165

- * M. Bikson, A. R. Brunoni, L. E. Charvet, V. P. Clark, L. G. Cohen, **Z.-D. Deng**, J. Dmochowski, D. J. Edwards, F. Frohlich, E. S. Kappenman, K. O. Lim, C. Loo, A. Mantovani, D. P. McMullen, L. C. Parra, M. Pearson, J. D. Richardson, J. M. Rumsey, P. Sehatpour, D. Sommers, G. Unal, E. M. Wassermann, A. J. Woods, and S. H. Lisanby, “Rigor and reproducibility in research with transcranial electrical stimulation: An NIMH-sponsored workshop,” *Brain Stimulation*, vol. 11, no. 3, pp. 465–480, May/Jun. 2018.
DOI: [10.1016/j.brs.2017.12.008](https://doi.org/10.1016/j.brs.2017.12.008); PMCID: PMC5997279
 - * S. M. Goetz and **Z.-D. Deng**, “The development and modeling of devices and paradigms for transcranial magnetic stimulation,” *International Review of Psychiatry*, vol. 29, no. 2, pp. 115–145, Apr. 2017.
DOI: [10.1080/09540261.2017.1305949](https://doi.org/10.1080/09540261.2017.1305949); PMCID: PMC5484089
 - Part of Special Issue: *Brain Stimulation*
 - * **Z.-D. Deng**, S. M. McClintock, N. E. Oey, B. Luber, and S. H. Lisanby, “Neuromodulation for mood and memory: From the engineering bench to the patient bedside,” *Current Opinion in Neurobiology*, vol. 30, pp. 38–43, Feb. 2015.
DOI: [10.1016/j.conb.2014.08.015](https://doi.org/10.1016/j.conb.2014.08.015); PMCID: PMC4342851
 - Part of Special Issue: *Neuropsychiatry*
- S. M. McClintock, J. Choi, **Z.-D. Deng**, L. G. Appelbaum, A. D. Krystal, and S. H. Lisanby, “Multifactorial determinants of the neurocognitive effects of electroconvulsive therapy,” *The Journal of ECT*, vol. 30, no. 2, pp. 165–176, Jun. 2014.
DOI: [10.1097/YCT.0b013e3181e48165](https://doi.org/10.1097/YCT.0b013e3181e48165); PMCID: PMC4143898
- A. V. Peterchev, M. A. Rosa, **Z.-D. Deng**, J. Prudic, and S. H. Lisanby, “Electroconvulsive therapy stimulus parameters: Rethinking dosage,” *The Journal of ECT*, vol. 26, no. 3, pp. 159–174, Sep. 2010.
DOI: [10.1097/YCT.0b013e3181e48165](https://doi.org/10.1097/YCT.0b013e3181e48165); PMCID: PMC2933093

BOOK
CHAPTERS

S. Reeves, **Z.-D. Deng**, and J. R. Young, “A history of transcranial magnetic stimulation,” in *TMS and Neuroethics*, V. Dubljević and J. R. Young, Eds., Cham, Switzerland: Springer, 2025, pp. 11–27.
DOI: [10.1007/978-3-031-92401-9](https://doi.org/10.1007/978-3-031-92401-9)

- * **Z.-D. Deng** and S. H. Lisanby, “Next-generation seizure therapy,” in *The Oxford Handbook of Transcranial Stimulation*, E. M. Wassermann, A. V. Peterchev, U. Ziemann, H. R. Siebner, V. Walsh, and S. H. Lisanby, Eds., 2nd ed. Oxford, UK: Oxford University Press, 2024, ch. 45, pp. 1188–1210.
DOI: [10.1093/oxfordhb/9780198832256.013.41](https://doi.org/10.1093/oxfordhb/9780198832256.013.41)

R. J. Ilmoniemi, **Z.-D. Deng**, L. Gomez, L. M. Koponen, J. O. Nieminen, A. V. Peterchev, and C. M. Epstein, “Transcranial magnetic stimulation coils,” in *The Oxford Handbook of Transcranial Stimulation*, E. M. Wassermann, A. V. Peterchev, U. Ziemann, H. R. Siebner, V. Walsh, and S. H. Lisanby, Eds., 2nd ed. Oxford, UK: Oxford University Press, 2024, ch. 4, pp. 102–123.
DOI: [10.1093/oxfordhb/9780198832256.013.4](https://doi.org/10.1093/oxfordhb/9780198832256.013.4)

J. Thomas, **Z.-D. Deng**, S. Awasthi, and S. H. Lisanby, “Magnetic seizure therapy,” in *Neuropsychology of Depression*, S. M. McClintock and J. Choi, Eds., New York: Guilford Press, 2022, ch. 21, pp. 383–406.

URL: <https://www.guilford.com/books/Neuropsychology-of-Depression>

- B. Kadriu, S. Subramanian, **Z.-D. Deng**, I. D. Henter, L. T. Park, and C. A. Zarate, Jr., “Rapid-acting antidepressants,” in *Depression*, M. H. Trivedi, Ed., Oxford, UK: Oxford University Press, 2019, ch. 13, pp. 218–240.
DOI: [10.1093/med/9780190929565.003.0013](https://doi.org/10.1093/med/9780190929565.003.0013)
- * S. Makarov, G. Bogdanov, G. Noetscher, W. Appleyard, R. Ludwig, J. Joutsa, and **Z.-D. Deng**, “Design and analysis of a whole-body noncontact electromagnetic subthreshold stimulation device with field modulation targeting nonspecific neuropathic pain,” in *Brain and Human Body Modeling: Computational Human Modeling at EMBC 2018*, S. Makarov, M. Horner, and G. Noetscher, Eds., Switzerland: Springer Nature, 2019, ch. 5, pp. 85–123.
DOI: [10.1007/978-3-030-21293-3_5](https://doi.org/10.1007/978-3-030-21293-3_5); **PMID:** 31725237
- * **Z.-D. Deng**, C. Liston, F. M. Gunning, M. J. Dubin, E. A. Fridgeirsson, J. Lilien, G. van Wingen, and J. van Waarde, “Electric field modeling for transcranial magnetic stimulation and electroconvulsive therapy,” in *Brain and Human Body Modeling: Computational Human Modeling at EMBC 2018*, S. Makarov, M. Horner, and G. Noetscher, Eds., Switzerland: Springer Nature, 2019, ch. 4, pp. 75–84.
DOI: [10.1007/978-3-030-21293-3_4](https://doi.org/10.1007/978-3-030-21293-3_4); **PMID:** 31725245
- B. Luber and **Z.-D. Deng**, “Application of non-invasive brain stimulation in psychophysiology,” in *Handbook of Psychophysiology*, J. T. Cacioppo, L. G. Tassinary, and G. G. Berntson, Eds., 4th ed. Cambridge, UK: Cambridge University Press, 2016, ch. 7, pp. 116–150.
DOI: [10.1017/9781107415782.007](https://doi.org/10.1017/9781107415782.007)
- A. V. Peterchev, **Z.-D. Deng**, and S. M. Goetz, “Advances in transcranial magnetic stimulation technology,” in *Brain Stimulation: Methodologies and Interventions*, I. M. Reti, Ed., Hoboken, NJ: Wiley-Blackwell, 2015, ch. 10, pp. 165–190.
DOI: [10.1002/9781118568323.ch10](https://doi.org/10.1002/9781118568323.ch10)
- S. H. Lisanby and **Z.-D. Deng**, “Magnetic seizure therapy for the treatment of depression,” in *Brain Stimulation: Methodologies and Interventions*, I. M. Reti, Ed., Hoboken, NJ: Wiley-Blackwell, 2015, ch. 8, pp. 123–148.
DOI: [10.1002/9781118568323.ch8](https://doi.org/10.1002/9781118568323.ch8)
- EDITORIALS, COMMENTARIES, & CORRESPONDENCE**
- S. K. Kar, A. Silva-dos-Santos, M. A. Lebedev, and **Z.-D. Deng**, “Editorial: How does brain stimulation work? Neuroversion and other putative mechanisms of action,” *Frontiers in Psychiatry*, vol. 15, 1488846, Sep. 2024.
DOI: [10.3389/fpsyg.2024.1488846](https://doi.org/10.3389/fpsyg.2024.1488846); **PMCID:** PMC11464472
- * **Z.-D. Deng**, R. D. Wiener, and S. H. Lisanby, “Magnetic seizure therapy vs electroconvulsive therapy for major depressive episode—Reply,” *JAMA Psychiatry*, vol. 81, no. 7, pp. 737–738, Jul. 2024.
DOI: [10.1001/jamapsychiatry.2024.0695](https://doi.org/10.1001/jamapsychiatry.2024.0695); **PMID:** 38656323
- A. R. Brunoni, **Z.-D. Deng**, and F. Padberg, “Enhancing repetitive transcranial magnetic stimulation effects for depression treatment: *Navigare necesse est*—and smart clinical trial designs,” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 7, no. 6, pp. 527–529, Jun. 2022.
DOI: [10.1016/j.bpsc.2022.03.006](https://doi.org/10.1016/j.bpsc.2022.03.006); **PMID:** 35680342
- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “On the characterization of coils for deep transcranial magnetic stimulation,” *Clinical Neurophysiology*, vol. 126, no. 7, pp. 1456–1457, Jul. 2015.
DOI: [10.1016/j.clinph.2014.10.144](https://doi.org/10.1016/j.clinph.2014.10.144); **PMID:** 25468237
- * **Z.-D. Deng**, S. H. Lisanby, and A. V. Peterchev, “On the stimulation depth of transcranial magnetic stimulation coils,” *Clinical Neurophysiology*, vol. 126, no. 4, pp. 843–844, Apr. 2015.
DOI: [10.1016/j.clinph.2014.06.048](https://doi.org/10.1016/j.clinph.2014.06.048); **PMID:** 25088734

OTHER CONTRIBUTIONS:
ACKNOWLEDGED
CONTRIBUTIONS,
NONREFEREED
PUBLICATIONS,
& CREATIVE
WORKS

- NIBS-BIDS Extension Proposal (BEP 037), 2025.
- Contribution: Extending the Brain Imaging Data Structure specification to establish standardized data and metadata storage guidelines for the non-invasive brain stimulation field
- American Psychiatric Association Task Force on Electroconvulsive Therapy, *The Practice of Electroconvulsive Therapy: Recommendations for Treatment, Training, and Privileging*, 3rd ed. Washington, DC: American Psychiatric Association Publishing, 2024.
- Contribution: Created illustrations of ECT configurations and computational models
- * **Z.-D. Deng**, “Brain: An intricate web,” artwork, *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2022.
 Voted First Place in Science as Art Competition
- T. R. Lago, K. S. Blair, G. Alvarez, A. Thongdarong, J. R. Blair, M. Ernst, and C. Grillon, “Threat-of-shock decreases emotional interference on affective Stroop performance in healthy controls and anxiety patients,” *European Journal of Neuroscience*, vol. 55, no. 9–10, pp. 2519–2528, May 2022.
DOI: 10.1111/ejn.14624; PMID: PMC7448696
Contribution: Created graphical abstract
- * **Z.-D. Deng**, “Blind researchers and the pathologic brain,” *National Academy of Neuropsychology Bulletin*, vol. 33, no. 1, cover artwork, 2020.
- R. C. Klein, S. M. Goetz, W. B. Liedtke, S. D. Moore, and A. V. Peterchev, “Static magnetic field modulates excitatory activity in layer II/III pyramidal neurons of the rat motor cortex,” in *Proceedings of the 2013 6th International IEEE/EMBS Conference on Neural Engineering (NER)*, San Diego, CA, USA, Nov. 2013, pp. 1190–1193.
DOI: 10.1109/NER.2013.6696152
Contribution: Performed magnetic field simulation
- W. Paulus, A. V. Peterchev, and M. Ridding, “Transcranial electric and magnetic stimulation: Technique and paradigms,” in *Handbook of Clinical Neurology*, 3rd Series, A. M. Lozano and M. Hallett, Eds., Amsterdam, The Netherlands: Elsevier, 2013, ch. 27, vol. 116, pp. 329–342.
DOI: 10.1016/B978-0-444-53497-2.00027-9; PMID: 24112906
Contribution: Created Figure 27.3
- M. Wysocki, M.-N. Fiamma, C. Straus, C.-S. Poon, and T. Similowski, “Chaotic dynamics of resting ventilatory flow in humans assessed through noise titration,” *Respiratory Physiology & Neurobiology*, vol. 153, no. 1, pp. 54–65, Aug. 2006.
DOI: 10.1016/j.resp.2005.09.008; PMID: 16303337
Contribution: Performed noise titration computations
- Z. Qi, G. M. Noetscher, A. Miles, K. Weise, T. R. Knösche, G. Nuñez Ponasso, D. Drumm, H. Lu, **Z.-D. Deng**, B. Danskin, A. Nummenmaa, M. Bikson, and S. N. Makaroff, “Brain stimulation thresholds for a realistic cortical column within a 1 mm³ MICrONS brain volume obtained with an approximate quasi-electrostatic solution.”
- D. Tang, D. Berger, **Z.-D. Deng**, B. Danskin, M. Ingersoll, H. Lu, B. Rosen, G. Noetscher, and S. Makaroff, “Directional mesoscale orientation of cortical synaptic clefts.”
- E. C. Ekpo, L. Beynel, B. Luber, **Z.-D. Deng**, T. J. Strauman, and S. H. Lisanby, “Resting state and task based functional connectivity reveal distinct mPFC and hippocampal network alterations in major depressive disorder.”
Data available
- I. Laakso, M. M. Paulides, S. Kadera, S. Ahn, C. L. Brace, M. Cavagnaro, J. Chen, **Z.-D. Deng**, V. De Santis, Y. Diao, L. Farrugia, M. Feliziani, S. Fiocchi, F. Fioranelli, T. Hikage, E. MacPherson, S. Makaroff, M. Mizuno, A. Opitz, E. Pickwell-MacPherson, P. Prakash, D. B. Rodrigues, K. Sasaki, T. Sakamoto, Z. Taylor, H. J. Visser, D. T. B. Yeo, and A. Hirata, “Roadmap towards personalized approaches and safety considerations in non-ionizing

radiation: From dosimetry to therapeutic and diagnostic applications," *arXiv*, Sep. 2025.
DOI: 10.48550/arXiv.2509.21165

- * P. L. Robins, J. R. Gilbert, B. Luber, N. Mustafa, E. Bharti, J. D. Stout, F. W. Carver, and **Z.-D. Deng**, "Hemispheric complementarity in hippocampal theta dynamics during mnemonic decision-making," *medRxiv*, Jul. 2025.
DOI: 10.1101/2025.07.18.25331749; PMCID: PMC12306797
 - * D. A. Drumm, G. C. Nuñez Ponasso, A. Linke, G. M. Noetscher, B. Maess, T. R. Knösche, J. Haueisen, J. D. Lewine, C. C. Abbott, S. N. Makaroff, and **Z.-D. Deng**, "Improved source localization of auditory evoked fields using reciprocal BEM-FMM," *bioRxiv*, May 2025.
DOI: 10.1101/2025.05.09.653081; PMCID: PMC12132354
 - * L. Beynel, E. Wiener, N. Baker, E. Greenstein, S. Francis, A. Neacsiu, C. Neige, S. Davis, E. Jones, B. Gindoff, B. Luber, S. H. Lisanby, and **Z.-D. Deng**, "Efficacy of non-invasive brain stimulation (NIBS) combined with evidence-based psychotherapy for psychiatric and neurodevelopmental disorders: A meta-analysis," *PROSPERO*, CRD42024570287, Aug. 2024.
Preregistration
- C. Lu, **Z.-D. Deng**, and F.-S. Choa, "Augmenting transcranial magnetic stimulation coil with magnetic material: An optimization approach," *bioRxiv*, Jan. 2022.
DOI: 10.1101/2022.01.21.477303
 Third Place in International Student Competition (awarded to C. Lu), *Brain & Human Body Modeling Conference*, 2021.
- * **Z.-D. Deng**, N. M. Arzeno, E. S. Katz, H. Chang, C. L. Marcus, and C.-S. Poon, "Non-high frequency heart rate chaos: A noninvasive marker of REM sleep and obstructive sleep apnea syndrome in children," *bioRxiv*, Oct. 2018.
DOI: 10.1101/457630

THESES

- * **Z.-D. Deng**, "Electromagnetic Field Modeling of Transcranial Electric and Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive and Subconvulsive Applications," Ph.D. dissertation, Columbia University, Department of Electrical Engineering, New York, NY, 2013. Sponsor: K. L. Shepard.
Available: *Columbia University Academic Commons*, DOI: 10.7916/D8F47WCS
- * **Z.-D. Deng**, "Stochastic Chaos and Thermodynamic Phase Transitions: Theory and Bayesian Estimation Algorithms," M.Eng. thesis, Massachusetts Institute of Technology, Department of Electrical Engineering and Computer Science, Cambridge, MA, 2007. Sponsor: C.-S. Poon.
Available: *DSpace@MIT*, HDL: 1721.1/41649

ABSTRACTS (SELECTED, 2023 – 2025)

Denotes oral presentation

- * **Z.-D. Deng**, "PROTECT: A model-guided, programmable stimulator for precision electroconvulsive therapy," submitted to the *Society of Biological Psychiatry Annual Meeting*, Apr./May 2026.
- * J. R. Gilbert, C. A. Zarate, Jr., and **Z.-D. Deng**, "Frontocingulate gamma power and connectivity as biomarkers of ketamine response in treatment-resistant depression," submitted to the *Society of Biological Psychiatry Annual Meeting*, Apr./May 2026.
- * **Z.-D. Deng**, C. A. Zarate, Jr., and J. R. Gilbert, "Frontocingulate gamma power and connectivity as biomarkers of ketamine response in treatment-resistant depression," submitted to the *Annual Meeting of the American College of Neuropsychopharmacology*, Jan. 2026.

C. N. Bakir, I. Azamet, L. Sangster-Carrasco, K. Delaney, M. Dib, **Z.-D. Deng**, and P. E. Croarkin, "A comparison of two motor threshold determination methods in adolescents undergoing treatment with TMS," *American Academy of Child and Adolescent Psychiatry Annual Meeting*, Oct. 2025.

- * S. Dey and **Z.-D. Deng**, “Closed-loop neuromodulation through the lens of direct and indirect data driven control,” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2025.
- ꝝ L. Beynel, V. Roopchansingh, R. Reynolds, P. A. Taylor, **Z.-D. Deng**, L. Li, N. Baker, D. Bandy, K. Cameron, H. Gura, E. Ekpo, S. Menon, E. Wiener, J. K. Rajendra, B. Luber, and S. H. Lisanby, “Using real-time fMRI neurofeedback to control brain state during rTMS: A proof-of-concept study,” *International Workshop on Concurrent TMS/fMRI*, Sep. 2025.
- L. D. Oliver, J. Jeyachandra, E. W. Dickie, C. Hawco, S. Mansour, S. M. Hare, R. W. Buchanan, A. K. Malhotra, D. M. Blumberger, **Z.-D. Deng**, and A. N. Voineskos, “Individualized transcranial magnetic stimulation targeting using Bayesian Optimization Of NeuroStimulation (BOONStim),” *University of Toronto Department of Psychiatry Research Day*, Jun. 2025.
- B. H. Chandler, D. K. Greenstein, K. T. Hurst, L. R. Waldman, C. A. Zarate, Jr., **Z.-D. Deng**, and E. D. Ballard, “Tracking affective correlates of ketamine response in treatment-resistant depression,” *NIH Postbac Poster Day*, May 2025.
- L. Oliver, D. Blumberger, C. Hawco, E. Dickie, J. Gallucci, J. Jeyachandra, S. Mansour, **Z.-D. Deng**, S. Hare, J. Gold, G. Foussias, M. Argyelan, Z. Daskalakis, R. Buchanan, A. Malhotra, and A. Voineskos, “Individualized transcranial magnetic stimulation targeting social cognitive network functional connectivity in schizophrenia spectrum disorders,” *Biological Psychiatry*, vol. 97, no. 9, p. S48, May 2025.
- * E. Wiener, L. Beynel, N. Baker, E. Greenstein, A. D. Neacsiu, E. Jones, B. Gindoff, S. M. Francis, C. Neige, S. W. Davis, B. Luber, S. H. Lisanby, and **Z.-D. Deng**, “Efficacy of non-invasive brain stimulation combined with evidence-based psychotherapy for psychiatric disorders: A meta-analysis,” *Annual Meeting of the Social and Affective Neuroscience Society*, Apr. 2025.
- B. H. Chandler, D. K. Greenstein, K. T. Hurst, L. R. Waldman, C. A. Zarate, Jr., **Z.-D. Deng**, and E. D. Ballard, “Exploring facial emotional expression as a biomarker for depression severity and treatment response,” *Washington Psychiatric Society Spring Presidential Symposium and Gala*, Apr. 2025.
 - ꝝ Accepted for presentation, unable to attend conference due to government travel restrictions
- C. Reid, S. Francis, E. Bharti, E. Greenstein, Z. Rezaee, B. Luber, **Z.-D. Deng**, C. Zrenner, and S. H. Lisanby, “Phase-triggered TMS using real-time mu rhythm EEG to enhance paired associative stimulation,” *Washington Psychiatric Society Spring Presidential Symposium and Gala*, Apr. 2025.
 - ꝝ Accepted for presentation, unable to attend conference due to government travel restrictions
- L. Beynel, V. Roopchansingh, R. Reynolds, P. A. Taylor, **Z.-D. Deng**, L. Li, N. Baker, D. Bandy, K. Cameron, H. Gura, E. Ekpo, S. Menon, E. Wiener, Z. Rezaee, J. K. Rajendra, B. Luber, and S. H. Lisanby, “A journey towards an objective control of brain state: Concurrent rTMS during real time fMRI neurofeedback,” *International Society for CNS Clinical Trials and Methodology Annual Scientific Meeting*, Feb. 2025.
 - ꝝ Accepted for presentation, unable to attend conference due to government travel restrictions
- ꝝ S. Francis, Z. Rezaee, C. Reid, E. Bharti, M. Jaime, E. Greenstein, **Z.-D. Deng**, B. Luber, C. Zrenner, and S. H. Lisanby, “Enhancing TMS response through real-time EEG-triggered paired associative stimulation of mu rhythm,” *International Brain Stimulation Conference*, Feb. 2025.
 - ꝝ Accepted for presentation, unable to attend conference due to government travel restrictions
- ꝝ N. I. Hasan, M. Dannhauer, D. Wang, **Z.-D. Deng**, and L. J. Gomez, “Real-time computation of E-Field in transcranial magnetic stimulation for neuronavigation and optimization,” *Brain Stimulation*, vol. 18, no. 1, pp. 575–576, Jan./Feb. 2025; also in *Photonics and Electromagnetics Research Symposium*, Apr. 2024.

② Third Place in Best Student Paper (awarded to N. I. Hasan), *Photonics and Electromagnetics Research Symposium*, Apr. 2024.

D. Tang, W. Wartman, A. Nummenmaa, M. Daneshzand, G. Noetscher, H. Lu, **Z.-D. Deng**, and S. N. Makaroff, “A BEM-FMM TMS coil designer using MATLAB platform,” *Brain Stimulation*, vol. 18, no. 1, p. 428, Jan./Feb. 2025; also presented at *NYC Neuromodulation Conference*, Aug. 2024.

- * **Z.-D. Deng**, “Multichannel Individualized Stimulation Therapy (MIST): A targeted approach to optimize electroconvulsive therapy,” *Brain Stimulation*, vol. 18, no. 1, p. 346, Jan./Feb. 2025.

✉ Accepted for presentation, unable to attend conference due to government travel restrictions

Z. Qi, G. Noetscher, A. Miles, K. Weise, T. Knösche; C. Cadman, A. Potashinsky, K. Liu, W. Wartman, G. Ponasso, M. Bikson, H. Lu, **Z.-D. Deng**, A. Nummenmaa, and S. Makaroff, “Why and how do microscopic field perturbations lower activating thresholds?” *Brain Stimulation*, vol. 18, no. 1, p. 217, Jan./Feb. 2025.

L. D. Oliver, D. M. Blumberger, C. Hawco, E. W. Dickie, J. Gallucci, J. Jeyachandra, S. Mansour, **Z.-D. Deng**, S. M. Hare, J. M. Gold, G. Foussias, M. Argyelan, Z. J. Daskalakis, R. W. Buchanan, A. K. Malhotra, and A. N. Voineskos, “Effects of individualized transcranial magnetic stimulation on social cognitive network functional connectivity in schizophrenia spectrum disorders: A target engagement study,” *Neuropsychopharmacology*, vol. 49, supplement, p. 420, Dec. 2024.

- * C. C. Abbott, T. L. Squillaci, B. A. Kimbrell, J. David, J. Upston, T. Jones, A. Datta, and **Z.-D. Deng**, “Predictive biomarkers to inform ECT parameter selection,” *Neuropsychopharmacology*, vol. 49, supplement, p. 411, Dec. 2024.

- * **Z.-D. Deng**, J. Kim, B. A. Pritchard, R. H. Schor, G. R. Dold, and S. H. Lisanby, “Multichannel Individualized Stimulation Therapy (MIST): Precision through computational modeling and multitargeted stimulation,” *Neuropsychopharmacology*, vol. 49, supplement, p. 192, Dec. 2024.

E. Jones, T. Torrico, L. Beynel, **Z.-D. Deng**, D. Nielson, E. Wiener, S. Menon, B. Luber, E. Ekpo, W. Regenold, and S. H. Lisanby, “Accelerated intermittent theta burst stimulation for depression,” *American Psychiatric Nurses Association Annual Conference*, Oct. 2024.

- * E. Bharti, S. Dey, V. Voon, S. M. Goetz, C. A. Zarate, Jr., S. H. Lisanby, and **Z.-D. Deng**, “Personalized brain modeling of psychiatric treatments,” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2024.

- * S. Dey and **Z.-D. Deng**, “A robust state estimation strategy for brain stimulation,” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2024.

E. Greenstein, Z. Rezaee, **Z.-D. Deng**, L. Oberman, and S. H. Lisanby, “Exploring individual variability in TMS effects: The case for E-field modeling in research,” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2024.

- * P. L. Robins, S. H. Lisanby, and **Z.-D. Deng**, “Quantifying aliasing in paper electroencephalography (EEG) during electroconvulsive therapy (ECT),” *The Journal of ECT*, vol. 40, no. 3, p. e20, Sep. 2024.

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,” *NYC Neuromodulation Conference*, Aug. 2024.

E. Ekpo, L. Beynel, **Z.-D. Deng**, B. Luber, W. T. Regenold, E. Jones, and S. H. Lisanby, “Functional connectivity in depression: Task-based vs resting state fMRI,” *Annual Biomedical Research Conference for Minoritized Scientists*, Nov. 2024.

S. M. Francis, S. N. Menon, L. Beynel, P. L. Robins, **Z.-D. Deng**, A. Thurm, T. White, F. Pereira, L. M. Oberman, and S. H. Lisanby, “Identifying domain-specific nodes using network controllability to determine potential TMS targets for ASD,” *Annual Meeting of the International Society for Autism Research*, May 2024.

L. Beynel, B. Luber, H. Gura, Z. Rezaee, E. Ekpo, **Z.-D. Deng**, O. Joseph, P. Taylor, and S. H. Lisanby, “When the target is a moving target: Practical issues in using task fMRI for rTMS targeting,” *Aperture Neuro*, vol. 4, no. Suppl 1, pp. 1457–1458, Jun. 2024.

L. D. Oliver, D. M. Blumberger, C. Hawco, E. W. Dickie, J. Gallucci, J. Jeyachandra, **Z.-D. Deng**, J. M. Gold, G. Foussias, M. Argyelan, Z. J. Daskalakis, R. W. Buchanan, A. K. Malhotra, and A. N. Voineskos, “Effects of personalized transcranial magnetic stimulation on social cognitive network functional connectivity in schizophrenia spectrum disorders,” *Biological Psychiatry*, vol. 95, no. 10, pp. S278–S279, May 2024; also presented at *Annual Congress of the Schizophrenia International Research Society*, Apr. 2024.

* P. L. Robins, J. R. Gilbert, and **Z.-D. Deng**, “Characterizing hippocampal activation with magnetoencephalography using the mnemonic similarity task in healthy participants,” *Aperture Neuro*, vol. 4, no. Suppl 1, p. 1713, Jun. 2024; also in *Biological Psychiatry*, vol. 95, no. 10, p. S205, May 2024; and *NIH Postbac Poster Day*, Apr. 2024.

E. Ekpo, L. Beynel, **Z.-D. Deng**, B. Luber, W. T. Regenold, E. Jones, and S. H. Lisanby, “Goal priming: Using a task to assess functional connectivity in depression,” *Biological Psychiatry*, vol. 95, no. 10, pp. S192–S193, May 2024.

* C. C. Abbott, J. Miller, M. Argyelan, S. M. McClintock, and **Z.-D. Deng**, “Individualized amplitude and electroconvulsive therapy,” *Biological Psychiatry*, vol. 95, no. 10, p. S31, May 2024.

M. Argyelan, **Z.-D. Deng**, O. T. Ousdal, L. Oltedal, G. Petrides, A. Malhotra, and C. C. Abbott, “Electroconvulsive therapy-induced volumetric brain changes converge on a common causal circuit in depression,” *Biological Psychiatry*, vol. 95, no. 10, pp. S29–S30, May 2024.

ꝝ S. N. Menon, S. M. Francis, L. Beynel, P. L. Robins, **Z.-D. Deng**, A. Thurm, T. White, F. Pereira, P. Taylor, L. M. Oberman, and S. H. Lisanby, “Localizing brain networks in autism: A protocol to identify potential rTMS targets,” *NIH Julius Axelrod Symposium*, Apr. 2024; also presented at *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2023.

M. Teferi, M. Patel, A. Casalvera, **Z.-D. Deng**, K. Lynch, D. Oathes, Y. Sheline, and N. Balderston, “Both cTBS and iTBS increase anxiety when delivered to the right dlPFC in healthy volunteers,” *Neuropsychopharmacology*, vol. 46, supplement, p. 83, Dec. 2023.

M. Jaime, L. M. Oberman, S. M. Francis, J. Stout, **Z.-D. Deng**, P. L. Robins, J. W. van der Veen, and S. H. Lisanby, “An experimental methods based approach to understanding the mechanisms underlying MEG indices of auditory/language processing,” *MEG North America Workshop*, Nov. 2023.

E. Jones, **Z.-D. Deng**, Z. Rezaee, P. Rohde, P. L. Robins, W. T. Regenold, and S. H. Lisanby, “Transcranial electric stimulation therapy for treatment resistant depression,” *American Psychiatric Nurses Association Annual Conference*, Oct. 2023.

M. Jaime, E. Ekpo, L. M. Oberman, S. M. Francis, L. Beynel, M. Hynd, P. L. Robins, **Z.-D. Deng**, J. Stout, J. W. van der Veen, A. Thurm, and S. H. Lisanby, “Design and methodology for a proof of mechanism study of individualized neuronavigated continuous theta burst stimulation for auditory processing in adolescents with autism spectrum disorder,” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2023.

E. Ekpo, H. Gura, Z. Rezaee, **Z.-D. Deng**, B. Luber, S. H. Lisanby, and L. Beynel, “Effects of practice and fMRI-Guided rTMS on a numerical Stroop task,” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2023.

- * M. Dannhauer, S. H. Lisanby, and **Z.-D. Deng**, “The next generation of Dosing Optimization for Transcranial Magnetic Stimulation (DO-TMS),” *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2023.
- * P. L. Robins, S. N. Makaroff, and **Z.-D. Deng**, “Electric field characteristics of rotating permanent magnet stimulation,” *Biomedical Engineering Society Annual Meeting*, Oct. 2023; also presented at *NIMH IRP Fellows’ Scientific Training Day*, Sep. 2023.
⊗ NIMH IRP Trainee Travel Award (awarded to P. L. Robins)
- ꝝ W. A. Wartman, K. Weise, M. Rach, 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,” *Brain & Human Body Modeling Conference*, Aug. 2023.
⊗ Third Place in International Student Competition (awarded to W. A. Wartman)
- * J. Kim, B. A. Pritchard, R. H. Schor, G. R. Dold, S. H. Lisanby, and **Z.-D. Deng**, “Multichannel Individualized Stimulation Therapy (MIST) system for treatment of depression,” *Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Jul. 2023.
- ꝝ S. N. Makaroff, W. A. Wartman, **Z.-D. Deng**, and A. Nummenmaa, “Charge-based brain modeling engine at mesoscale and multiscale,” *WPI Research, Discovery, and Innovation Annual Symposium*, May 2023.
- P. L. Robins, P. Rohde, **Z.-D. Deng**, W. T. Regenold, and S. H. Lisanby, “Feasibility method for magnetoencephalography data collection and analysis for patients receiving electroconvulsive therapy,” *NIH Postbac Poster Day*, Apr. 2023.
- 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*, Apr. 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, Mar./Apr. 2023.
- B. Luber, S. Davis, **Z.-D. Deng**, D. Murphy, A. Peterchev, and S. H. Lisanby, “Targeting deep brain structures with TMS using diffusion tensor imaging,” *Brain Stimulation*, vol. 16, no. 1, p. 190, Jan./Feb. 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, Jan./Feb. 2023.
- *ꝝ 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, Jan./Feb. 2023.
- ꝝ J. Ferreira, L. Morales, R. Lemdiasov, H. Lu, **Z.-D. Deng**, and S. Makaroff, “TMS coil and TMS coil array designer with fast multipole method,” *Brain Stimulation*, vol. 16, no. 1, p. 136, Jan./Feb. 2023.

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,” International Patent Application, PCT/US2025/27755, filed May 5, 2025. Assignee: National Institutes of Health, U.S. Department of Health and Human Services.
- C. C. Abbott, **Z.-D. Deng**, J. Upston, T. Jones, and A. Datta, “Systems and methods for electroconvulsive therapy,” International Patent Application, WO 2024/148196 A1, filed Jul. 11, 2024. Assignee: University of New Mexico. ↗

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,” International Patent Application, WO 2024/215761 A1, filed Apr. 10, 2024. Assignee: National Institutes of Health, U.S. Department of Health and Human Services. [□](#)

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. Assignee: 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 parasym pathetic modulation,” U.S. Patent 9,737,258, Aug. 22, 2017. Assignee: Massachusetts Institute of Technology. [□](#)

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. Assignee: 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. Assignee: The Trustees of Columbia University in the City of New York. [□](#)

ONGOING
RESEARCH
SUPPORT

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

Congressionally Directed Medical Research Programs Award TP220072 2024.12 – 2026.12
Role: Intramural NIH collaborator; PI: D. L. Brody

This study aims to compare TMS protocols that may alleviate depressive symptoms in US military service members with a history of concussion/mild traumatic brain injury.

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 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	<p><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.</p> <p><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.</p> <p><i>PRecision Optimally Targeted ECT (PROTECT)</i> NIH/NIMH R01 2025.09 Role: mPI; collaborating PIs: C. C. Abbott, A. Datta</p> <p><i>High-density theta burst stimulation at 100 Hz: Development and first trial in cocaine use disorder</i> NIH UG3/UH3 2025.09 Role: Intramural NIH collaborator; PI: H. Lu</p> <p><i>Transdiagnostic trial to reduce default mode network connectivity in bipolar depression and major depressive disorder with accelerated iTBS</i> NIH 2025.06 Role: Intramural NIH collaborator; PI: Y. I. Sheline</p> <p><i>Electromagnetic brain stimulation modeling at the synaptic level</i> NIH R21 2025.02 Role: Intramural NIH collaborator; PI: S. N. Makaroff</p> <p><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</p> <p><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.</p> <p><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.</p> <p><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.</p> <p><i>Fast-Fail Trials: Mood and Anxiety Spectrum Disorders (FAST-MAS)</i> NIMH 271201200006I-3-27100003-1 2016.06 – 2017.12 Role: Data analyst; PI: A. D. Krystal</p>
COMPLETED RESEARCH SUPPORT	

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



INVITED
SEMINARS &
WEBINARS

Denotes Continuing Medical Education accredited presentation

- International Society for ECT and Neurostimulation Webinar 2025
Advancing ECT through computational modeling, dose optimization, and device innovation

- Arizona State University, School for Biological and Health Systems Engineering 2025
Model-driven neurostimulation: Computational approaches to device and dose optimization

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

- IEEE Magnetics 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

- University of California, San Francisco, 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	2023
<i>Computational neurostimulation: Treatment optimization and technology development</i>	
National Center of Neuromodulation for Rehabilitation, MUSC	2022
<i>Model-driven design for brain stimulation therapies</i> 	
International Network of tES-fMRI Webinar	2022
<i>Electric field modeling and optimization approaches for individualized targeting</i>	
NIMH Intramural Research Program Investigators' Seminar	2022
<i>Seizure therapies: The next generation</i>	
Brown University/Butler Hospital, Department of Psychiatry & Human Behavior	2021
<i>Computational model driven design for brain stimulation</i>	
University of Pennsylvania, Center for Neuromodulation in Depression and Stress	2021
<i>Electromagnetic brain stimulation from low to high intensity</i>	
VA Boston Healthcare System, Boston University School of Medicine	2020
Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar	
<i>Precision neurostimulation: History, physics, computational modeling, and engineering</i>	
Medical University of Vienna, Neuroimaging Lab	2020
<i>Precision seizure therapy</i>	
International Symposium on Advancing Stimulation Precision Medicine of Brain Disorders, Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resonance	2019
<i>Rational design of precision seizure therapy</i>	
Mount Sinai Icahn School of Medicine, Depression and Anxiety Center	2019
<i>Rational design of individualized noninvasive brain stimulation</i>	
NIMH Intramural Research Program Investigators' Seminar	2018
<i>Computational neurostimulation: Engineering better brain stimulation therapies</i>	
UCLA Brain Mapping Center	2018
<i>Computational neurostimulation: Engineering better brain stimulation therapies</i>	
UCLA Semel Institute for Neuroscience and Human Behavior	2018
Neuromodulation Division	
<i>Modeling and design for magnetic stimulation</i>	
USC Mark and Mary Stevens Neuroimaging and Informatics Institute	2018
<i>Computational neurostimulation</i>	
NIDA, Neuroimaging Research Branch	2016
<i>Advances in transcranial magnetic stimulation technology</i>	
Mayo Clinic College of Medicine, Department of Molecular Pharmacology	2016
Neurobiology of Alcoholism and Drug Addiction Lab	
<i>Transcranial magnetic stimulation technology development</i>	
Mayo Clinic College of Medicine, Department of Neurologic Surgery	2016
Neural Engineering Lab	
<i>Optimizing transcranial magnetic stimulation</i>	
NIMH, Experimental Therapeutics & Pathophysiology Branch	2016
<i>Engineering better electromagnetic brain stimulation therapies</i>	
Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences	2015
Chair's round: <i>Fundamentals of transcranial electric and magnetic stimulation dosing</i>	
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 <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>	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	Electroconvulsive Therapy Conference & GEMRIC Workshop <i>ECT time machine: What yesterday's devices teach about tomorrow's therapy</i>
CONFERENCE TALKS & WORKSHOPS	⊕ 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>	2025
	Accepted for presentation, unable to attend due to government travel restrictions	
	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 CONFERENCE	⊕ 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> 	2022
	Part of workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, & biomarker development</i>	

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 pandemic	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	2018
<i>Optimizing high-density stimulation arrays for brain targeting</i>	
Neuropsychiatric Drug Development Summit	2018
<i>Targeted intermittent device delivered interventions will ultimately prove superior to maintenance treatment with drugs for brain disorders</i>	
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>		2015
⊕ <i>Visiting Fellowship in Transcranial Magnetic Stimulation</i>		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	

MENTORING SUMMARY



FACULTY ADVISORY

D. C. Farrar, M.D., Ph.D., University of New Mexico School of Medicine	2025 –
Project: “CEASE-LD: Characterizing brain 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 negative self-referential processing in depression with transcranial magnetic stimulation”	
S. M. Hare, Ph.D., University of Maryland School of Medicine	2024 – 2029
NIH/NIMH K01 MH133116	
Project: “Cognitive and neural correlates of TMS motor intracortical inhibition in schizophrenia”	
S. H. Siddiqi, M.D., Brigham & Women’s Hospital	2020 – 2025
NIH/NIMH K23 MH121657	
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	2019 – 2023
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> , 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 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	2015 – 2017
THESIS EXAMINATION COMMITTEES	S. J. Bolland, Biomedical Engineering, University of Western Australia 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. Available: <i>UWA Research Repository</i> , DOI: 10.26182/7vwg-p536	2025
	D. Tang, Electrical & Computer Engineering, Worcester Polytechnic Institute M.S. thesis: "Computational and experimental approaches to brain stimulation: TMS simulation, coil measurement, and neural structure analysis." Sponsor: S. N. Makaroff. Available: <i>Digital WPI</i> , URL: https://digital.wpi.edu/show/6h440x853	2025
	W. A. Wartman, Electrical & Computer Engineering, Worcester Polytechnic Institute Ph.D. dissertation: "Adaptive mesh refinement for quasistatic electromagnetic modeling of brain stimulation and recording methods." Sponsor: S. N. Makaroff. Available: <i>Digital WPI</i> , URL: https://digital.wpi.edu/show/sq87c029w	2024
	D. Q. Troung, Biomedical Engineering, CUNY City College 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	2019
GRADUATE STUDENTS	E. Bharti, Ph.D. cand., 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  Trainee Travel Award, NIMH Intramural Research Program, 2023.  First Place in Student Competition, <i>Brain & Human Body Modeling Conference</i> , 2022. Career progression: Lead interventional technician, Columbia Mental Health	2021 – 2024
	M. R. Hynd, B.S., NIMH IRTA Fellow Career progression: Ph.D. student, University of North Carolina at Chapel Hill	2020 – 2022
	S. Awasthi, B.S., NIMH IRTA Fellow Career progression: Medical student, Stanford University School of Medicine	2018 – 2020
	M. M. Noh, S.B., NIMH IRTA Fellow Career progression: Medical student, University of Cincinnati College of Medicine	2018 – 2019
	J. Thomas, M.S., NIMH IRTA Fellow Career progression: Program officer, National Academies of Sciences, Engineering, & Medicine	2017 – 2019
	M. Velez Afanador, B.S., NIMH IRTA Fellow  Outstanding Poster Award, <i>NIH Postbac Poster Day</i> , 2018. Career progression: Medical student, Howard University College of Medicine	2016 – 2019
UNDERGRADS	D. T. Weaver, Biology, Duke University Career progression: M.D./Ph.D. student, Case Western Reserve University	2016
	E. F. Salgado, Psychology & Neuroscience, Duke University  Graduated with Distinction Career progression: Ph.D. student, Indiana University–Purdue University Indianapolis	2016
	Z. Feng, Biomedical Engineering and Biology, Duke University	2015 – 2016

	Career progression: Medical student, University of Colorado School of Medicine	
M. L. Glidewell, Biomedical Engineering, Duke University		2015 – 2016
Career progression: Senior strategy consultant, IBM		
W. Lim, Biomedical Engineering, Duke University		2015 – 2016
Career progression: Medical student, Texas A&M College of Medicine		
F. M. Mercer, Gender, Sexuality and Feminist Studies, Duke University		2015 – 2016
Career progression: Analyst, Morgan Stanley		
E. Shinder, Biology, Duke University		2015 – 2016
② Graduated with Distinction		
Career progression: Medical student, Stony Brook School of Medicine		
E. P. Vienneau, Biomedical Engineering, Duke University		2015 – 2016
② Howard G. Clark Award for Excellence in Research		
Career progression: Ph.D. student, Vanderbilt University		
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
② 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		
E. Chung, Psychology, University of Maryland, College Park		2017
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		
Institute of Electrical and Electronics Engineers (IEEE)		
Senior Member (2023 –), Member (2013 – 2023), Student Member (2004 – 2013)		
Engineering in Medicine and Biology Society		2004 –
Brain Technical Community		2025 –
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

PROFESSIONAL SERVICE & 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) Data Processing and MRI Working Group	2025 –
	Biomedical Engineering Society Mid-Career Award Subcommittee	2025
	Chapter Development Report Reviewers	2025
	American Society of Clinical Psychopharmacology Technology Committee	2023 –
	Early Career Committee	2023 – 2027
	Technology Task Force	2020 – 2023
INSTITUTIONAL SERVICE	Reviewer, NIH Intramural AIDS Research Fellowships	2025
	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 – 2025
	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
	Community Reviewer (formerly 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>Bioelectromagnetics</i>	2010 –

Biological Psychiatry
Biological Psychiatry: Global Open Science
BioMedical Engineering OnLine
BMJ Mental Health
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
Depression and Anxiety
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 Access
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
Neuroscience Letters
PLOS Computational Biology
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: *New modeling methods: Spinal cord stimulation and novel stimulation*

	Chair of panel: <i>Development and assessment of modeling methods</i>	
American Society of Clinical Psychopharmacology Annual Meeting	Program review subcommittee	2023
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>		
NIH Workshop on TMS-EEG Methodology and Data Integration		2020
Organizer and funding applicant		
▣ Funding awarded; event was canceled due to COVID-19 pandemic		
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	
ASCP Early Career Workshop		2021
Presentation: <i>Engaging presentation strategies for any audience</i> (CME accredited)		
Mental Health Association of Maryland		2020
Presentation: <i>Fundamentals of transcranial brain stimulation</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 pandemic		
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>		
Innovation Leader, Psychiatry Innovation Lab, American Psychiatric Association		2016

	Duke Translational Medicine Institute, Undergraduate Research Society Presentation: <i>Engineering meets psychiatry</i>	2016
	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
	Structural Equation Modeling, CenterStat by Curran-Bauer Analytics	2022
	Diversity and Inclusion Certificate Program, NIH	2021 – 2022
	FSL Course, University of Oxford FMRIB Analysis Group	2020
	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 Medical Center/New York State Psychiatric Institute	2009
	Basic Life Support, American Heart Association	Recertified 2023.07

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