Zhi-De Deng

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Research Specialties

- Noninvasive brain stimulation: technology development, modeling, device safety, translational and clinical applications
- Computational electromagnetics
- Electrophysiological and neuroimaging biomarker development
- Neural plasticity
- Nonlinear dynamics of physiological systems
- Translational neuromodeling

Education

Expected 2024 **M.H.Sc., Clinical Research**, Duke University

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

2011 **M.Phil., Electrical Engineering**, Columbia University
- Graduate minor in Neuroscience

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

2007 **S.B., Electrical Science and Engineering**, MIT

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

Professional Appointments & Employment

Academic

2019–present **Staff Scientist**, **Director of Computational Neurostimulation Research Program**, Noninvasive Neuromodulation Unit, Experimental Therapeutics & Pathophysiology Branch, Intramural Research Program, NIMH

2016–present **Adjunct Assistant Professor**, Department of Psychiatry & Behavioral Sciences, Duke University School of Medicine

2016–2019 **Research Fellow**, Noninvasive Neuromodulation Unit, Experimental Therapeutics & Pathophysiology Branch, Intramural Research Program, NIMH

- Richard J. Wyatt Memorial Fellowship for Translational Research

2015–present **Faculty**, Duke Institute for Brain Sciences, Duke University

2014–2016 **Medical Instructor**, Department of Psychiatry & Behavioral Sciences, Duke University School of Medicine

- Duke Translational Medicine Institute KL2 Fellow

2013–2014 **Postdoctoral Associate**, Department of Psychiatry & Behavioral Sciences, Duke University School of Medicine

2010–2013 **Visiting Graduate Research Assistant**, Department of Psychiatry & Behavioral Sciences, Duke University School of Medicine

2007–2010 **Graduate Research Assistant**, Department of Psychiatry, Columbia University College of Physicians and Surgeons/New York State Psychiatric Institute

- Columbia Irving Institute for Clinical and Translational Research T32 Fellow

2006–2007 **Graduate Research Assistant**, Harvard–MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology

2005–2006 **Undergraduate Research Assistant**, Harvard–MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology

Nonprofit Organization

2017–present **Co-founder**, **Scientific Advisor**, Singula Institute

Internships

2004 **Executive Intern**, Department of Anesthesiology, New York–Presbyterian Hospital/Weill Cornell Medical College

2003 **Internship Coordinator**, The New York Times Company Foundation

2002 **News Technology Intern**, The New York Times Company

Publications (* denotes first, joint first, or senior author)

Refereed Journal Articles

*75 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*, online ahead of print.
PMID: 37536999 DOI: 10.1111/bdi.13370

*74 **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.
PMCID: PMC10452519 DOI: 10.3390/biomedicines11082320

73 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.
PMID: 37196934 DOI: 10.1016/j.jad.2023.05.042

72 M. Teferi, W. Makhoul, **Z.-D. Deng**, D. J. Oathes, Y. I. Sheline, and N. L. Balderston, "Continuous theta burst stimulation to the right dorsolateral prefrontal cortex may increases potentiated startle in healthy individuals," *Biological Psychiatry: Global Open Science*, vol. 3, no. 3, pp. 470–479, July 2023.
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71 J. Miller, T. R. Jones, J. Upston, **Z.-D. Deng**, S. M. McClintock, E. Erhardt, D. Farrar, D. K. Quinn, 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, July 2023.
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70 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.
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69 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.
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68 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. Mc Laughlin, and X. Zhang, "Alpha oscillatory activity is causally linked to working memory retention," *PLOS Biology*, vol. 21, no. 2, e3001999, Feb. 2023.
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PMCID: PMC9902462 DOI: 10.1038/s41398-023-02312-w

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*66 S. N. Makaroff, H. Nguyen, Q. Meng, H. Lu, A. Nummenmaa, and **Z.-D. Deng**, "Modeling transcranial magnetic stimulation coils with magnetic cores," *Journal of Neural Engineering*, vol. 20, no. 1, 016028, Jan. 2023.
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65 S. Qi, V. D. Calhoun, D. Zhang, J. Miller, **Z.-D. Deng**, K. L. Narr, Y. I. Sheline, S. M. McClintock, R. Jiang, X. Yang, J. Upston, T. R. 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. 22, 477, Dec. 2022. Correction: vol. 21, 113, 2023.
PMCID: PMC9733153 DOI: 10.1186/s12916-022-02678-6

64 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.
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63 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. 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, 616, Oct. 2022. Correction: vol. 10, 247, 2023.
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62 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, June 2022.
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60 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.
PMCID: PMC8851689 DOI: 10.1016/j.neuroimage.2021.118863

*59 **Z.-D. Deng**, M. Argyelan, J. Miller, D. 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. Commentary in vol. 27, no. 9, pp. 3571–3572.
PMCID: PMC9095458 DOI: 10.1038/s41380-021-01380-y

58 N. L. Balderston, J. C. Beer, D. Seok, W. Makhoul, **Z.-D. Deng**, T. Girelli, M. Teferi, N. Smyk, M. Jaskir, D. J. Oathes, R. T. Shinohara, 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.
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56 B. Kadriu, C. A. Farmer, P. Yuan, L. T. Park, **Z.-D. Deng**, R. Moaddel, I. D. Henter, B. Shovestul, E. D. Ballard, C. Kraus, P. W. Gold, R. Machado-Vieira, and C. A. Zarate, Jr., "The kynurenine pathway and bipolar disorder: Intersection of the monoaminergic and glutamatergic systems and immune response," *Molecular Psychiatry*, vol. 26, no. 8, pp. 4085–4095, Aug. 2021.
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55 A. Takamiya, F. Bouckaert, M. Laroy, J. Blommaert, A. Radwan, A. Khatoun, **Z.-D. Deng**, M. Mc Laughlin, 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, July–Aug. 2021.
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54 E. A. Friðgeirsson, **Z.-D. Deng**, D. Denys, J. A. van Waarde, and G. A. van Wingen, "Electric field strength induced by electroconvulsive therapy may be associated with clinical outcome: A pilot study," *NeuroImage: Clinical*, vol. 30, 102581, Feb. 2021.
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53 P. J. C. Suen, S. Doll, M. C. Battistuzzo, 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.
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52 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.
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51 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–June 2020.
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49 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. Teklehaimanot, K. G. Tobias, R. D. Weiner, R. C. Young, C. H. Kellner, on behalf of the 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. Commentary in pp. 317–319.
PMCID: PMC7050408 DOI: 10.1016/j.jagp.2019.10.003

48 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.
PMCID: PMC7021903 DOI: 10.1038/s41386-019-0583-5

47 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 due to neurostimulation," *Advanced Science*, vol. 7, no. 4, 1902863, Feb. 2020.
PMCID: PMC7029648 DOI: 10.1002/advs.201902863

46 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.
PMCID: PMC7026136 DOI: 10.1038/s41398-020-0751-8

45 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.
PMCID: PMC6821463 DOI: 10.1126/sciadv.aav9847

44 M. Argyelan, L. Oltedal, **Z.-D. Deng**, B. Wade, M. Bikson, A. Joanlanne, S. Sanghani, H. Bartsch, M. Cano, A. M. Dale, U. Dannlowski, 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. Sienaert, 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.
PMCID: PMC6874416 DOI: 10.7554/eLife.49115

Refereed Journal Articles (continue)

*43 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.
PMCID: PMC7654714 DOI: 10.1016/j.neubiorev.2019.08.018

42 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.
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41 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, June 2019.
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40 M. J. Dubin, I. P. Ilieva, **Z.-D. Deng**, J. Thomas, A. Albright, 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.
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39 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.
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38 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.
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37 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.
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*36 **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.
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35 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.
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*33 **Z.-D. Deng**, S.H. Lisanby, and A.V. Peterchev, "Controlling stimulation strength and focality in electroconvulsive therapy via electrode size, spacing, and current amplitude," *The Journal of ECT*, vol. 29, no. 4, pp. 325–335, Dec. 2013.
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32 B. Luber, J. Stener, A. Tucker, C. Habeck, A.V. Peterchev, **Z.-D. Deng**, R. 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, June 2013.
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*31 **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. Commentary in pp. 14–15.
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30 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.
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*29 **Z.-D. Deng**, S.H. Lisanby, and A.V. Peterchev, "Electric field strength and focality of electroconvulsive therapy and magnetic seizure therapy: A finite element simulation study," *Journal of Neural Engineering*, vol. 8, no. 1, 016007, Jan. 2011.
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28 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.
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*26 **Z.-D. Deng** and S.H. Lisanby, "Electric field characteristics of low-field synchronized transcranial magnetic stimulation (sTMS)," *Proceedings of the IEEE Engineering in Medicine and Biology Society*, July 2017, pp. 1445–1448.
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*25 **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," *Proceedings of the IEEE Engineering in Medicine and Biology Society*, Aug. 2015, pp. 2203–2206.
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*22 **Z.-D. Deng** and A. V. Peterchev, "Transcranial magnetic stimulation coil with electronically switchable active and sham modes," *Proceedings of the IEEE Engineering in Medicine and Biology Society*, Aug. 2011, pp. 1993–1996.
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Intellectual Property

8 PRecision, Optimally Targeted, Electroconvulsive Therapy (PROTECT)
Inventors: **Z.-D. Deng**, J. Kim, G. R. Dold, B. A. Pritchard, R. H. Schor, S. H. Lisanby
- Invention disclosure submitted to NIH; Aug. 2023

7 Systems and methods for amplitude-determined seizure titrations and electric field modeling in electroconvulsive therapy
Inventors: C. C. Abbott, A. Datta, J. Upston, T. Jones, **Z.-D. Deng**
Assignee: University of New Mexico
- US Provisional Patent application No. 63/516,371; July 28, 2023

6 Systems and methods for multichannel individualized stimulation therapy
Inventors: **Z.-D. Deng**, B. A. Pritchard, J. Kim, G. R. Dold, R. H. Schor, S. H. Lisanby
Assignee: NIH
- US Provisional Patent application No. 63/495,244; Apr. 10, 2023

5 Systems and methods for E-field informed electroconvulsive therapy
Inventors: C. C. Abbott, **Z.-D. Deng**, J. Upston, T. Jones, A. Datta
Assignee: University of New Mexico
- US Provisional Patent application No. 63/437,017; Jan. 4, 2023

4 Whole body non-contact electrical stimulation device with variable parameters
Inventors: S. N. Makarov, G. M. Noetscher, V. S. Makarov, **Z.-D. Deng**
Assignee: NEVA Electromagnetics, LLC
- US No. 10,551,449; Feb. 4, 2020

3 Systems and methods for detecting a physiological abnormality in a patient by using cardiac or other chaos in combination with a non-increasing parasympathetic modulation
Inventors: C.-S. Poon, **Z.-D. Deng**
Assignee: MIT
- US No. 9,737,258; Aug. 22, 2017
- PCT WO/2014/120353; July 8, 2014

2 Transcranial magnetic stimulation coil with electronically switchable active and sham modes
Inventors: A. V. Peterchev, **Z.-D. Deng**
Assignee: Columbia University
- US Provisional Patent application No. 61/525,922; Aug. 22, 2011

1 Methods, apparatus, and systems for magnetic stimulation
Inventors: A. V. Peterchev, S. H. Lisanby, **Z.-D. Deng**
Assignee: Columbia University
- US No. 9,295,853; Mar. 29, 2016
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Research Support

Pending Research Support

resub 2022.10 **Charge-based brain modeling engine with boundary element fast multipole method**
NIH/NIBIB R01 MH130490 (PI: S. N. Makarov)
Role: Intramural NIH collaborator

2023.09 **Development of a next generation ECT system: PRecision Optimal Targeted ECT (PROTECT)**
NIH/NIMH SBIR (PIs: A. Datta, C. C. Abbott)
Role: Intramural NIH collaborator

2023.03 **Cognitive and neural correlates of TMS motor intracortical inhibition in schizophrenia**
NIH/NIMH K01 (PI: S. H. Hare)
Role: Intramural NIH collaborator/advisor

2023.06 **Optimizing accelerated iTBS intersession interval to target Connectivity in Depression (CONNECT-D)**
NIH/NIMH K01 (PIs: Y. I. Sheline, Z. J. Daskalakis, P. B. Fitzgerald)
Role: Intramural NIH collaborator/advisor

2023.06 **Improving the optimization of TMS coil placement with precise calculation of electric fields and robust computation of personalized functional networks**
NIH/NIMH R01 (PI: Y. Fan)
Role: Intramural NIH collaborator/advisor

Ongoing Research Support

2022.09–2027.06 **Novel electric-field modeling approach to quantify changes in resting state functional connectivity following theta burst stimulation**
NIH/NIMH U01 MH130447 (PI: N. L. Balderston)
Role: Intramural NIH collaborator
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.

2022.08–2027.05 **Deciphering mechanisms of ECT outcomes and adverse effects (DECODE)**
NIH/NIMH R01 (MH128686 PI: Y. I. Sheline; MH128690 PIs: K. L. Narr, R. Espinoza; MH128691 PI: S. M. McClintock; MH128692 PI: C. C. Abbott)
Role: Intramural NIH collaborator

2021.02–2023.01 **Electroconvulsive therapy amplitude titration for improved clinical outcomes in late-life depression**
NIH/NIMH R61/R33 MH125126 (PI: C. C. Abbott)
Role: Intramural NIH collaborator
This study uses titrated amplitude ECT, individualized based on seizure threshold, to improve clinical response while minimizing cognitive impairment in geriatric depression.

2020.05–2023.04 **Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders**
NIH/NIMH R61/R33 MH120188 (PIs: A. N. Voineskos, D. M. Blumberger)
Role: Intramural NIH collaborator
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.

2019.04–2026.02 **Efficacy of biomarker-guided rTMS for treatment resistant depression**
NIH/NIMH R01 MH118388 (PIs: C. M. Liston, F. M. Gunning, N. R. Williams)
Role: Intramural NIH collaborator
This confirmatory efficacy trial tests a novel, biotype-guided treatment selection strategy for rTMS in treatment-resistant depression.

2019.09–2023.07 **Examining the mechanisms of anxiety regulation using a novel, sham-controlled, fMRI-guided rTMS protocol and a translational laboratory model of anxiety**
NIH/NIMH K01 MH121777 (PI: N. L. Balderston)
Role: Intramural NIH collaborator/advisor
This study uses rTMS to study the effect of right dlPFC activity on objective and subjective measures of induced anxiety, anxiety-related working memory deficits, and TMS-evoked BOLD responses during simultaneous TMS–fMRI.

2020.09–2025.08 **Personalized circuit-based neuromodulation targets for depression**
NIH/NIMH K23 MH121657 (PI: S. H. Siddiqi)
Role: Intramural NIH collaborator/advisor
This study aims to better understand how distinct brain circuits can be mapped and selectively stimulated with TMS to treat different symptoms of major depression.

NIH Protocols

2020–present **Role of GABAergic transmission in auditory processing in Autism Spectrum Disorder**
NIMH Protocol 20-M-0159 (PI: S. H. Lisanby)
Role: Associate investigator

2019–present **Safety and feasibility of individualized low amplitude seizure therapy**
NIMH Protocol 19-M-0073 (PI: S. H. Lisanby)
Role: Associate investigator

2019–present **Mechanism of action underlying ketamine's antidepressant effects: an investigation of the AMPA throughput theory in patients with treatment-resistant major depression**
NIMH Protocol 19-M-0107 (PI: C. A. Zarate, Jr.)
Role: Associate investigator

2017–present **Concurrent fMRI-guided rTMS and cognitive therapy for the treatment of major depressive episodes**
NIMH Protocol 17-M-0147 (PI: S. H. Lisanby)
Role: Associate investigator

2017–present **Development of non-invasive brain stimulation techniques**
NIMH Protocol 18-M-0015 (PI: S. H. Lisanby)
Role: Associate investigator

2017–present **Development of functional and structural magnetic resonance imaging techniques for the study of mood and anxiety disorders**
NIMH Protocol 07-M-0021 (PI: A. C. Nugent)
Role: Associate investigator

2017–present **Identifying neurobiological mechanisms that underlie acute nicotine withdrawal and drive early relapse in smokers**
NIDA Protocol 12-DA-N474 (PI: A. Janes)
Role: Associate investigator

2016–present **Neuropharmacologic imaging and biomarker assessments of response to acute and repeated-dosed ketamine infusions in major depressive disorder**
NIMH Protocol 17-M-0060 (PI: C. A. Zarate, Jr.)
Role: Associate investigator

2016–present **Evaluation of patients with mood and anxiety disorders and healthy volunteers**
NIMH Protocol 01-M-0254 (PI: C. A. Zarate, Jr.)
Role: Associate investigator

2018–2019 **Modulation of the parieto–frontal communication**
NINDS Protocol 18-N-0054 (PI: M. Hallett)
Role: Associate investigator

2017–2019 **Effect of TMS to frontoparietal attention network on anxiety potentiated startle**
NIMH Protocol 17-M-0042 (PI: C. Grillon)
Role: Associate investigator

Extramural Protocols

2023.02–present **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 (PI: V. M. Tang)
Role: Consultant

2019.10–2022.09 **ADEPT: Adaptive trial for the treatment of depression associated with concussion using repetitive transcranial magnetic stimulation protocols**
Center for Neuroscience and Regenerative Medicine, Uniformed Services University (PI: D. L. Brody)
Role: Associate investigator

Completed Research Support

2016.09–2020.07 **ECT pulse amplitude and medial temporal lobe engagement**
NIH/NINDS U01 MH111826 (PI: C. C. Abbott)
Role: Co-I
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.

2018.06–2020.06 **Individualized low amplitude seizure therapy (iLAST)**
Brain & Behavior Research Foundation Young Investigator Award 26161
Role: PI
This study aims to develop a novel form of seizure therapy for depression that avoids the neurocognitive side effects of electroconvulsive therapy by using computational modeling to direct multi-electrode configurations that provide targeted and individualized dosing.

2016.06–2017.12 **Fast-Fail Trials: Mood and Anxiety Spectrum Disorders (FAST-MAS)**
NIMH 271201200006I-3-27100003-1 (PI: A. D. Krystal)
Role: Data analyst
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.

2015.04–2017.01 **Transcranial direct current stimulation as a treatment for acute fear**
NIH/NIMH R21 MH106772 (PI: A. D. Krystal)
Role: Co-I
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.

2014.07–2016.06 **Individualized optimally-targeted seizure therapy**
NIH/NCATS KL2 TR001115 (Training Grant PI: R. M. Califf)
Role: PI
This award from the Duke Translational Medicine Institute prepares the fellow for a successful career as a multidisciplinary independent investigator in the field of brain stimulation. The goal of the project is to develop a novel individualized neurotargeted seizure therapy.

2015.03–2016.06 **Safety and feasibility of low amplitude electroconvulsive therapy**
Duke University School of Medicine, Pilot fund
Role: PI
This study evaluates whether neurocognitive side effects of electroconvulsive therapy can be improved by reducing the current pulse amplitude.

Completed Research Support (continue)

2009.04–2016.03 **Prolonging Remission In Depressed Elderly (PRIDE)**
NIH/NIMH U01 MH084241 (PI: S. H. Lisanby)
Role: Data analyst
This study evaluates the efficacy and neurocognitive effects of combined electroconvulsive and pharmaco-therapy in prolonging remission in elderly patients with major depression.

2015.04–2016.06 **Low field magnetic stimulation coil design**
Tal Medical (PI: A. V. Peterchev)
Role: Co-I
This project develops a novel coil system for low field magnetic stimulation.

2015.11–2016.06 **Concurrent cognitive behavioral therapy and transcranial magnetic stimulation in obsessive-compulsive disorder**
American Psychiatric Association Research Scholarship (Grantee: Y. Hu)
Role: Acting PI
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.

2014.01–2015.12 **Evoked potentials as markers of ketamine-induced cortical plasticity in patients with major depressive disorder**
Janssen Research & Development, LLC (PI: A. D. Krystal)
Role: Co-I
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.

2005.07–2011.07 **Magnetic seizure therapy for the treatment of depression**
Stanley Medical Research Institute (PI: S. H. Lisanby)
Role: Postdoctoral fellow
This two-center, randomized, double-blind controlled trial compares the antidepressant efficacy and side effects of magnetic seizure therapy and electroconvulsive therapy.

2010.07–2015.01 **Translational research evaluating neurocognitive memory processes**
NIH/NIMH K23 MH087739 (PI: S. M. McClintock)
Role: Postdoctoral fellow
This study informs the cognitive component processes underlying memory impairment after electroconvulsive therapy.

2010.07–2015.12 **Rational dosing for electric and magnetic seizure therapy**
NIH/NIMH R01 MH091083 (PI: S. H. Lisanby)
Role: Graduate research assistant, contributed to grant writing
This study lays a foundation for optimizing stimulus parameters of electric and magnetic seizure therapy through computational modeling and preclinical studies of seizure induction.

2010.09–2011.06 **Field shaping and coil design for transcranial magnetic stimulation**
NIH/NCRR TL1 RR024158 (Training Grant PI: H. N. Ginsberg)
Role: Predoctoral fellow
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 deep transcranial magnetic stimulation.

Completed Research Support (continue)

2007.08–2009.07 **Development of a novel TMS device with controllable pulse shape**
NIH/NIBIB R21 EB006855 (PI: A. V. Peterchev)
Role: Graduate research assistant
This project develops an efficient transcranial magnetic stimulation device that produces nearly rectangular pulses with adjustable amplitude, width, and directionality.

2005.11–2009.06 **Nonlinear analysis of heart rate variability**
NIH/NHLBI R01 HL079503 (PI: C.-S. Poon)
Role: Graduate research assistant
This project develops advanced nonlinear estimation and adaptive control algorithms for the modeling and analysis of the cardiovascular system.

Scholarships, Fellowships, & Honors

2023 **Scholar, Advanced Research Institute in Geriatric Mental Health**, Dartmouth College, supported by grant from NIH (R25MH068502)

2019 **NIMH Director's Award**, for scientific innovation at the interface of computation and psychiatry, NIMH Intramural Research Program

2018 **Richard J. Wyatt Memorial Fellowship Award for Translational Research**, NIMH Intramural Research Program

2018 **New Investigator Award**, American Society of Clinical Psychopharmacology

2018 **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

2017 **NARSAD Young Investigator Award**, Brain & Behavior Research Foundation

2017 **Career Development Institute for Psychiatry**, Stanford University

2017 **New Investigator Award**, International Society for CNS Clinical Trials and Methodology

2016 **Certificate for Highly Cited Research**, Brain Stimulation, Elsevier

2015 **Young Investigator Memorial Travel Award**, American College of Neuropsychopharmacology

2015 **Scholar, Summer Research Institute in Geriatric Mental Health**, Weill Cornell Medical College, supported by grant from NIH (R25MH019946)

2015 **Chair's Choice Award**, Society of Biological Psychiatry

2014 **Innovative Poster Award, Young Investigator Award Finalist**, National Network of Depression Centers

2010 **Best Abstract Award**, International Society for Neurostimulation

2010 **Presidential Teaching Award Finalist**, Columbia University

2006 **Student Paper Competition Finalist**, IEEE Engineering in Medicine and Biology Society

2002 **New York Times College Scholarship**, New York Times Company Foundation

Talks & Colloquia

Grand Rounds

Planned 2024 Advanced Research Institute Grand Rounds in Mental Health and Aging Research
Neurostimulation revolution: Advancing treatment optimization and technology innovation

Planned 2024 University of Texas Southwestern
Individualized seizure therapy: Treatment optimization and technological breakthroughs

2020 Westmead Hospital, Sydney, Australia
Advances in neuromodulation: Electroconvulsive therapy

2018 Clinical TMS Society Grand Rounds Webinar
Transcranial magnetic stimulation: Physics, devices, and modeling

2017 University of New Mexico School of Medicine, Psychiatry & Behavioral Sciences
Toward individualized electroconvulsive therapy for treatment of depression

2015 Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences
Toward next generation seizure therapy

2015 Central Regional Hospital, Butner, NC
Individualized seizure therapy

Invited Talks, Seminars, Worskops, & Panels

2023 Brain and Human Body Modeling Conference, The Martinos Center for Biomedical Imaging, Massachusetts General Hospital
Chair: *New modeling methods and targets: Spinal cord stimulation and novel stimulation*
Chair: *Development and assessment of modeling methods*
Contributed talk: *Effects of low intensity magnetic stimulation*
Judge: Student competition

2023 International Conference of the IEEE Engineering in Medicine and Biology Society
Panel: *Computational analysis of non-invasive neuromodulation constructs: Brain and spine*
Contributed talk: *Modeling of transcranial magnetic stimulation and electroconvulsive therapy in the treatment of depression*

2023 University of Pittsgburgh
Computational neurostimulation: Approach to treatment optimization and technology development

2023 ADAA Anxiety and Depression Conference
Panel: *Parsing through syndromic heterogeneity in youths with mental illness to identify neurocircuit mechanisms and develop novel treatments*
Contributed talk: *Modeling and dose optimization for transcranial magnetic stimulation and electroconvulsive therapy for treatment of depression*

2023 International Brain Stimulation Conference
Symposium chair: *Insights and challenges in preclinical models of TMS: Multimodal investigations across animal species*
Fast-track oral symposium chair: *Advanced computational modeling and optimization methods for noninvasive brain stimulation*

2022 International Network of tES fMRI (INTF) Webinar Series
Electric field modeling and optimization approaches for individualized targeting

Invited Talks, Seminars, Worskops, & Panels (continue)

2022 International Society for Magnetic Resonance in Medicine, workshop on MRI of Neuromodulation: Target Engagement, Neural Mechanism & Biomarker Development
Modeling of TMS

2022 Bergen Workshop of the Global ECT–MRI Collaboration
ECT device development

2022 International Congress of Clinical Neurophysiology
Chair: *Towards optimized TMS targeting approaches*

2022 Brain and Human Body Modeling Conference, The Martinos Center for Biomedical Imaging, Massachusetts General Hospital
Chair: *Modeling of transcranial electrical stimulation and deep brain stimulation*
Contributed talk: *ECT, electric field, neuroplasticity, and clinical outcomes*

2022 European Conference of Brain Stimulation in Psychiatry
Panel: *Beyond clinical syndromes: Understanding mechanisms of neuromodulation from a dimensional perspective*
Contributed talk: *Depressive symptom dimensions and response trajectories in ECT and MST*

2022 Medical University of South Carolina, National Center of Neuromodulation for Rehabilitation
Model-driven design for brain stimulation therapies

2022 Society of Biological Psychiatry Annual Meeting
Panel: *Dimensional approaches to device neuromodulation*
Contributed talk: *Depressive symptom dimensions and response trajectories in ECT and MST*

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

2022 Global ECT–MRI Collaboration (GEMRIC) Young Researchers Collective
ECT, electric field, neuroplasticity, and clinical outcomes

2021 Butler Hospital, Brown University
Computational model driven design for brain stimulation

2021 American Academy of Child and Adolescent Psychiatry Annual Meeting
Panel: *Recent work with contemporary computational methods and artificial intelligence to advance the practice of child and adolescent psychiatry*
Contributed talk: *Introduction to computational psychiatry*

2021 European College of Neuropsychopharmacology Congress
Panel: *Neurobiology of rapid mood changes*
Contributed talk: *Precision neurostimulation: Electroconvulsive therapy*

2021 University of Pennsylvania, Center for Neuromodulation in Depression and Stress
Electromagnetic brain stimulation from low to high intensity

2021 Society for Brain Mapping & Therapeutics Annual Congress
Advances in electroconvulsive therapy for treatment of depression

2021 American Society of Clinical Psychopharmacology Annual Meeting
Early Career Workshop: *How to give a virtual talk*

Invited Talks, Seminars, Worskops, & Panels (continue)

2021 International College of Neuropsychopharmacology Virtual World Congress
Panel: *Next generation seizure therapy and neuromodulation*

2020 European Conference of Brain Stimulation in Psychiatry
Panel: *What can we learn from ECT: Insights from the GEMRIC consortium*
Contributed talk: *Using electric field modeling to inform ECT dosing and device development*

2020 NIH Basic Training Course on Transcranial Magnetic Stimulation
TMS physics, devices, modeling

2020 University of Minnesota Non-Invasive Brain Stimulation Workshop
Use of individual electric field models in clinical research

2020 American Society of Clinical Psychopharmacology Annual Meeting
Panel: *New developments in neurostimulation* #coronacancelled

2020 VA Boston Healthcare System, Boston University School of Medicine, Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar
Precision neurostimulation: History, physics, computational modeling, engineering, and more

2020 NYC Neuromodulation Online
Discussant: *Noninvasive vagus nerve stimulation applied to stress management, opioid withdrawal, and neurocognitive disorders*

2020 Medical University of Vienna, Neuroimaging Lab
Precision seizure therapy

2019 American College of Neuropsychopharmacology
Panel: *Precision neurostimulation for treatment of psychiatric disorders*
Contributed talk: *Rational design of precision seizure therapy*

2019 International Symposium on Advancing Stimulation Precision Medicine of Brain Disorders, Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resonance
Rational design of precision seizure therapy

2019 International College of Neuropsychopharmacology Meeting
Workshop: *Neurobiological and clinical characterization, and treatment development for treatment resistant depression*
Contributed talk: *Individualized electroconvulsive therapy: Reinventing ECT*

2019 American Society of Clinical Psychopharmacology Annual Meeting
Co-chair: *Treatment-resistant mood disorders across the lifespan: Novel therapeutics*

2019 Mount Sinai Icahn School of Medicine, Depression and Anxiety Center
Rational design of individualized noninvasive brain stimulation

2019 International Brain Stimulation Conference
Panel: *Individualized brain stimulation: Addressing heterogeneity across modalities*
Contributed talk: *Individualized electroconvulsive therapy for treatment of depression*

2018 NIMH Intramural Research Program Investigators' Seminar Series
Computational neurostimulation: Engineering better noninvasive brain stimulation therapies

Invited Talks, Seminars, Worskops, & Panels (continue)

2018 UCLA Brain Mapping Center
Computational neurostimulation: Engineering better brain stimulation therapies

Semel Institute for Neuroscience and Human Behavior, Neuromodulation Division
Modeling and design for magnetic stimulation

2018 USC Mark and Mary Stevens Neuroimaging and Informatics Institute
Computational neurostimulation

2018 2nd Bergen Workshop of the Global ECT–MRI Collaboration
Electric field modeling for electroconvulsive therapy

2018 Joint NYC Neuromodulation Conference & NANS Summer Series
Preconference workshop director: *Computational modeling in neuromodulation: Tools for engineers, clinicians, and researchers*
Contributed talk: *Optimizing stimulation arrays and high-density EEG for brain targeting*

2018 Neuropsychiatric Drug Development Summit
Targeted intermittent device delivered interventions will ultimately prove superior to maintenance treatment with drugs for brain disorders

2018 International Conference of the IEEE Engineering in Medicine and Biology Society
Chair: *Computational human models for brain stimulation*
Contributed talk: *Electric field induced by transcranial magnetic stimulation: Applications in depression and anxiety disorder*

2018 APA Annual Conference Presidential Symposium
Presidential symposium: *ECT in the era of new brain stimulation treatments: Road map of future enhancements*
Contributed talk: *Individualized neurotargeted seizure therapy: Reinventing ECT*

2018 ADAA Anxiety and Depression Conference
Panel: *Personalized medicine for treatment resistant depressed patients: Novel strategies to optimize treatment with antidepressant medications, ketamine, and ECT*
Contributed talk: *Individualized neurotargeted seizure therapy: Reinventing ECT*

2017 NIMH Non-Invasive Brain Stimulation Electric Field Modeling Workshop
Use of individual electric field models in clinical research

2017 NYC Neuromodulation Conference
Low field magnetic stimulation

2016 NIDA, Neuroimaging Research Branch
Advances in transcranial magnetic stimulation technology

2016 NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications
Effect of anatomical variability on electric field characteristics of tES

2016 Mayo Clinic College of Medicine, Department of Molecular Pharmacology, Neurobiology of Alcoholism and Drug Addiction Lab
Transcranial magnetic stimulation technology development

Department of Neurosurgery Research, Neural Engineering Lab
Optimizing transcranial magnetic stimulation

Invited Talks, Seminars, Worskops, & Panels (continue)

2016 NIMH, Experimental Therapeutics & Pathophysiology Branch
Engineering better electromagnetic brain stimulation therapies

2015 International Society for ECT and Neurostimulation Annual Meeting
Workshop: *Spatial targeting with transcranial magnetic stimulation*

2015 Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences
Chair's round: *Fundamentals of transcranial electric and magnetic stimulation dosing*

2015 Weill Cornell Medical College, Department of Biomedical Engineering
Transcranial magnetic stimulation: Pulse source, coil design, & concurrent neuroimaging

2014 Duke University, Department of Biomedical Engineering
Modeling and coil design considerations for transcranial magnetic stimulation

Teaching & Mentoring

Appointments

2022–present **Educational Counselor**, MIT

2018–2019 **Research Mentor**, Fischell Department of Bioengineering, University of Maryland, College Park, A. James Clark School of Engineering
Capstone Design Project: Detection of brain-to-brain synchrony for improved psychotherapy

2017, 2019 **Lecturer**, NINDS
Clinical Neuroscience Program Lecture Series

2017 **Lecturer**, NIMH
fMRI Course

2016 **Instructor**, Department of Neuroscience, Duke University
Research Independent Study

2014–2016 **Faculty**, Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine
Visiting Fellowship in Transcranial Magnetic Stimulation & Electroconvulsive Therapy Fellowship (Continuing Medical Education)

2015–2016 **Research Mentor**, Matching Undergraduates to Science and Engineering Research Program, Duke University

2015–2016 **Faculty**, Biosciences Collaborative for Research Engagement, Duke University

2010 Spring **Teaching Assistant, Columbia Video Network Course Assistant**, Department of Electrical Engineering, Columbia University Fu Foundation School of Engineering and Applied Science
Analog Systems in VLSI (graduate level)

2009 Fall **Teaching Assistant**, Department of Electrical Engineering, Columbia University Fu Foundation School of Engineering and Applied Science
The Digital Information Age

2009 Fall **Recitation Instructor**, Department of Biostatistics, Columbia University Mailman School of Public Health
Biostatistics (graduate level)

2003–2007 **Teaching Assistant**, Department of Mathematics, MIT
Multivariable Calculus (Fall '03–'06), *Differential Equations* (Spring '04–'07)

2004 Fall **Grader**, Department of Electrical Engineering and Computer Science, MIT
Signals and Systems

Thesis Committee

2019 D. Q. Troung, "Translational Modeling of Non-Invasive Electrical Stimulation," Ph.D. dissertation, City College of the City University of New York, Department of Biomedical Engineering, New York, NY, 2019. Sponsor: M. Bikson. Available: CUNY Academic Works, https://academicworks.cuny.edu/cc_etds_theses/774

2017 G. Asturias, "Effect of Repetitive Transcranial Magnetic Stimulation on the Structural and Functional Connectome in Patients with Major Depressive Disorder," Undergraduate Honors Thesis, Duke University, Department of Psychology and Neuroscience, Durham, NC, 2017. Sponsor: Z.-D. Deng. Available: DukeSpace, HDL: 10161/14299

Mentees

Reseach Fellow/Postdoc

2022–present M. Dannhauer, Max Planck Institute for Human Cognitive and Brain Sciences

Graduate Student

2012 M. Kshirsagar, Biomedical Engineering, Duke University

NIH Postbaccalaureate IRTAs

2021–present P. L. Robins, Physics, Lawrence University
2018–2020 S. M. Awasthi, Biomedical Engineering, Johns Hopkins University
2018–2019 M. M. Noh, Bioengineering, MIT
2017–2019 J. Thomas, Physiology and Biophysics, University of Virginia
2016–2019 M. Velez Afanador, Microbiology, University of Puerto Rico

Undergraduate Students

2014–2017 G. Asturias, Neuroscience & Psychology, Duke University (Distinction)
Z. Feng, Biomedical Engineering and Biology, Duke University
M. Glidewell, Biomedical Engineering, Duke University
S. Lee, Biomedical Engineering, Duke University
J. R. Lilien, Electrical & Computer Engineering, Duke University (Walter J. Seeley Award)
W. Lim, Biomedical Engineering, Duke University
F. M. Mercer, Women's Studies, Duke University
E. Salgado, Neuroscience & Psychology, Duke University (Distinction)
R. Shah, Neuroscience & Psychology, Duke University
E. Shinder, Biology, Duke University (Distinction)
E. P. Vienneau, Biomedical Engineering, Duke University (Howard G. Clark Award)
D. T. Weaver, Biology, Duke University

Summer Interns

2018 M. Dib, Biomedical Engineering, University of Maryland, College Park
2017 E. Chung, Psychology, University of Maryland, College Park
2017 A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University
2015 C. M. Prevost, Biomedical Engineering, Clemson University
2013 J. V. McCall, Biomedical Engineering, North Carolina State University

Professional Affiliations & Services

Professional Society Membership

2004–present **Institute of Electrical and Electronics Engineers**, Senior Member
Engineering in Medicine and Biology Society

2019–present **American Society of Clinical Psychopharmacology**, Member
2023–2027 Early Career Committee
2023–2025 Technology Committee
2020–2023 Technology Task Force

2021–present **Biomedical Engineering Society**, Member

2023–present **American College of Neuropsychopharmacology**, Associate Member

2017–2018 **Anxiety and Depression Association of America**, Member

2017–2019 **International Society for CNS Clinical Trials and Methodology**, Member

2008–2012 **Society for Industrial and Applied Mathematics**, Student Member

2005–2012 **Society for Neuroscience**, Student Member

2004–2009 **American Physical Society**, Student Member

Editorial & Grant Review Services

Peer Review Journals

2022–present Frontiers in Psychiatry
Associate Editor: Neuroimaging and Stimulation
Co-Editor on Research Topic: How Does Brain Stimulation Work? Neuroversion and Other Putative Mechanisms of Action
Associate Editor: Neurostimulation

Guest Associate Editor: Neuropharmacology
Research Topic: Neurobiology of Rapid Mood Changes

2022–present Frontiers in Psychology
Review Editor: Addictive Behaviors
Review Editor: Consciousness Research

2023 Physics in Medicine and Biology
Guest Editor on Special Issue: Electromagnetic Modeling for Brain Stimulation

Grant Review Panels

2022–present NIH BluePrint MedTech Program, reviewer

2021 NIH Early Career Reviewer Program
Biophysics of Neural Systems (BPNS) Study Section, *ad hoc* reviewer

2018, 2021 Duke Institute for Brain Sciences, Research Incubator Awards

Conference Organizing Committee

2022–2023 Brain and Human Body Modeling Conference, The Martinos Center for Biomedical Imaging, Massachusetts General Hospital

Conference Proceedings/Abstract Review

2008–present 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
American Society of Clinical Psychopharmacology Annual Meeting

ad hoc reviewer AIP Advances
American Journal of Psychiatry
Asian Journal of Psychiatry
Australasian Physical and Engineering Sciences in Medicine
Biological Psychiatry
BioMedical Engineering OnLine
Brain Sciences
Brain Stimulation
Cerebral Cortex
Clinical EEG and Neuroscience
Clinical Neurophysiology
CNS Spectrums
Computational and Mathematical Methods in Medicine
Computer Methods and Programs in Biomedicine
Cortex
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 Transactions on Biomedical Engineering
IEEE Transactions on Neural Systems & Rehabilitation Engineering
IEEE Transactions on Magnetics
Journal of ECT
Journal of Neural Engineering
Journal of Neuroscience Methods
JoVE
Medical & Biological Engineering & Computing
Medical Hypotheses
Nature Mental Health
NeuroImage; NeuroImage Clinical
Neuromodulation: Technology at the Neural Interface
Neuroscience Letters
PLoS One
Scientific Reports
Translational Psychiatry

Community Involvement & Outreach

2023–present NIH Research Workforce Diversity and Equity Outreach Special Interest Group

2022 Judge, NIMH Training Day Three-Minute Talks competition

2020 Mental Health Association of Maryland
Presentation: *Fundamentals of transcranial brain stimulation*

2020 Jewish Social Service Agency
Presentation: *Basics of brain stimulation devices: What are they and how do they work*

2020 Exhibitor, USA Science & Engineering Festival #coronacancelled

2019 University of Pennsylvania, Wharton Undergraduate Health Care Club
Presentation: *Research in mental health treatment*

2019 Judge, MIT Hacking Medicine: DC Grand Hack

2019 NIH High School Scientific Training and Enrichment Program
Presentation: *Bioelectricity and brain stimulation*

2019 NIH Take Your Child to Work Day
Presentation: *How to fool your brain*

2019 UCLA, CruX Neurotech Organization
Presentation: *Neuromodulation in psychiatry*

2018 University of Pennsylvania, Wharton Undergraduate Health Care Club
Presentation: *Technology and the future of mental health treatment*

2017–present NIH Noninvasive Brain Stimulation Special Interest Group

2017–2019 Judge/Lead Judge, NIH Postbac Poster Day

2016 Innovation Leader, Psychiatry Innovation Lab, American Psychiatric Association

2016 Duke Psychiatry, Mood Disorders Support and Education Group
Presentation: *Brain stimulation treatments for severe mood disorders*

2016 Duke Translational Medicine Institute, Undergraduate Research Society
Presentation: *Engineering meets psychiatry*

2015 Duke Psychiatry, Mood Disorders Support and Education Group
Presentation: *New frontiers in treatments for mood disorders*

Certifications & Continuing Education

2023 Mid-Level Leadership Program, NIH

2021–2022 Diversity and Inclusion Certificate Program, NIH

2019 Non-invasive Transcranial Brain Stimulation Course, Danish Research Centre for Magnetic Resonance, Copenhagen University Hospital Hvidovre

2015–2016 Health Disparities Research Curriculum, Duke Translational Medicine Institute CTSA

2015 Tackling the Challenges of Big Data, MIT Professional Education Program

2009 Transcranial magnetic stimulation administration certified, Columbia University Medical Center/New York State Psychiatric Institute

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