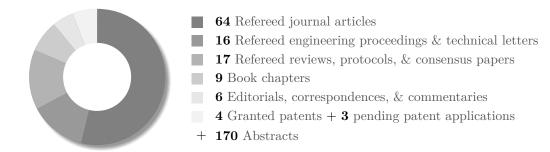
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RESEARCH FOCUS	Noninvasive brain stimulation: Device development, modeling, stimulus parameter and dose optimization, translational and clinical applications	
	Computational electromagnetics	
	Electrophysiological and neuroimaging biomarker development	
	Neural plasticity and translational neuromodeling	
	Nonlinear dynamics of physiological systems	
EDUCATION	Ph.D., Electrical Engineering, Columbia University 2013 Dissertation: Electromagnetic Field Modeling of Transcranial Electric & Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive & Subconvulsive Applications	
	M.Phil., Electrical Engineering, Columbia University Graduate concentration in Neuroscience 2011	
	M.Eng., Electrical Engineering & Computer Science, MIT Thesis: Stochastic Chaos and Thermodynamic Phase Transitions: Theory and Bayesian Estimation Algorithms	
	S.B., Electrical Science & Engineering, MIT 2007	
	S.B., Physics, MIT Minor in Economics 2006	
POSTGRADUATE TRAINING & FELLOWSHIP APPOINTMENTS	Research Fellow, National Institute of Mental Health Noninvasive Neuromodulation Unit Experimental Therapeutics & Pathophysiology Branch ✓ Richard J. Wyatt Memorial Fellowship for Translational Research	
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Professional & Academic Appointments	Staff Scientist, NIMH Noninvasive Neuromodulation Unit Experimental Therapeutics & Pathophysiology Branch	
	Adjunct Assistant Professor, Duke University School of Medicine2016 – 2024Division of Behavioral Medicine & NeurosciencesDepartment of Psychiatry & Behavioral SciencesNetwork Faculty, Duke Institute for Brain Sciences	
	Medical Instructor, Duke University School of Medicine Division of Brain Stimulation & Neurophysiology Department of Psychiatry & Behavioral Sciences → Duke Translational Medicine Institute KL2 Fellow	

Nonprofit Leadership	Co-founder & Scientific Advisor Singula Institute	2017 –
RESEARCH ASSISTANTSHIPS	Visiting Graduate Research Assistant, Duke Psychiatry Division of Brain Stimulation & Neurophysiology	010 - 2013
& Internships	Graduate Research Assistant, Columbia Psychiatry Division of Brain Stimulation & Therapeutic Modulation ✓ Irving Institute for Clinical and Translational Research T32 Fellow	007 - 2010
	Research Assistant, MIT Harvard-MIT Division of Health Sciences & Technology	005 - 2007
	Executive Intern , NewYork-Presbyterian/Weill Cornell Medical Center Department of Anesthesiology	2004
	Internship Coordinator, The New York Times Company Foundation	2003
	Newsroom Technology Intern, The New York Times Company	2002
Awards & Honors	NIMH Director's Award For outstanding transdisciplinary scientific contributions to advance neuromodula nologies for the study and treatment of psychiatric disorders, NIMH	2024 ation tech-
	Elected Full Member Sigma Xi, The Scientific Research Honor Society	2024
	High Five Award For excellent preparation for and presentation at the Noninvasive Neuromodulat Board of Scientific Counselors review, NIMH	2024 ion Unit's
	Scholar, Advanced Research Institute in Geriatric Mental Health Dartmouth College, supported by grant from NIH (R25MH068502)	023 - 2024
	NIMH Director's Award For scientific innovation at the interface of computation and psychiatry, NIMH	2019
	Richard J. Wyatt Memorial Fellowship Award for Translational Research NIMH Intramural Research Program	n 2018
	New Investigator Award American Society of Clinical Psychopharmacology	2018
	Early Career Investigator Travel Fellowship Award Society of Biological Psychiatry	2018
	Research Colloquium for Junior Investigators American Psychiatric Association	2018
	Alies Muskin Career Development Leadership Program Anxiety & Depression Association of America	2018
	NARSAD Young Investigator Award Brain & Behavior Research Foundation	2017
	Career Development Institute for Psychiatry Stanford University	2017
	New Investigator Award International Society for CNS Clinical Trials and Methodology	2017
	Certificate for Highly Cited Research Brain Stimulation, Elsevier	2016

Young Investigator Memorial Travel Award American College of Neuropsychopharmacology	2015
Scholar, Summer Research Institute in Geriatric Mental Health Weill Cornell Medical College, supported by grant from NIH (R25MH019946)	2015
Chair's Choice Award Society of Biological Psychiatry	2014
Innovative Research Poster Award National Network of Depression Centers	2014
Best Abstract Award International Society for ECT and Neurostimulation	2010
Presidential Teaching Award Finalist Columbia University	2010
Student Paper Competition Finalist IEEE Engineering in Medicine and Biology Society	2006
New York Times College Scholarship The New York Times Company Foundation	2002

RESEARCH OUTPUT SUMMARY



REFEREED JOURNAL ARTICLES

- * Denotes first, joint first, or senior author
 - S. M. McClintock, **Z.-D. Deng**, M. M. Husain, V. J. Thakkar, E. Bernhardt, R. D. Weiner, B. Luber, and S. H. Lisanby, "Comparing the neurocognitive effects of right-unilateral ultrabrief pulse electroconvulsive therapy and magnetic seizure therapy for the treatment of major depressive episode," *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 10, no. 2, Feb. 2025.

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- Journal cover
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- 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*, online ahead of print, 2024.

 PMCID: PMC10635016; DOI: 10.1162/imag_a_00412
 - Third Place in Best Student Paper (awarded to N. I. Hasan), Photonics and Electromagnetics Research Symposium, 2024.
- 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 treat-

ment," The Journal of ECT, online ahead of print, 2024.

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* 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.

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- Trainee Travel Award (awarded to P. L. Robins), NIMH IRP Fellows' Scientific Training Day, 2023.
- * Z.-D. Deng, B. Luber, S. M. McClintock, R. D. Weiner, M. M. Husain, and S. H. Lisanby, "Clinical outcomes of magnetic seizure therapy vs electroconvulsive therapy for major depressive episode: A randomized clinical trial," *JAMA Psychiatry*, vol. 81, no. 3, pp. 240–249, Mar. 2024.

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* 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," *Neuropsy-chopharmacology*, vol. 49, no. 4, pp. 640–648, Mar. 2024.

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- 🕏 Part of the Special Issue: Electromagnetic Modeling for Brain Stimulation 🖸
- Third Place in International Student Competition (awarded to W. A. Wartman), Brain & Human Body Modeling Conference, 2023.
- M. Argyelan, **Z.-D. Deng**, O. T. Ousdal, L. Oltedal, B. Angulo, M. Baradits, A. J. Spitzberg, U. Kessler, A. Sartorius, A. Dols, K. L. Narr, R. Espinoza, J. A. van Waarde, I. Tendolkar, P. van Eijndhoven, G. A. van Wingen, A. Takamiya, T. Kishimoto, M. B. Jorgensen, A. Jorgensen, O. B. Paulson, A. Yrondi, P. Péran, C. Soriano-Mas, N. Cardoner, M. Cano, L. van Diermen, D. Schrijvers, J.-B. Belge, L. Emsell, F. Bouckaert, M. Vandenbulcke, M. Kiebs, R. Hurlemann, P. C. R. Mulders, R. Redlich, U. Dannlowski, E. Kavakbasi, M. D. Kritzer, K. K. Ellard, J. A. Camprodon, G. Petrides, A. K. Malhotra, and C. C. Abbott, "Electroconvulsive therapy-induced volumetric brain changes converge on a common causal circuit in depression," *Molecular Psychiatry*, vol. 29, no. 2, pp. 229–237, Feb. 2024.

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- First Place in International Student Competition (awarded to P. L. Robins), Brain ℰ Human Body Modeling Conference, 2022.
- C. Kraus, A. Kautzky, V. Watzal, A. Gramser, B. Kadriu, Z.-D. Deng, L. Bartova, C. A. Zarate, Jr., R. Lanzenberger, D. Souery, S. Montgomery, J. Mendlewicz, J. Zohar, G. Fanelli, A. Serretti, and S. Kasper, "Body mass index and clinical outcomes in individuals with major depressive disorder: Finding from the GSRD European Multicenter Database," Journal of Affective Disorder, vol. 335, pp. 349–357, Aug. 2023.

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* 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.

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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.

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- * 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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- N. L. Balderston, J. C. Beer, D. Seok, W. Makhoul, Z.-D. Deng, T. Girelli, M. Teferi, N. Smyk, M. Jaskir, D. J. Oathes, and Y. I. Sheline, "Proof of concept study to develop a novel connectivity-based electric-field modelling approach for individualized targeting of transcranial magnetic stimulation treatment," Neuropsychopharmacology, vol. 47, no. 2, pp. 588–598, Jan. 2022.

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- 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 July 28, 2023 (not converted to non-provisional).
- S. N. Makarov, G. M. Noetscher, V. S. Makarov, and Z.-D. Deng, "Whole body non-contact electrical stimulation device with variable parameters," U.S. Patent 10,551,449, Feb. 4, 2020, assigned to NEVA Electromagnetics, LLC.
- C.-S. Poon and **Z.-D. Deng**, "Systems and methods for detecting a physiological abnormality in a patient by using cardiac or other chaos in combination with a non-increasing parasympathetic modulation," U.S. Patent 9,737,258, Aug. 22, 2017, assigned to the 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, assigned to The Trustees of Columbia University in the City of New York.
- A. V. Peterchev, S. H. Lisanby, and **Z.-D. Deng**, "Methods, apparatus, and systems for magnetic stimulation," U.S. Patent 8,801,589, Aug. 12, 2014, assigned to The Trustees of Columbia University in the City of New York.

NIH Protocols

A feasibility study of Transcranial Electric Stimulation Therapy (TEST) for treatment resistant depression

NIMH Protocol 21-M-0031

2021 -

Role: Associate investigator; PI: S. H. Lisanby

Role of GABAergic transmission in auditory processing in Autism Spectrum Disorder NIMH Protocol 20-M-0159

Role: Associate investigator; PI: S. H. Lisanby

Safety and feasibility of individualized low amplitude seizure therapy

NIMH Protocol 19-M-0073

2019 -

2020 -

Role: Associate investigator; PI: S. H. Lisanby

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

2019 -

Role: Associate investigator; PI: C. A. Zarate, Jr.

 $Concurrent\ fMRI$ -guided rTMS and $cognitive\ therapy\ for\ the\ treatment\ of\ major\ depressive\ episodes$

NIMH Protocol 17-M-0147

2017 -

Role: Associate investigator; PI: S. H. Lisanby

Development of non-invasive brain stimulation techniques

NIMH Protocol 18-M-0015

2017 -

Role: Associate investigator; PI: S. H. Lisanby

Development of functional and structural magnetic resonance imaging techniques for the study of mood and anxiety disorders

NIMH Protocol 07-M-0021

2017 -

Role: Associate investigator; PI: A. C. Nugent

Identifying neurobiological mechanisms that underlie acute nicotine withdrawal and drive early relapse in smokers

NIDA Protocol 12-DA-N474

2017 -

Role: Associate investigator; PI: A. Janes

Neuropharmacologic imaging and biomarker assessments of response to acute and repeated-dosed ketamine infusions in major depressive disorder

NIMH Protocol 17-M-0060

2016 -

Role: Associate investigator; PI: C. A. Zarate, Jr.

Evaluation of patients with mood and anxiety disorders and healthy volunteers

NIMH Protocol 01-M-0254

2016 -

Role: Associate investigator; PI: C. A. Zarate, Jr.

Modulation of the parieto-frontal communication

NINDS Protocol 18-N-0054

2018 - 2019

Role: Associate investigator; PI: M. Hallett

Effect of TMS to frontoparietal attention network on anxiety potentiated startle

NIMH Protocol 17-M-0042

2017 - 2019

Role: Associate investigator; PI: C. Grillon

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

Congressionally Directed Medical Research Programs Award TP220072

2024 -

Role: Intramural NIH collaborator; PI: D. L. Brody

This study aims to compare different types of TMS that may alleviate depressive symptoms in US military service members with a history of concussion.

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

NIH/NIMH R01 MH130490

2023.07 - 2028.05

Role: Intramural NIH collaborator; PI: S. N. Makaroff

This project seeks to create a new brain modeling engine that employs boundary element and fast multipole methods to achieve superior spatial resolution and accuracy in electromagnetic modeling.

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

NIH/NIMH U01 MH130447

2022.09 - 2027.06

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

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

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

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

2023.02 -

Role: Consultant; PI: V. M. Tang

This proof-of-concept clinical trial will evaluate the feasibility and tolerability of a 4-week

course of rTMS to the prefrontal cortex and insula as a treatment for cannabis use disorder.

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: Y. I. Sheline, K. L. Narr, R. Espinoza, S. M. Mc-Clintock, C.C. 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 - 2023.01

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.

Neuromodulation of social cognitive circuitry in people with schizophrenia spectrum disorders NIH/NIMH R61/R33 MH120188 2020.05 - 2023.04

Role: Intramural NIH collaborator; mPIs: A. N. Voineskos, D. M. Blumberger

This study uses advanced brain imaging, and compare different brain stimulation techniques, to determine whether targeting the dorsomedial prefrontal cortex can engage social cognitive brain circuitry in people with schizophrenia spectrum disorders.

Pending Research SUPPORT

Improving ECT clinical outcomes through seizure- and model-quided stimulation parameters NIH UH3/UG3 2024.10

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

Development of high-density theta burst TMS technology and initial testing in humans

NIH UH3/UG3 2024.09

Role: Intramural NIH collaborator; PI: H. Lu

Improving the optimization of TMS coil placement with precise calculation of electric fields and robust computation of personalized functional networks

NIH/NIMH R01 2024.10

Role: Intramural NIH collaborator; PI: Y. Fan

Targeting the causal depression network with electroconvulsive therapy

NIH/NIMH R33/R61

Role: Intramural NIH collaborator; PI: M. Argyelan

Development of a next generation ECT system: PRecision Optimally Targeted ECT

NIH/NIMH UG3/UH3 2024.06

Role: Intramural NIH collaborator; PI: C. C. Abbott

Completed Research Support

ECT pulse amplitude and medial temporal lobe engagement

NIH/NINDS U01 MH111826

2016.09 - 2020.07Role: Co-I; PI: C. C. Abbott

This study explores the impact of targeted hippocampal engagement with varying levels of electroconvulsive therapy current amplitude in elderly patients with clinical, neuropsychological and neuroimaging assessments.

Individualized low amplitude seizure therapy (iLAST)

Brain & Behavior Research Foundation Young Investigator Award 26161 2018.06 – 2020.06 Role: PI

This study aims to develop a novel form of seizure therapy for depression that avoids the neurocognitive side effects of electroconvulsive therapy by using computational modeling to direct multi-electrode configurations that provide targeted and individualized dosing.

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

NIMH 271201200006I-3-27100003-1

2016.06 - 2017.12

2024.02

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

The goal of this project is to establish the kappa opiate receptor occupancy and mu opiate

receptor effects after two weeks of daily dosing with the investigational agent LY2456302, which has been demonstrated to be a selective kappa opiate receptor antagonist.

Transcranial direct current stimulation as a treatment for acute fear

NIH/NIMH R21 MH106772

2015.04 - 2017.01

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

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

Individualized optimally-targeted seizure therapy

NIH/NCATS KL2 TR001115

2014.07 - 2016.06

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

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

Safety and feasibility of low amplitude electroconvulsive therapy

Duke University School of Medicine, Pilot fund

2015.03 - 2016.06

Role: PI

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

Prolonging Remission In Depressed Elderly (PRIDE)

NIH/NIMH U01 MH084241

2009.04 - 2016.03

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

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

Low field magnetic stimulation coil design

Tal Medical

2015.04 - 2016.06

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

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

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

American Psychiatric Association Research Scholarship

2015.11 - 2016.06

Role: Acting PI; Grantee: Y. Hu

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

 $\label{lem:eq:control} Evoked\ potentials\ as\ markers\ of\ ketamine-induced\ cortical\ plasticity\ in\ patients\ with\ major\ depressive\ disorder$

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.

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.

Translational research evaluating neurocognitive memory processes

NIH/NIMH K23 MH087739

2010.07 - 2015.01

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

This study informs the cognitive component processes underlying memory impairment

after electroconvulsive the rapy. $\,$

	Rational dosing for electric and magnetic seizure therapy NIH/NIMH R01 MH091083 Role: Graduate research assistant, contributed to grant writing; PI: S. I This study aims to optimize stimulus parameters of electric and magnet through computational modeling and preclinical studies of seizure induces	tic seizure the	
	Field shaping and coil design for transcranial magnetic stimulation NIH/NCRR TL1 RR024158 Role: PI; Training Grant PI: H. N. Ginsberg This award from the Columbia University Irving Institute for Clinical Research supports clinical research training for predoctoral students in The goal of the project is to develop novel coil design for transcranial mag	the basic scie	tional ences.
	Development of a novel TMS device with controllable pulse shape NIH/NIBIB R21 EB006855 Role: Graduate research assistant; PI: A. V. Peterchev This project develops an efficient transcranial magnetic stimulation dev nearly rectangular pulses with adjustable amplitude, width, and direction		
	Nonlinear analysis of heart rate variability NIH/NHLBI R01 HL079503 Role: Graduate research assistant; PI: CS. Poon This project develops advanced nonlinear estimation and adaptive cont the modeling and analysis of the cardiovascular system.	2005.11-20 crol algorithm	
Grand Rounds	Advanced Research Institute Grand Rounds in Mental Health and Aging I Advancing neurostimulation treatment optimization and technology inno		2023
	Westmead Hospital, Sydney, Australia Advances in neuromodulation: Electroconvulsive therapy		2020
	Clinical TMS Society Transcranial magnetic stimulation: Physics, devices, and modeling		2018
	University of New Mexico, Department of Psychiatry & Behavioral Science Toward individualized electroconvulsive therapy for treatment of depress		2017
	Central Regional Hospital, Butner, NC Individualized seizure therapy		2015
	Duke University School of Medicine, Department of Psychiatry & Behavior Toward next generation seizure therapy	ral Sciences	2015
Invited Seminars	NIMH Intramural Research Program Investigators' Seminar Series Reading faces: Using facial expression analysis to track emotional states	Upcoming s in depression	
	UCSF Department of Psychiatry & Behavioral Sciences Engineering precision in neuromodulation: Computational models and cl	Upcoming linical applications	
	University of Pittsburgh, Geriatric Psychiatry Neuroimaging Laboratory The full spectrum: Electromagnetic brain stimulation from minimal to re-	$naximal\ inter$	$2024 \\ nsity$
	University of Texas Southwestern, Center for Depression Research and Clin Advancements in computational neurostimulation for depression treatment technology development		2023 zation
	University of Pittsburgh, Department of Psychiatry Computational neurostimulation: Treatment optimization and technolog	y developmer	2023 nt
	MUSC National Center of Neuromodulation for Rehabilitation		2022

Model-driven design for brain stimulation therapies $\stackrel{\square}{\mathbb{D}}$	
NIMH Intramural Research Program Investigators' Seminar Series Seizure therapies: The next generation	2022
Butler Hospital, Brown University Computational model driven design for brain stimulation	2021
University of Pennsylvania, Center for Neuromodulation in Depression and Stress Electromagnetic brain stimulation from low to high intensity	2021
VA Boston Healthcare System, Boston University School of Medicine Harvard Medical School Neuropsychiatry Translational Research Fellowship Seminar Precision neurostimulation: History, physics, computational modeling, and engineer	2020 ing
Medical University of Vienna, Neuroimaging Lab Precision seizure therapy	2020
Mount Sinai Icahn School of Medicine, Depression and Anxiety Center Rational design of individualized noninvasive brain stimulation	2019
NIMH Intramural Research Program Investigators' Seminar Series Computational neurostimulation: Engineering better brain stimulation therapies	2018
UCLA Brain Mapping Center Computational neurostimulation: Engineering better brain stimulation therapies	2018
UCLA 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
NIDA, Neuroimaging Research Branch Advances in transcranial magnetic stimulation technology	2016
Mayo Clinic College of Medicine, Department of Molecular Pharmacology Neurobiology of Alcoholism and Drug Addiction Lab Transcranial magnetic stimulation technology development	2016
Mayo Clinic College of Medicine, Department of Neurologic Surgery Neural Engineering Lab Optimizing transcranial magnetic stimulation	2016
NIMH, Experimental Therapeutics & Pathophysiology Branch Engineering better electromagnetic brain stimulation therapies	2016
Duke University School of Medicine, Department of Psychiatry & Behavioral Sciences Chair's round: Fundamentals of transcranial electric and magnetic stimulation dosing	$\frac{2015}{ng}$
Weill Cornell Medical College, Department of Biomedical Engineering Transcranial magnetic stimulation: Pulse source, coil design, & concurrent neuroim	2015 $aging$
Duke University, Department of Biomedical Engineering Modeling and coil design considerations for transcranial magnetic stimulation	2014
International Society for ECT and Neurostimulation Annual Meeting Upcoming Multichannel Individualized Stimulation Therapy	g 2025
American Neuropsychiatric Association Annual Meeting Upcoming Panel: Interventional neuropsychiatry: From mechanisms to clinical decision-makin Contributed talk: Advancing personalized seizure therapy: Magnetic seizure therapy Multichannel Individualized Stimulation Therapy	g

CONFERENCE TALKS, WORKSHOPS, & PANELS

International Brain Stimulation Conference	Upcoming 2025
Symposium: ECT reimagined: Precision, prediction, and personalized ca Contributed talk: Multichannel Individualized Stimulation Therapy (Mapproach to optimize electroconvulsive therapy	
IEEE Brain Discovery & Neurotechnology Workshop, University of Illinois A model-driven approach to personalized neuromodulation treatment	Chicago 2024
$\label{lem:condition} \begin{tabular}{ll} International Symposium on Novel Neuromodulation Techniques \\ Model-driven \ brain \ stimulation \ treatments \\ \end{tabular}$	2024
NIMH Workshop on The Placebo Effect: Key Questions for Translational R Challenges and strategies in implementing effective sham stimulation for r stimulation trials	
International Society for Magnetic Resonance in Medicine Annual Meeting Workshop: From basics to applications: MRI of neuromodulation using Contributed talk: TMS devices and modeling	7024 ΓMS and FUS
Brain and Human Body Modeling Conference The Martinos Center for Biomedical Imaging, Massachusetts General Hospi Chair: New modeling methods and targets: Spinal cord stimulation and methods: Chair: Development and assessment of modeling methods Contributed talk: Effects of low intensity magnetic stimulation	
International Conference of the IEEE Engineering in Medicine and Biology Panel: Computational analysis of non-invasive neuromodulation: Brain of Contributed talk: Modeling of TMS and ECT in the treatment of depresent	and spine
ADAA Anxiety and Depression Conference Panel: Parsing through syndromic heterogeneity in youths with mental is neurocircuit mechanisms and develop novel treatments Contributed talk: Modeling and dose optimization for TMS and ECT	2023 Illness to identify
International Brain Stimulation Conference Symposium chair: Insights and challenges in preclinical models of TMS vestigations across animal species Symposium chair: Advanced computational modeling and optimization me vasive brain stimulation	
International Network of tES-fMRI (INTF) Webinar Series Electric field modeling and optimization approaches for individualized tar	2022 $geting$
International Society for Magnetic Resonance in Medicine Workshop: MRI of neuromodulation: Target engagement, neural mech marker development Contributed talk: Modeling of TMS	2022 nanism, and bio-
Bergen Workshop of the Global ECT–MRI Collaboration $ECT\ device\ development$ ${\ \ \cite{collaboration}}$	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 Hospi Chair: Modeling of transcranial electrical stimulation and deep brain stim Contributed talk: ECT, electric field, neuroplasticity, and clinical outcome	nulation
European Conference of Brain Stimulation in Psychiatry Panel: Beyond clinical syndromes: Understanding mechanisms of neuron dimensional perspective Contributed talk: Symptom dimensions and response trajectories in ECT	

Society of Biological Psychiatry Annual Meeting Panel: Dimensional approaches to device neuromodulation Contributed talk: Depressive symptom dimensions in seizure therapy	2022
Global ECT–MRI Collaboration Young Researchers Collective ECT, electric field, neuroplasticity, and clinical outcomes	2022
American Academy of Child and Adolescent Psychiatry Annual Meeting Panel: Recent work with contemporary computational methods and artificial intelligent advance the practice of child and adolescent psychiatry Contributed talk: Introduction to computational psychiatry	2021 nce to
European College of Neuropsychopharmacology Congress Panel: Neurobiology of rapid mood changes Contributed talk: Precision neurostimulation: Electroconvulsive therapy	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: <i>How to give a virtual talk</i>	2021
International College of Neuropsychopharmacology Virtual World Congress Next generation seizure therapy and neuromodulation	2021
European Conference of Brain Stimulation in Psychiatry Panel: What can we learn from ECT: Insights from the GEMRIC consortium Contributed talk: Electric field modeling to inform ECT dosing and device developm	2020 $nent$
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
NYC Neuromodulation Online Discussant: Noninvasive vagus nerve stimulation applied to stress management, of withdrawal, and neurocognitive disorders	2020 opioid
American College of Neuropsychopharmacology Annual Meeting 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 Disor Copenhagen University Hospital Hvidovre, Danish Research Centre for Magnetic Resor Rational design of precision seizure therapy	
International College of Neuropsychopharmacology Meeting Workshop: Neurobiological and clinical characterization, and treatment development treatment resistant depression Contributed talk: Individualized seizure therapy: Reinventing ECT	2019 $nt\ for$
American Society of Clinical Psychopharmacology Annual Meeting Co-chair: Treatment-resistant mood disorders across the lifespan: Novel therapeutics	2019
International Brain Stimulation Conference Panel: Individualized brain stimulation: Addressing heterogeneity across modalities Contributed talk: Individualized electroconvulsive therapy for treatment of depression	2019 n
Bergen Workshop of the Global ECT–MRI Collaboration Electric field modeling for electroconvulsive therapy	2018
Joint NYC Neuromodulation Conference & NANS Summer Series Optimizing high-density stimulation arrays for brain targeting	2018

	Neuropsychiatric Drug Development Summit Targeted intermittent device delivered interventions will ultimately prove sup tenance treatment with drugs for brain disorders	2018 perior to main-
	International Conference of the IEEE Engineering in Medicine and Biology Sc Chair: Computational human models for brain stimulation Contributed talk: Electric field induced by TMS: Applications in depression	
	American Psychiatric Association Annual Conference Presidential symposium: ECT in the era of new brain stimulation treatment Contributed talk: Individualized neurotargeted seizure therapy: Reinventing	
	ADAA Anxiety and Depression Conference Panel: Personalized medicine for treatment resistant depressed patients: Note to optimize treatment with antidepressant medications, ketamine, and ECT Contributed talk: Individualized neurotargeted seizure therapy: Reinventing	1
	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	2017
	NIMH Workshop on Transcranial Electrical Stimulation: Mechanisms, Technol apeutic Applications Effect of anatomical variability on electric field characteristics of tES	ogy, and Ther- 2016
	International Society for ECT and Neurostimulation Annual Meeting Workshop: Spatial targeting with transcranial magnetic stimulation	2015
Teaching &	Educational Counselor, MIT	2022 -
MENTORING APPOINTMENTS	Research Mentor, University of Maryland, College Park Fischell Department of Bioengineering Capstone project: Detection of brain-to-brain synchrony for improved ps	2018-2019 $sychotherapy$
	Lecturer, NIH National Institute of Mental Health Basic Training Course on Transcranial Magnetic Stimulation fMRI Course National Institute of Neurological Disorders and Stroke Clinical Neuroscience Program Lecture Series	2020 Summer 2017 2017, 2019
	Faculty, Duke University Department of Psychology & Neuroscience Research Independent Study Matching Undergraduates to Science and Engineering Research Program Biosciences Collaborative for Research Engagement Department Psychiatry & Behavioral Sciences Visiting Fellowship in Electroconvulsive Therapy (CME accredited) Visiting Fellowship in Transcranial Magnetic Stimulation (CME accredited)	2016 2015 - 2016 2015 - 2016 2015 ed) 2014 - 2016
	Teaching Assistant , Columbia University Department of Electrical Engineering Analog Systems in VLSI (graudate level) The Digital Information Age	Spring 2010 Fall 2009
	Recitation Instructor, Columbia University Mailman School of Public Heal Department of Biostatistics Biostatistics (graduate level)	lth Fall 2009

Fall 2009

	$Multivariable\ Calculus$ $Differential\ Equations$	$\begin{array}{c} {\rm Fall} \ 2003-2006 \\ {\rm Spring} \ 2004-2007 \end{array}$
Sponsored Theses	G. Asturias, Psychology & Neuroscience, Duke University © Graduated with Distinction Undergraduate honors thesis: "Effect of repetitive transcrania the structural and functional connectome in patients with m DukeSpace. HDL: 10161/14299 Post-training position: Medical student, Stanford University	najor depressive disorder,"
THESIS EXAMINATION COMMITTEE MEMBERSHIP	W. A. Wartman, Electrical & Computer Engineering, Worcester Poph.D. dissertation: "Adaptive mesh refinement for quasistatic of brain stimulation and recording methods" Sponsor: S. N. Makaroff	
	D. Q. Troung, Biomedical Engineering, CUNY City College Ph.D. dissertation: "Translational modeling of non-invasive e CUNY Academic Works. URL: academicworks.cuny.edu/cc_etds_tl Sponsor: M. Bikson	
Career Development Award	S. K. Conroy, M.D., Ph.D., Indiana University School of Medicine Project: "Targeting the medial prefrontal cortex with theta by negative self-referential processing in major depression"	2024 – urst stimulation to reduce
Advisory	S. M. Hare, Ph.D., University of Maryland School of Medicine NIH/NIMH K01 MH133116 Project: "Cognitive and neural correlates of TMS motor intrace phrenia"	2024 – 2029 ortical inhibition in schizo-
	S. H. Siddiqi, M.D., Brigham & Women's Hospital NIH/NIMH K23 MH121657 Project: "Personalized circuit-based neuromdulation targets for Seleman Prize for Exceptional Clinical Research, Brain & Behavior	_
	N. L. Balderston, Ph.D., University of Pennsylvania Perelman Schon NIH/NIMH K01 MH121777 Project: "Examining the mechanisms of anxiety regulation using fMRI-guided rTMS protocol and a translational laboratory mod Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Projects of the Remain Prize for Exceptional Clinical Research, Brain & Behavioral Prize for Exceptional Pr	2019-2023 g a novel, sham-controlled, del of anxiety"
RESEARCH	S. Dey, Ph.D., NIMH Visiting Postdoctoral Fellow	2024 -
FELLOWS & POSTDOCS	M. Dannhauer, Ph.D., NIMH Research Fellow Post-training position: Assistant Professor, Department of Corolina University	2022 – 2024 mputer Science, East Car-
GRADUATE	E. Bharti, Ph.D. candidate, NIH Oxford-Cambridge Scholars Prog	ram 2024 –
STUDENTS	M. Kshirsagar, M.S., Biomedical Engineering, Duke University Post-training position: Consultant, Deloitte Consulting	2012
Postbacs	 P. L. Robins, B.A., NIMH Intramural Research Training Award (II. NIMH Intramural Research Program Trainee Travel Award First Place in Student Competition, Brain & Human Body Mode Post-training position: TMS technician, Columbia Associates 	2023
	M. R. Hynd, B.S., NIMH IRTA Fellow Post-training position: Ph.D. student, University of North Card	2020 – 2022 blina at Chapel Hill

Teaching Assistant, MIT Concourse Program

	S. Awasthi, B.S., NIMH IRTA Fellow Post-training position: Medical student, Stanford University School of Medical	2018 - 2020 ine
	M. M. Noh, S.B., NIMH IRTA Fellow Post-training position: Medical student, University of Cincinnati College of M	2018 – 2019 Medicine
	J. Thomas, M.S., NIMH IRTA Fellow Post-training position: Program officer, National Academies of Sciences, Engi Medicine	2017 – 2019 neering, and
	M. Velez Afanador, B.S., NIMH IRTA Fellow Outstanding Poster Award, NIH Postbac Poster Day Post-training position: Medical student, Howard University College of Medical	2016 – 2019 2018 ine
Undergrads	D. T. Weaver, Biology, Duke University Post-training position: M.D./Ph.D. student, Case Western Reserve University	2016 y
	 E. F. Salgado, Psychology & Neuroscience, Duke University Graduated with Distinction Post-training position: Ph.D. student, Indiana University—Purdue University 	2016 Indianapolis
	Z. Feng, Biomedical Engineering and Biology, Duke University Post-training position: Medical student, University of Colorado School of Me	2015-2016 dicine
	M. L. Glidewell, Biomedical Engineering, Duke University Post-training position: Senior strategy consultant, IBM	2015 - 2016
	W. Lim, Biomedical Engineering, Duke University Post-training position: Medical student, Texas A&M College of Medicine	2015 - 2016
	F. M. Mercer, Gender, Sexuality and Feminist Studies, Duke University Post-training position: Analyst, Morgan Stanley	2015 - 2016
	 E. Shinder, Biology, Duke University Graduated with Distinction Post-training position: Medical student, Stony Brook School of Medicine 	2015 - 2016
	 E. P. Vienneau, Biomedical Engineering, Duke University Howard G. Clark Award for Excellence in Research Post-training position: Ph.D. student, Vanderbilt University 	2015 - 2016
	S. H. Lee, Biomedical Engineering, Duke University Post-training position: Manager, Strategy & Operations, Tempus Labs	2015
	R. Shah, Psychology & Neuroscience, Duke University Post-training position: Medical student, Yale School of Medicine	2015
	 J. R. Lilien, Electrical & Computer Engineering, Duke University Walter J. Seeley Scholastic Award Post-training position: Machine learning engineer, Amazon 	2014 - 2016
Interns	M. Dib, Biomedical Engineering, University of Maryland, College Park Supervised as a summer intern at the NIH, provided ongoing mentorship duri terms, including advising Capstone design project Post-training position: Medical student, Weill Cornell Medicine	2018 – 2019 ng academic
	A. L. Halberstadt, Biology and Psychology, Carnegie Mellon University Post-training position: Ph.D. student, Penn State University	ummer 2017
	C. M. Prevost, Biomedical Engineering, Clemson University S Post-training position: Medical student, University of South Carolina School	ummer 2015 of Medicine
	J. V. McCall, Biomedical Engineering, North Carolina State University Post-training position: Ph.D. student, North Carolina State University	ummer 2013

Professional Societies Membership & Service	IEEE, Engineering in Medicine and Biology Society Senior Member Member Student Member	$2023 - \\2013 - 2023 \\2004 - 2013$
	American Society of Clinical Psychopharmacology Member Early Career Committee Technology Committee Technology Task Force	$2019 - \\2023 - 2027 \\2023 - 2025 \\2020 - 2023$
	Biomedical Engineering Society Member	2021-
	American College of Neuropsychopharmacology Associate Member	2023 –
	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
EDITORIAL	Deputy Editor, Transcranial Magnetic Stimulation	2024 –
Roles	Associate Editor, Frontiers in Psychiatry Sections: Neurostimulation, Neuroimaging Co-Editor on Research Topic: How Does Brain Stimulation Work? Other Putative Mechanisms of Action	2022 – Neuroversion and 2024
	Review Editor, Frontiers in Psychology Sections: Addictive Behaviors, Consciousness Research	2022 –
	Review Editor, Frontiers in Psychiatry Sections: Neurostimulation, Neuroimaging	2016-2022
	Guest Associate Editor, Frontiers in Pharmacology: Neuropharmacology Co-Editor on Research Topic: Neurobiology of Rapid Mood Changes	2020
	Guest Editor, Physics in Medicine and Biology Special Issue: Electromagnetic Modeling for Brain Stimulation	2024
	Ad hoc journal 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	2010 –

Brain Stimulation Cerebral Cortex

Chaos, Solitons & Fractals

Clinical EEG and Neuroscience

Clinical Neurophysiology

 $CNS\ Spectrums$

Computational and Mathematical Methods in Medicine

Computer Methods and Programs in Biomedicine

Cortex

European Psychiatry

Frontiers in Cell and Developmental Biology

Frontiers in Medicine: Intensive Care Medicine and Anesthesiology

Frontiers in Neurology: Applied Neuroimaging Frontiers in Neuroscience: Brain Imaging Methods

IEEE Antennas and Propagation Magazine

IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology

IEEE Transactions on Biomedical Engineering

IEEE Transactions on Neural Systems & Rehabilitation Engineering

IEEE Transactions on Magnetics

Imaging Neuroscience

Journal of ECT

Journal of Neural Engineering

Journal of Neuroscience Methods

Journal of Psychiatric Research

JoVE

Medical & Biological Engineering & Computing

 $Medical\ Hypotheses$

Nature Mental Health

NeuroImage; NeuroImage Clinical

Neuromodulation: Technology at the Neural Interface

Neuroscience Letters

PLOS ONE

Scientific Reports

Translational Psychiatry

Reviewer, Conference Proceedings and Abstract

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

Ad hoc reviewer, NIH Early Career Reviewer Program

GRANT REVIEW PANELS Reviewer, NIH BluePrint MedTech Program

2022 -

2021

Biophysics of Neural Systems Study Section

Reviewer, Duke Institute for Brain Sciences, Research Incubator Awards

2018, 2021

CONFERENCE ORGANIZING COMMITTEE Organizing committee, and judge in student competition

2022 - 2023

Brain and Human Body Modeling Conference

Program review subcommittee

2023

American Society of Clinical Psychopharmacology Annual Meeting

Preconference workshop director, NYC Neuromodulation Conference

2018

Workshop: Computational modeling in neuromodulation: Tools for engineers, clinicians, and researchers

Community Involvement,	Producer, <i>Psychopharm Today</i> podcast Hosted by the American Society of Clinical Psychopharmacology	2024 –
Outreach, & Science Advocacy	NIH Research Workforce Diversity and Equity Outreach Special Interest Gr	roup 2023 –
	Judge, NIMH Training Day Three-Minute Talks competition	2022
	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	2020 w do they work
	Exhibitor, USA Science & Engineering Festival $\#$ coronac ancelled	2020
	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	2019
	University of Pennsylvania, Wharton Undergraduate Health Care Club Presentation: Technology and the future of mental health treatment	2018
	NIH Noninvasive Brain Stimulation Special Interest Group	2017 -
	Judge/Lead Judge, NIH Postbac Poster Day	2017 - 2019
	Innovation Leader, Psychiatry Innovation Lab, American Psychiatric Associ	iation 2016
	Duke Psychiatry, Mood Disorders Support and Education Group Presentation: Brain stimulation treatments for severe mood disorders Presentation: New frontiers in treatments for mood disorders	2016 2015
	Duke Translational Medicine Institute, Undergraduate Research Society Presentation: $Engineering\ meets\ psychiatry$	2016
Professional	Mid-Level Leadership Program, NIH	2023
DEVELOPMENT	Diversity and Inclusion Certificate Program, NIH	2021 - 2022
& CONTINUING EDUCATION	Non-invasive Transcranial Brain Stimulation Course, Danish Research Cen Resonance, Copenhagen University Hospital Hvidovre	tre for Magnetic 2019
	Health Disparities Research Curriculum, Duke Translational Medicine Instit	tute 2015 – 2016
	Tackling the Challenges of Big Data, MIT Professional Education Program	2015
	Clinical Research Training Program, Duke University	$2014\!-\!2015$
	Transcranial magnetic stimulation administration certified, Columbia Universical Center/New York State Psychiatric Institute	rsity Irving Med- 2009
	Basic Life Support, American Heart Association Re	ecertified 2023.07