

# ZHI-DE DENG





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

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| PREDOCTORAL<br>RESEARCH<br>ASSISTANTSHIPS<br>& INTERNSHIPS | <b>Visiting Graduate Research Assistant</b> , Duke Psychiatry                    | 2010–2013   |
|  | <b>Graduate Research Assistant</b> , Columbia Psychiatry                         | 2007–2010   |
|  | <b>Research Assistant</b> , Harvard–MIT Division of Health Sciences & Technology | 2005–2007   |
|  | <b>Executive Intern</b> , Weill Cornell Medicine Anesthesiology                  | Summer 2004 |
|  | <b>Internship Coordinator</b> , Children’s Aid Society                           | Summer 2003 |
|  | <b>Newsroom Technology Intern</b> , The New York Times Company                   | Summer 2002 |
| AWARDS &<br>HONORS:<br>INTERNATIONAL<br>& NATIONAL         | <b>Certificate for Top Cited Article</b>   | 2025        |
|  | <i>Bipolar Disorders</i> , International Society for Bipolar Disorders/Wiley     |             |
|  | <b>Elected to Full Membership</b>  | 2024        |
|  | Sigma Xi, The Scientific Research Honor Society                                  |             |
|  | <b>Scholar, Advanced Research Institute in Geriatric Mental Health</b>           | 2023–2024   |
|  | Dartmouth College, supported by grant from NIH/NIMH R25 MH068502                 |             |
|  | <b>Elevated to Senior Membership</b>   | 2023        |
|  | Institute of Electrical and Electronics Engineers (IEEE)                         |             |
|  | <b>Elected to Associate Membership</b>   | 2023        |
|  | American College of Neuropsychopharmacology                                      |             |
|  | <b>New Investigator Award</b>  | 2018        |
|  | American Society of Clinical Psychopharmacology                                  |             |
|  | <b>Early Career Investigator Travel Fellowship Award</b>                         | 2018        |
|  | Society of Biological Psychiatry   |             |
|  | <b>Research Colloquium for Junior Investigators</b>                              | 2018        |
|  | American Psychiatric Association   |             |
|  | <b>Alies Muskin Career Development Leadership Program</b>                        | 2018        |
|  | Anxiety & Depression Association of America                                      |             |
|  | <b>NARSAD Young Investigator Award</b>   | 2017        |
|  | Brain & Behavior Research Foundation   |             |
|  | <b>Scholar, Career Development Institute for Psychiatry</b>                      | 2017        |
|  | Stanford University/University of Pittsburgh                                     |             |
|  | <b>New Investigator Award</b>  | 2017        |
|  | International Society for CNS Clinical Trials and Methodology                    |             |
|  | <b>Certificate for Highly Cited Research</b>                                     | 2016        |
|  | <i>Brain Stimulation</i> , Elsevier  |             |
|  | <b>Young Investigator Memorial Travel Award</b>                                  | 2015        |
|  | American College of Neuropsychopharmacology                                      |             |
|  | <b>Scholar, Summer Research Institute in Geriatric Mental Health</b>             | 2015        |
|  | Weill Cornell Medical College, supported by NIH/NIMH R25 MH019946                |             |
|  | <b>Chair’s Choice Travel Fellowship Award</b>                                    | 2015        |
|  | Society of Biological Psychiatry   |             |
|  | <b>Innovative Research Poster Award</b>  | 2014        |
|  | National Network of Depression Centers   |             |
|  | <b>Best Abstract Award</b>   | 2010        |
|  | International Society for Neurostimulation                                       |             |
|  | <b>New York Times College Scholarship</b>  | 2002–2006   |
|  | The New York Times Company Foundation  |             |

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| AWARDS &<br>HONORS:<br>INSTITUTIONAL<br>& LOCAL | <b>Special Act Award</b>  | 2025      |
|   | For outstanding scholarship advancing precision neuromodulation, NIMH   |           |
|   | <b>NIMH Director's Award</b>  | 2024      |
|   | For outstanding transdisciplinary scientific contributions to advance neuromodulation technologies for the study and treatment of psychiatric disorders |           |
|   | <b>High Five Award</b>  | 2024      |
|   | For excellent preparation for and presentation at the Noninvasive Neuromodulation Unit's Board of Scientific Counselors review, NIMH                    |           |
|   | <b>First Place Winner, Science as Art Competition</b>   | 2022      |
|   | NIMH Intramural Research Program Fellows' Scientific Training Day   |           |
|   | <b>NIMH Director's Award</b>  | 2019      |
|   | For scientific innovation at the interface of computation and psychiatry  |           |
|   | <b>Richard J. Wyatt Memorial Fellowship Award for Translational Research</b>  | 2018      |
|   | NIMH Intramural Research Program  |           |
|   | <b>KL2 Career Development Award</b>   | 2014–2016 |
|   | Duke Translational Medicine Institute, supported by NIH/NCATS KL2 TR001115  |           |
|   | <b>Presidential Award for Outstanding Teaching, Finalist</b>  | 2010      |
|   | Columbia University   |           |
|   | <b>CTSA T32 Certificate Award</b>   | 2008–2009 |
|   | Columbia University Irving Institute for Clinical and Translational Research, supported by NIH/NCRR TL1 RR024158  |           |

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| RESEARCH<br>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  |

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| RESEARCH<br>OUTPUT<br>SUMMARY |  <b>66</b> Refereed original research articles                                       |
|                               |  <b>22</b> Refereed conference proceedings & technical notes                         |
|                               |  <b>17</b> Refereed reviews, trial protocols, & consensus papers                     |
|                               |  <b>10</b> Book chapters   |
|                               |  <b>5</b> Editorials, commentaries, & correspondence                                 |
|                               |  <b>9</b> IP filings (4 granted U.S. patents, 3 pending, 2 unconverted provisionals) |
|                               | + <b>178</b> Abstracts  |

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| REFEREED<br>ORIGINAL<br>RESEARCH<br>ARTICLES | <b>* Denotes first, joint first, or senior author</b>  |
|  | A. V. Peterchev, <b>Z.-D. Deng</b> , 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,” <i>Biological Psychiatry: Global Open Science</i> , vol. 5, no. 3, 100471, May 2025.<br>DOI: 10.1016/j.bpsgos.2025.100471; PMCID: PMC11985115; Data available    |
|  | S. M. McClintock, <b>Z.-D. Deng</b> , M. M. Husain, V. J. Thakkar, E. Bernhardt, R. D. Weiner, B. Lubner, and S. H. Lisanby, “Comparing the neurocognitive effects of right-unilateral ultra-brief pulse electroconvulsive therapy and magnetic seizure therapy for the treatment of major depressive episode,” <i>Biological Psychiatry: Cognitive Neuroscience and Neuroimaging</i> , vol. 10, no. 2, pp. 175–185, Feb. 2025.<br>DOI: 10.1016/j.bpsc.2024.10.016; PMID: 39515580 |
|  |  Journal cover  |
|  |  |

📺 Media coverage: *Brain & Behavior Research Foundation* [🔗](#) | *UT Southwestern News Release*, Jan. 2025. [🔗](#)

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

DOI: [10.1016/j.brs.2024.12.1192](#); PMCID: [PMC11867869](#); Data available [📄](#)

📖 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](#); 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](#); 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](#); 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](#); PMID: [39185880](#)

\* M. Dib, J. D. Lewine, C. C. Abbott, and **Z.-D. Deng**, “Electroconvulsive therapy modulates loudness dependence of auditory evoked potentials: A pilot MEG study,” *Frontiers in Psychiatry*, vol. 15, 1434434, Aug. 2024.

DOI: [10.3389/fpsy.2024.1434434](#); 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](#); 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](#); 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](#); 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; PMID: PMC10839568

🏆 Top Cited Article, awarded by Wiley, 2025.

📺 Media coverage: *Psychiatric Times*, Feb. 2024. 📄

- \* P. L. Robins, S. N. Makaroff, M. Dib, S. H. Lisanby, and **Z.-D. Deng**, “Electric field characteristics of rotating permanent magnet stimulation,” *Bioengineering*, vol. 11, no. 3, 258, Mar. 2024.

DOI: 10.3390/bioengineering11030258; PMID: PMC10968657

📖 Part of Special Issue: *Electric, Magnetic, and Electromagnetic Fields in Biology and Medicine: From Mechanisms to Biomedical Applications: 2<sup>nd</sup> Edition* 📄

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

- \* **Z.-D. Deng**, B. Lubner, S. M. McClintock, R. D. Weiner, M. M. Husain, and S. H. Lisanby, “Clinical outcomes of magnetic seizure therapy vs electroconvulsive therapy for major depressive episode: A randomized clinical trial,” *JAMA Psychiatry*, vol. 81, no. 3, pp. 240–249, Mar. 2024.

DOI: 10.1001/jamapsychiatry.2023.4599; PMID: PMC10701670

📖 Commentary: vol. 81, no. 7, pp. 736–737, Jul. 2024. 📄 📄 Reply: pp. 737–738. 📄

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

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

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

📄 Research highlight commentary: pp. 635–636. 📄

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

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

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

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

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

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

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

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

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

Aug. 2023.

DOI: 10.3390/biomedicines11082320; PMID: PMC10452519

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

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

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

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

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

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

J. Miller, T. Jones, J. Upston, **Z.-D. Deng**, S.M. McClintock, E. Erhardt, D. Farrar, and C.C. Abbott, “Electric field, ictal theta power, and clinical outcomes in electroconvulsive therapy,” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 8, no. 7, pp. 760–767, Jul. 2023.

DOI: 10.1016/j.bpsc.2023.03.001; PMID: PMC10329999

A. Guillen, C.C. Abbott, **Z.-D. Deng**, Y. Huang, P. Pascoal-Faria, D.Q. Truong, and A. Datta, “Impact of modeled field of view in electroconvulsive therapy current flow simulations,” *Frontiers in Psychiatry*, vol. 14, 1168672, May 2023.

DOI: 10.3389/fpsy.2023.1168672; PMID: PMC10232815

☐ Part of Research Topic: *Translational Approaches in Neurostimulation Research: Challenges and Opportunities for Neuropsychiatry* ☑

M. Alawi, P.F. Lee, **Z.-D. Deng**, Y.K. Goh, and P.E. Croarkin, “Modelling the differential effects of age on transcranial magnetic stimulation induced electric fields,” *Journal of Neural Engineering*, vol. 20, no. 2, 026016, Mar. 2023.

DOI: 10.1088/1741-2552/ac9a76; PMID: PMC10278869

X. Chen, R. Ma, W. Zhang, G.Q. Zeng, Q. Wu, A. Yimiti, X. Xia, J. Cui, Q. Liu, X. Meng, J. Bu, Q. Chen, Y. Pan, N.X. Yu, S. Wang, **Z.-D. Deng**, A.T. Sack, M. McLaughlin, and X. Zhang, “Alpha oscillatory activity is causally linked to working memory retention,” *PLOS Biology*, vol. 21, no. 2, e3001999, Feb. 2023.

DOI: 10.1371/journal.pbio.3001999; PMID: PMC9983870

Z. Fu, C.C. Abbott, J. Miller, **Z.-D. Deng**, S.M. McClintock, M.S.E. Sendi, J. Sui, and V.D. Calhoun, “Cerebro-cerebellar functional neuroplasticity mediates the effect of electric field on electroconvulsive therapy outcomes,” *Translational Psychiatry*, vol. 13, no. 1, 43, Feb. 2023.











DOI: 10.1038/s41398-023-02312-w; PMID: PMC9902462; Code available ☐☑

\* S.N. Makaroff, H. Nguyen, Q. Meng, H. Lu, A.R. Nummenmaa, and **Z.-D. Deng**, “Modeling transcranial magnetic stimulation coils with magnetic cores,” *Journal of Neural Engineering*, vol. 20, no. 1, 016028, Jan. 2023.

DOI: 10.1088/1741-2552/acae0d; PMID: PMC10481791; Code available ☐☑

S. Qi, V.D. Calhoun, D. Zhang, J. Miller, **Z.-D. Deng**, K.L. Narr, Y. Sheline, S.M. McClintock, R. Jiang, X. Yang, J. Upston, T. Jones, J. Sui, and C.C. Abbott, “Links between electroconvulsive therapy responsive and cognitive impairment multimodal brain networks in late-life major depressive disorder,” *BMC Medicine*, vol. 20, no. 1, 477, Dec. 2022.

DOI: 10.1186/s12916-022-02678-6; PMID: PMC9733153; Code available ☐☑

- H. Li, **Z.-D. Deng**, D. Oathes, and Y. Fan, “Computation of transcranial magnetic stimulation electric fields using self-supervised deep learning,” *NeuroImage*, vol. 264, 119705, Dec. 2022.  
DOI: 10.1016/j.neuroimage.2022.119705; 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; 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; 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; 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; 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.  
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OTHER CONTRIBUTIONS:  
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- \* **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.  
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- 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. Lubner, 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. Lubner, 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. Lubner, 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. Lubner, 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.


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- M. Argyelan, **Z.-D. Deng**, O. T. Ousdal, L. Olteidal, 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.
- ✍ 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. Lubner, 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)
- ✍ 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.
- ✍ 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.
- \* 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.
-  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 parasympathetic 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 electro-magnetic modeling.

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

NIH/NIMH U01 MH130447

2022.09 – 2027.06

Role: Intramural NIH collaborator; PI: N. L. Balderston

This study aims to develop a model using whole-brain estimates of the TMS-induced electric field to predict changes in resting state functional connectivity following neuromodulatory TMS, and validate this model in a large cohort of healthy volunteers receiving multiple doses of either intermittent or continuous theta burst stimulation.

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

Centre for Addiction and Mental Health, Toronto, ON, Canada

2023.02 –

Role: Consultant; PI: V. M. Tang

This proof-of-concept clinical trial will evaluate the feasibility and tolerability of a 4-week course of rTMS to the prefrontal cortex and insula as a treatment for cannabis use disorder.

*Deciphering mechanisms of ECT outcomes and adverse effects (DECODE)*

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 antidepressant benefits and cognitive adverse effects to determine optimal ECT dose.

*ECT amplitude titration for improved clinical outcomes in late-life depression*

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.

PENDING  
RESEARCH  
SUPPORT

*PRrecision Optimally Targeted ECT (PROTECT)*

NIH/NIMH R01

2025.06

Role: mPI; collaborating PIs: C. C. Abbott, A. Datta

*Transdiagnostic trial to reduce default mode network connectivity in bipolar depression and major depressive disorder with accelerated iTBS*

NIH

2025.06

Role: Intramural NIH collaborator; PI: Y. I. Sheline

|                                  |  |                   |
|----------------------------------|--|-------------------|
| COMPLETED<br>RESEARCH<br>SUPPORT | <i>Electromagnetic brain stimulation modeling at the synaptic level</i><br>NIH R21<br>Role: Intramural NIH collaborator; PI: S. N. Makaroff  | 2025.02           |
|                                  | <i>Improving ECT clinical outcomes through seizure- and model-guided stimulation parameters</i><br>NIH UG3/UH3<br>Role: mPI; collaborating PIs: C. C. Abbott, A. Datta   | 2024.10           |
|                                  | <i>Improving the optimization of TMS coil placement with precise calculation of electric fields and robust computation of personalized functional networks</i><br>NIH/NIMH R01<br>Role: Intramural NIH collaborator; PI: Y. Fan  | 2024.10           |
|                                  | <i>Development of high-density theta burst TMS technology and initial testing in humans</i><br>NIH UG3/UH3<br>Role: Intramural NIH collaborator; PI: H. Lu   | 2024.09           |
|                                  | <i>Targeting the causal depression network with electroconvulsive therapy</i><br>NIH/NIMH R33/R61<br>Role: Intramural NIH collaborator; PI: M. Argyelan  | 2024.02           |
|                                  | <i>Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders</i><br>NIH/NIMH R61/R33 MH120188<br>Role: Intramural NIH collaborator; mPIs: A. N. Voineskos, D. M. Blumberger<br>This study uses advanced brain imaging, and compare different brain stimulation techniques, to determine whether targeting the dorsomedial prefrontal cortex can engage social cognitive brain circuitry in people with schizophrenia spectrum disorders. | 2020.05 – 2023.04 |
|                                  | <i>ECT pulse amplitude and medial temporal lobe engagement</i><br>NIH/NINDS U01 MH111826<br>Role: Co-I; PI: C. C. Abbott<br>This study explores the impact of targeted hippocampal engagement with varying levels of electroconvulsive therapy current amplitude in elderly patients with clinical, neuropsychological and neuroimaging assessments.   | 2016.09 – 2020.07 |
|                                  | <i>Individualized low amplitude seizure therapy (iLAST)</i><br>Brain & Behavior Research Foundation Young Investigator Award 26161<br>Role: PI<br>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.   | 2018.06 – 2020.06 |
|                                  | <i>Fast-Fail Trials: Mood and Anxiety Spectrum Disorders (FAST-MAS)</i><br>NIMH 271201200006I-3-27100003-1<br>Role: Data analyst; PI: A. D. Krystal<br>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.   | 2016.06 – 2017.12 |
|                                  | <i>Transcranial direct current stimulation as a treatment for acute fear</i><br>NIH/NIMH R21 MH106772<br>Role: Co-I; PI: A. D. Krystal<br>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.   | 2015.04 – 2017.01 |
|                                  | <i>Individualized optimally-targeted seizure therapy</i><br>NIH/NCATS KL2 TR001115<br>Role: PI; Training Grant PI: R. M. Califf<br>This award from the Duke Translational Medicine Institute prepares the fellow for a suc-  | 2014.07 – 2016.06 |

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

|  |  |  |
|--|--|--|
|  |  | <b>30</b> Invited seminars & webinars  |
|  |  | <b>7</b> Grand rounds                  |
|  |  | <b>43</b> Conference talks & workshops |

INVITED SEMINARS & WEBINARS

† **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*

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

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

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

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

University of Pittsburgh, Department of Psychiatry 2023  
*Computational neurostimulation: Treatment optimization and technology development*

National Center of Neuromodulation for Rehabilitation, MUSC 2022  
*Model-driven design for brain stimulation therapies* 

International Network of tES-fMRI Webinar 2022  
*Electric field modeling and optimization approaches for individualized targeting*

NIMH Intramural Research Program Investigators' Seminar 2022  
*Seizure therapies: The next generation*

Brown University/Butler Hospital, Department of Psychiatry & Human Behavior 2021  
*Computational model driven design for brain stimulation*


|                 |   |      |
|-----------------|---|------|
|                 | University of Pennsylvania, Center for Neuromodulation in Depression and Stress<br><i>Electromagnetic brain stimulation from low to high intensity</i>  | 2021 |
|                 | VA Boston Healthcare System, Boston University School of Medicine<br>Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar<br><i>Precision neurostimulation: History, physics, computational modeling, and engineering</i> | 2020 |
|                 | Medical University of Vienna, Neuroimaging Lab<br><i>Precision seizure therapy</i>  | 2020 |
|                 | International Symposium on Advancing Stimulation Precision Medicine of Brain Disorders,<br>Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resonance<br><i>Rational design of precision seizure therapy</i>              | 2019 |
|                 | Mount Sinai Icahn School of Medicine, Depression and Anxiety Center<br><i>Rational design of individualized noninvasive brain stimulation</i>   | 2019 |
|                 | NIMH Intramural Research Program Investigators' Seminar<br><i>Computational neurostimulation: Engineering better brain stimulation therapies</i>  | 2018 |
|                 | UCLA Brain Mapping Center<br><i>Computational neurostimulation: Engineering better brain stimulation therapies</i>  | 2018 |
|                 | UCLA Semel Institute for Neuroscience and Human Behavior<br>Neuromodulation Division<br><i>Modeling and design for magnetic stimulation</i>   | 2018 |
|                 | USC Mark and Mary Stevens Neuroimaging and Informatics Institute<br><i>Computational neurostimulation</i>   | 2018 |
|                 | NIDA, Neuroimaging Research Branch<br><i>Advances in transcranial magnetic stimulation technology</i>   | 2016 |
|                 | Mayo Clinic College of Medicine, Department of Molecular Pharmacology<br>Neurobiology of Alcoholism and Drug Addiction Lab<br><i>Transcranial magnetic stimulation technology development</i>   | 2016 |
|                 | Mayo Clinic College of Medicine, Department of Neurologic Surgery<br>Neural Engineering Lab<br><i>Optimizing transcranial magnetic stimulation</i>  | 2016 |
|                 | NIMH, Experimental Therapeutics & Pathophysiology Branch<br><i>Engineering better electromagnetic brain stimulation therapies</i>   | 2016 |
|                 | Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences<br>Chair's round: <i>Fundamentals of transcranial electric and magnetic stimulation dosing</i>   | 2015 |
|                 | Weill Cornell Medical College, Department of Biomedical Engineering<br><i>Transcranial magnetic stimulation: Pulse source, coil design, &amp; concurrent neuroimaging</i>   | 2015 |
|                 | Duke University, Department of Biomedical Engineering<br><i>Modeling and coil design considerations for transcranial magnetic stimulation</i>   | 2014 |
| GRAND<br>ROUNDS | † Barrow Neurological Institute, Phoenix, AZ<br><i>Innovating neurostimulation: From treatment optimization to next-generation technology</i>   | 2025 |
|                 | Advanced Research Institute Grand Rounds in Mental Health and Aging Research<br><i>Advancing neurostimulation treatment optimization and technology innovation</i>  | 2023 |
|                 | Westmead Hospital, Sydney, Australia<br><i>Advances in neuromodulation: Electroconvulsive therapy</i>   | 2020 |
|                 | † Clinical TMS Society<br><i>Transcranial magnetic stimulation: Physics, devices, and modeling</i>  | 2018 |

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|------------------------------------|--|------|
|                                    | † University of New Mexico, Department of Psychiatry & Behavioral Sciences<br><i>Toward individualized electroconvulsive therapy for treatment of depression</i>   | 2017 |
|                                    | † Central Regional Hospital, Butner, NC<br><i>Individualized seizure therapy</i>   | 2015 |
|                                    | † Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences<br><i>Toward next generation seizure therapy</i>  | 2015 |
| CONFERENCE<br>TALKS &<br>WORKSHOPS | Electroconvulsive Therapy Conference & GEMRIC Workshop<br><i>ECT time machine: What yesterday's devices teach about tomorrow's therapy</i>   | 2025 |
|                                    | † American Neuropsychiatric Association Annual Meeting<br><i>Advancing personalized seizure therapy: Magnetic seizure therapy and Multichannel Individualized Stimulation Therapy</i><br>Part of Program Committee Symposium: <i>Interventional neuropsychiatry: From mechanisms to clinical decision making</i> | 2025 |
|                                    | International Brain Stimulation Conference<br><i>Multichannel Individualized Stimulation Therapy: A targeted approach to optimize ECT</i><br>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<br><i>A model-driven approach to personalized neuromodulation treatment</i>  | 2024 |
|                                    | NIMH Workshop on The Placebo Effect: Key Questions for Translational Research<br><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<br><i>TMS devices and modeling</i><br>Part of workshop: <i>From basics to applications: MRI of neuromodulation using TMS and FUS</i>   | 2024 |
|                                    | Brain and Human Body Modeling Conference<br><i>Effects of low intensity magnetic stimulation</i>   | 2023 |
|                                    | International Conference of the IEEE Engineering in Medicine and Biology Society<br><i>Modeling of TMS and ECT in the treatment of depression</i><br>Part of panel: <i>Computational analysis of non-invasive neuromodulation constructs: Brain &amp; spine</i>  | 2023 |
|                                    | † ADAA Anxiety and Depression Conference<br><i>Modeling and dose optimization for TMS and ECT</i><br>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<br><i>Modeling of TMS</i>    | 2022 |
|                                    | Part of workshop: <i>MRI of neuromodulation: Target engagement, neural mechanism, &amp; biomarker development</i>  |      |
|                                    | Bergen Workshop of the Global ECT–MRI Collaboration<br><i>ECT device development</i>    | 2022 |
|                                    | Brain and Human Body Modeling Conference<br><i>ECT, electric field, neuroplasticity, and clinical outcomes</i><br>Part of panel: <i>Modeling of transcranial electrical stimulation and deep brain stimulation</i>   | 2022 |
|                                    | European Conference of Brain Stimulation in Psychiatry<br><i>Symptom dimensions and response trajectories in ECT and MST</i><br>Part of panel: <i>Beyond clinical syndromes: Understanding mechanisms of neuromodulation from a dimensional perspective</i>  | 2022 |
|                                    | † Society of Biological Psychiatry Annual Meeting<br><i>Depressive symptom dimensions in seizure therapy</i>   | 2022 |

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|---|------|
| Part of panel: <i>Dimensional approaches to device neuromodulation</i>  |      |
| Global ECT–MRI Collaboration Young Researchers Collective<br><i>ECT, electric field, neuroplasticity, and clinical outcomes</i>   | 2022 |
| † American Academy of Child and Adolescent Psychiatry Annual Meeting<br><i>Introduction to computational psychiatry</i><br>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<br><i>Precision neurostimulation: Electroconvulsive therapy</i><br>Part of panel: <i>Neurobiology of rapid mood changes</i>  | 2021 |
| Society for Brain Mapping & Therapeutics Annual Congress<br><i>Advances in electroconvulsive therapy for treatment of depression</i>  | 2021 |
| International College of Neuropsychopharmacology Virtual World Congress<br><i>Next generation seizure therapy and neuromodulation</i>   | 2021 |
| European Conference of Brain Stimulation in Psychiatry<br><i>Electric field modeling to inform ECT dosing and device development</i><br>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<br><i>Use of individual electric field models in clinical research</i>   | 2020 |
| NYC Neuromodulation Online<br>Discussant, <i>Noninvasive vagus nerve stimulation applied to stress management, opioid withdrawal, and neurocognitive disorders</i>  | 2020 |
| American Society of Clinical Psychopharmacology Annual Meeting<br><i>Advancing seizure therapy: Rational design for precision outcomes</i><br>Part of panel: <i>New developments in neurostimulation</i>  | 2020 |
|  Accepted for presentation; conference was canceled due to COVID-19 pandemic   |      |
| † American College of Neuropsychopharmacology Annual Meeting<br><i>Rational design of precision seizure therapy</i><br>Part of panel: <i>Precision neurostimulation for treatment of psychiatric disorders</i>  | 2019 |
| International College of Neuropsychopharmacology Meeting<br><i>Individualized seizure therapy: Reinventing ECT</i><br>Part of workshop: <i>Neurobiological and clinical characterization, and treatment development for treatment resistant depression</i>                                  | 2019 |
| International Brain Stimulation Conference<br><i>Individualized electroconvulsive therapy for treatment of depression</i><br>Part of panel: <i>Individualized brain stimulation: Addressing heterogeneity across modalities</i>   | 2019 |
| Bergen Workshop of the Global ECT–MRI Collaboration<br><i>Electric field modeling for electroconvulsive therapy</i>   | 2018 |
| Joint NYC Neuromodulation Conference & NANS Summer Series<br><i>Optimizing high-density stimulation arrays for brain targeting</i>  | 2018 |
| Neuropsychiatric Drug Development Summit<br><i>Targeted intermittent device delivered interventions will ultimately prove superior to maintenance treatment with drugs for brain disorders</i>  | 2018 |
| International Conference of the IEEE Engineering in Medicine and Biology Society<br><i>Electric field induced by TMS: Applications in depression and anxiety</i><br>Part of panel: <i>Computational human models for brain stimulation</i>  | 2018 |
| † American Psychiatric Association Annual Conference<br><i>Individualized neurotargeted seizure therapy: Reinventing ECT</i>  | 2018 |



Part of Presidential Symposium: *ECT in the era of new brain stimulation treatments*

- † ADAA Anxiety and Depression Conference 2018  
*Individualized neurotargeted seizure therapy: Reinventing ECT*  
 Part of panel: *Personalized medicine for treatment resistant depressed patients: Novel strategies to optimize treatment with antidepressant medications, ketamine, and ECT*
- NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop 2017  
*Use of individual electric field models in clinical research* 
- NYC Neuromodulation Conference 2017  
*Low field magnetic stimulation*
- NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications 2016  
*Effect of anatomical variability on electric field characteristics of tES*
- † International Society for ECT and Neurostimulation Annual Meeting 2015  
 Workshop: *Spatial targeting with transcranial magnetic stimulation*
- International Conference of the IEEE Engineering in Medicine and Biology Society 2010  
*TMS in the presence of deep brain stimulation implants: Induced electrode currents*  
*ECT in the presence of deep brain stimulation implants: Electric field effects*
- Annual National Predoctoral Clinical Research Training Program Meeting 2009  
*Coil design for deep-brain transcranial magnetic stimulation*
- TRANSFORM Research Day, Irving Institute for Clinical and Translational Research 2009  
*Electromagnetic field shaping and coil design for transcranial brain stimulation*
- International Conference of the IEEE Engineering in Medicine and Biology Society 2008  
*Coil design considerations for deep brain transcranial magnetic stimulation*
- Annual Meeting of the Society for Neuroscience 2006  
*Heart rate variability is more chaotic in REM than NREM sleep in children*
- International Conference of the IEEE Engineering in Medicine and Biology Society 2006  
*Heart rate variability in pediatric obstructive sleep apnea*

TEACHING &  
MENTORING  
APPOINTMENTS

**Lecturer, NIH**

- National Institute of Mental Health  
*Basic Training Course on Transcranial Magnetic Stimulation*  2020  
*fMRI Course* Summer 2017

- National Institute of Neurological Disorders and Stroke  
*Clinical Neuroscience Program Lecture Series* 2017, 2019

**Research Mentor, University of Maryland, College Park** 2018–2019

- Fischell Department of Bioengineering  
 Capstone project: *Detection of brain-to-brain synchrony for improved psychotherapy*

**Faculty, Duke University**

- Department of Psychology & Neuroscience  
*Research Independent Study* 2016
- Matching Undergraduates to Science and Engineering Research Program 2015–2016
- Biosciences Collaborative for Research Engagement 2015–2016
- Department Psychiatry & Behavioral Sciences  
*Visiting Fellowship in Electroconvulsive Therapy* (CME accredited) 2015  
*Visiting Fellowship in Transcranial Magnetic Stimulation* (CME accredited) 2014–2016

**Teaching Assistant, Columbia University**

- Department of Electrical Engineering  
*Analog Systems in VLSI* (graduate level) Spring 2010

**Recitation Instructor**, Columbia University Mailman School of Public Health  
Department of Biostatistics  
*Biostatistics* (graduate level)

Fall 2009

**Teaching Assistant**, MIT  
Concourse Program  
*Multivariable Calculus*  
*Differential Equations*

Fall 2003 – 2006  
Spring 2004 – 2007

MENTORING  
SUMMARY


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


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 mag-  
netic stimulation”

S. M. Hare, Ph.D., University of Maryland School of Medicine  
NIH/NIMH K01 MH133116 2024 – 2029  
Project: “Cognitive and neural correlates of TMS motor intracortical inhibition in schizo-  
phrenia”

S. H. Siddiqi, M.D., Brigham & Women’s Hospital  
NIH/NIMH K23 MH121657 2020 – 2025  
Project: “Personalized circuit-based neuromodulation targets for depression”  
 Klerman Prize for Exceptional Clinical Research, *Brain & Behavior Research Foundation*, 2022.


N. L. Balderston, Ph.D., University of Pennsylvania Perelman School of Medicine  
NIH/NIMH K01 MH121777 2019 – 2023  
Project: “Examining the mechanisms of anxiety regulation using a novel, sham-controlled,  
fMRI-guided rTMS protocol and a translational laboratory model of anxiety”  
 Klerman Prize for Exceptional Clinical Research, *Brain & Behavior Research Foundation*, 2021.

RESEARCH  
FELLOWS &  
POSTDOCS

S. Dey, Ph.D., NIMH Visiting Postdoctoral Fellow 2024 –

M. Dannhauer, Ph.D., NIMH Research Fellow 2022 – 2024  
Career progression: Assistant Professor, Computer Science, East Carolina University

SPONSORED  
THESES

G. Asturias, Psychology & Neuroscience, Duke University 2015 – 2017  
Undergraduate honors thesis: “Effect of repetitive transcranial magnetic stimulation on  
the structural and functional connectome in patients with major depressive disorder.”  
Available: *DukeSpace*, **HDL:** 10161/14299  
 Graduated with Distinction  
Career progression: Medical student, Stanford University School of Medicine

THESIS  
EXAMINATION  
COMMITTEES

S. J. Bolland, Biomedical Engineering, University of Western Australia 2025  
Ph.D. dissertation: “A comparative study of transcranial magnetic stimulation induced  
electrical field distributions in neural tissue: A translational pipeline for finite element  
method analysis using MRI modalities.” Sponsor: J. Rodger.

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|-------------------|--|-----------|
|                   | D. Tang, Electrical & Computer Engineering, Worcester Polytechnic Institute  | 2025      |
|                   | M.S. thesis: “Computational and experimental approaches to brain stimulation: TMS simulation, coil measurement, and neural structure analysis.” Sponsor: S. N. Makaroff. |           |
|                   | Available: <i>Digital WPI</i> , URL: <a href="https://digital.wpi.edu/show/6h440x853">https://digital.wpi.edu/show/6h440x853</a>   |           |
|                   | W. A. Wartman, Electrical & Computer Engineering, Worcester Polytechnic Institute  | 2024      |
|                   | Ph.D. dissertation: “Adaptive mesh refinement for quasistatic electromagnetic modeling of brain stimulation and recording methods.” Sponsor: S. N. Makaroff.             |           |
|                   | Available: <i>Digital WPI</i> , URL: <a href="https://digital.wpi.edu/show/sq87c029w">https://digital.wpi.edu/show/sq87c029w</a>   |           |
|                   | D. Q. Troung, Biomedical Engineering, CUNY City College  | 2019      |
|                   | Ph.D. dissertation: “Translational modeling of non-invasive electrical stimulation.” Sponsor: M. Bikson.   |           |
|                   | Available: <i>CUNY Academic Works</i> , URL: <a href="https://academicworks.cuny.edu/cc_etds_theses/774">https://academicworks.cuny.edu/cc_etds_theses/774</a>           |           |
| GRADUATE STUDENTS | E. Bharti, Ph.D. cand., NIH–Cambridge Scholars Program   | 2024–     |
|                   | M. Kshirsagar, M.S., Biomedical Engineering, Duke University   | 2012      |
|                   | Career progression: Consultant, Deloitte Consulting  |           |
| POSTBACS          | P. L. Robins, B.A., NIMH Intramural Research Training Award (IRTA) Fellow  | 2021–2024 |
|                   | 🏆 Trainee Travel Award, NIMH Intramural Research Program, 2023.  |           |
|                   | 🏆 First Place in Student Competition, <i>Brain &amp; Human Body Modeling Conference</i> , 2022.  |           |
|                   | Career progression: Lead interventional technician, Columbia Mental Health   |           |
|                   | M. R. Hynd, B.S., NIMH IRTA Fellow   | 2020–2022 |
|                   | Career progression: Ph.D. student, University of North Carolina at Chapel Hill   |           |
|                   | S. Awasthi, B.S., NIMH IRTA Fellow   | 2018–2020 |
|                   | Career progression: Medical student, Stanford University School of Medicine  |           |
|                   | M. M. Noh, S.B., NIMH IRTA Fellow  | 2018–2019 |
|                   | Career progression: Medical student, University of Cincinnati College of Medicine  |           |
|                   | J. Thomas, M.S., NIMH IRTA Fellow  | 2017–2019 |
|                   | Career progression: Program officer, National Academies of Sciences, Engineering, & Medicine   |           |
|                   | M. Velez Afanador, B.S., NIMH IRTA Fellow  | 2016–2019 |
|                   | 🏆 Outstanding Poster Award, <i>NIH Postbac Poster Day</i> , 2018.  |           |
|                   | Career progression: Medical student, Howard University College of Medicine   |           |
| UNDERGRADS        | D. T. Weaver, Biology, Duke University   | 2016      |
|                   | Career progression: M.D./Ph.D. student, Case Western Reserve University  |           |
|                   | E. F. Salgado, Psychology & Neuroscience, Duke University  | 2016      |
|                   | 🏆 Graduated with Distinction   |           |
|                   | Career progression: Ph.D. student, Indiana University–Purdue University Indianapolis   |           |
|                   | Z. Feng, Biomedical Engineering and Biology, Duke University   | 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 |
|                   | 🏆 Graduated with Distinction   |           |
|                   | Career progression: Medical student, Stony Brook School of Medicine  |           |

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|---------------------------------------|---|-------------|
|                                       | E. P. Vienneau, Biomedical Engineering, Duke University   | 2015 – 2016 |
|                                       | 🏆 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 |
|                                       | 🏆 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     | <b>Institute of Electrical and Electronics Engineers (IEEE)</b>   |             |
|                                       | Senior Member (2023–), Member (2013–2023), Student Member (2004–2013)   |             |
|                                       | Engineering in Medicine and Biology Society   | 2004 –      |
|                                       | Brain Technical Community   | 2025 –      |
|                                       | <b>American College of Neuropsychopharmacology</b> , Associate Member   | 2023 –      |
|                                       | <b>Biomedical Engineering Society</b> , Member  | 2021 –      |
|                                       | <b>American Society of Clinical Psychopharmacology</b> , 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   | 2025 –      |
|                                       | Department of Electrical & Computer Engineering, Worcester Polytechnic Institute  |             |
|                                       | Board Member, The Global ECT–MRI Research Collaboration (GEMRIC)  | 2025 –      |
|                                       | Data Processing and MRI Working Group   |             |
|                                       | Biomedical Engineering Society  |             |
|                                       | Mid-Career Award Subcommittee   | 2025        |
|                                       | Chapter Development Report Reviewers  | 2025        |

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|                          | American Society of Clinical Psychopharmacology   |             |
|                          | Technology Committee  | 2023 –      |
|                          | Early Career Committee  | 2023 – 2027 |
|                          | Technology Task Force   | 2020 – 2023 |
| INSTITUTIONAL<br>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<br>REVIEW          | Reviewer, NIH BluePrint MedTech Program   | 2021 –      |
|                          | Reviewer, NIH Center for Scientific Review<br>Biophysics of Neural Systems Study Section                                    | 2021.10     |
|                          | Reviewer, Duke Institute for Brain Sciences, Research Incubator Awards  | 2018, 2021  |
| EDITORIAL<br>ROLES       | Editorial Board Member, <i>Brain Stimulation</i>  | 2025 –      |
|                          | Deputy Editor, <i>Transcranial Magnetic Stimulation</i>   | 2024 –      |
|                          | Associate Editor, <i>Frontiers in Psychiatry</i>  | 2022 –      |
|                          | Sections: Neurostimulation, Neuroimaging  |             |
|                          | Co-Editor on Research Topic: <i>How Does Brain Stimulation Work? Neuroversion and Other Putative Mechanisms of Action</i> ☐ | 2024        |
|                          | Community Reviewer (formerly Review Editor), <i>Frontiers in Psychology</i>   | 2022 –      |
|                          | Sections: Addictive Behaviors, Consciousness Research   |             |
|                          | Review Editor, <i>Frontiers in Psychiatry</i>   | 2016 – 2022 |
|                          | Sections: Neurostimulation, Neuroimaging  |             |
|                          | Guest Associate Editor, <i>Frontiers in Pharmacology: Neuropharmacology</i>   | 2020        |
|                          | Co-Editor on Research Topic: <i>Neurobiology of Rapid Mood Changes</i> ☐  |             |
|                          | Guest Editor, <i>Physics in Medicine and Biology</i>  | 2024        |
|                          | Special Issue: <i>Electromagnetic Modeling for Brain Stimulation</i> ☐  |             |
|                          | <i>Ad hoc</i> journal reviewer  | 2010 –      |
|                          | <i>AIP Advances</i>   |             |
|                          | <i>American Journal of Psychiatry</i>   |             |
|                          | <i>Asian Journal of Psychiatry</i>  |             |
|                          | <i>Australasian Physical and Engineering Sciences in Medicine</i>   |             |
|                          | <i>Biological Psychiatry</i>  |             |
|                          | <i>Biological Psychiatry: Global Open Science</i>   |             |
|                          | <i>BioMedical Engineering OnLine</i>  |             |
|                          | <i>BMJ Mental Health</i>  |             |
|                          | <i>Brain Research Bulletin</i>  |             |
|                          | <i>Brain Sciences</i>   |             |
|                          | <i>Brain Stimulation</i>  |             |
|                          | <i>Cerebral Cortex</i>  |             |
|                          | <i>Chaos, Solitons &amp; Fractals</i>   |             |

*Clinical EEG and Neuroscience*  
*Clinical Neurophysiology*  
*CNS Spectrums*  
*Computational and Mathematical Methods in Medicine*  
*Computer Methods and Programs in Biomedicine*  
*Computer Methods in Biomechanics and Biomedical Engineering*  
*Cortex*  
*European Psychiatry*  
*Frontiers in Cell and Developmental Biology*  
*Frontiers in Medicine: Intensive Care Medicine and Anesthesiology*  
*Frontiers in Neurology: Applied Neuroimaging*  
*Frontiers in Neuroscience: Brain Imaging Methods*  
*IEEE 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*

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| 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                                    |        |

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

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



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| PROFESSIONAL<br>DEVELOPMENT<br>& CONTINUING<br>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                                     | 2019                |
|  | Danish Research Centre for Magnetic Resonance, Copenhagen University Hospital Hvidovre |                     |
|  | 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                             | 2009                |
|  | Columbia University Medical Center/New York State Psychiatric Institute                |                     |
|  | Basic Life Support, American Heart Association   | Recertified 2023.07 |
| LAST UPDATED   | September 1, 2025  |                     |