

Curriculum Vitae

Edward Marten Merricks, Ph.D.

Updated:
February 2026

Instructor

Department of Neurology, Johns Hopkins School of Medicine
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Baltimore, MD 21287

Instructor

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Professional Employment

<i>Month/Year</i>	<i>Description</i>	<i>Institution</i>
07/2025 – present	Instructor	Johns Hopkins University, Baltimore, MD
07/2025 – present	Instructor	Kennedy Krieger Institute, Baltimore, MD
04/2021 – 05/2025	Associate Research Scientist	Columbia University, New York, NY
05/2016 – 04/2021	Post-Doctoral Research Scientist <i>Advisor: Catherine A. Schevon, M.D., Ph.D.</i>	Columbia University, New York, NY
11/2015 – 05/2016	Research Assistant	Newcastle University, UK

Education

<i>Years</i>	<i>Degree</i>	<i>Field</i>	<i>Institution</i>
2012 – 2016	Ph.D.	Neuroscience	Newcastle University, UK
	<i>Thesis:</i>	<i>Single unit action potential recordings in humans: implications for epilepsy</i>	
	<i>Advisor:</i>	<i>Andrew J. Trevelyan, M.A., M.B.B.Ch., D.Phil.</i>	
2011 – 2012	M.Res.	Neuroscience	Newcastle University, UK
2007 – 2010	B.Sc. (Hons)	Artificial Intelligence & Cybernetics	University of Reading, UK

Honors/Awards

2025	Invited expert jury member for the “OHBM 2025 BrainArt Competition”
2024	First-preference Green Card (EB-1A) for “Exceptional Ability in Science”
2024 & 2025	“Trusted Reviewer Status” award from the Institute of Physics (IOP)
2011 – 2015	Wellcome Trust Ph.D. / M.Res. Scholarship Grant “Systems Neuroscience: From Networks to Behaviour” Total direct funding: £168,795 GBP (~\$270,000 USD at date of award) Grant IDs: <i>Wellcome Trust 096973/Z/11/Z & 096973/Z/11/A</i>
2013	Sixth International Workshop on Seizure Prediction (San Diego, CA) 1 of 3 young investigators selected to give a lecture
2010	Commendation for best undergraduate robotics research project: “Significant analysis and implementation for the complex reproduction of paintings”

Professional Memberships

2025 – present	Associate Member, Institute of Physics (IOP)
2020 – 2025	Member, New York Academy of Sciences
2017 – 2024	Member, American Epilepsy Society
2015 – 2016	Member, British Neuroscience Association
2012 – 2013; 2019 – 2020	Member, Society for Neuroscience

Talks

2025	“Human seizures at the scale of single neurons” Epilepsy Surgical Case Conference, Johns Hopkins University. November. Baltimore, MD
2025	“Human seizures at the scale of single neurons” Kennedy Krieger Institute/Johns Hopkins University. June. (Remote)
2024	“Single neuron activity during human seizures” De Jager Research Group, Columbia University Medical Center. March. New York, NY
2023	“Macro & micro EEG: Human seizures at the scale of single neurons” American Clinical Neurophysiology Society Annual Meeting. March. Austin, TX
2022	“Seizures at the scale of single neurons” American Epilepsy Society Annual Meeting. December. Nashville, TN
2022	“Human single neuron activity underlying spontaneous seizures” Burke Neurological Institute, Weill Cornell Medicine. June. (Remote)
2020	“Neuronal firing and action potential changes during ictal recruitment in humans” Epilepsy Research Seminar, Columbia University Medical Center. January. New York, NY
2013	“Single unit firing patterns preceding human seizures” Sixth International Workshop on Seizure Prediction. November. San Diego, CA

Academic Service

Editorial board:	<i>Frontiers in Neurology: Epilepsy</i>	(Review Editor)
Ad hoc peer reviewer:	<i>Brain</i> <i>Epilepsia</i> <i>Neuropharmacology</i> <i>Journal of Neural Engineering</i> <i>Brain Communications</i> <i>Scientific Reports</i> <i>eNeuro</i> <i>Translational Neuroscience</i> <i>Frontiers in Neuroscience</i> <i>Frontiers in Neuroinformatics</i> <i>Biomedical Physics & Engineering Express</i>	
Collaborating reviewer:	<i>Neurology</i> <i>Journal of Neuroscience</i> <i>eBioMedicine</i>	

Pre-prints

2025	Sevak, B., Scott, D., Merricks, E.M. , Denis, C., Kremen, V., Tononi, G., Schevon, C., Boly, M. “Direct intracranial EEG evidence for a local breakdown in normal sleep homeostasis at the human seizure onset zone.” medRxiv. Available at: doi: 10.1101/2025.11.04.25339396
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- 2024 **Merricks, E.M.**, Deshpande, S.S., Agopyan-Miu, A.H., Smith, E.H., Schlafly, E.D., McKhann, G.M., Goodman, R.R., Sheth, S.A., Greger, B., House, P.A., Eskandar, E.N., Madsen, J.R., Cash, S.S., Trevelyan, A.J., Van Drongelen, W., Schevon, C.A. “*Aberrant fast spiking interneuronal activity precedes seizure transitions in humans.*” **medRxiv**. Available at: doi:[10.1101/2024.01.26.24301821](https://doi.org/10.1101/2024.01.26.24301821)
- 2024 Zhu, H., Michalak, A.J., **Merricks, E.M.**, Agopyan-Miu, A.H., Jacobs, J., Hamberger, M.J., Sheth, S.A., McKhann, G.M., Feldstein, N.A., Schevon, C.A., Hillman, E.M.C. “*Spectral-switching analysis reveals real-time neuronal network representations of concurrent spontaneous naturalistic behaviors in human brain.*” **bioRxiv**. Available at: doi:[10.1101/2024.07.08.600416](https://doi.org/10.1101/2024.07.08.600416)

Peer-Reviewed Journal Articles

(total citations: **956**, h-index: **14**)

- 2025 Cowan, R.L., Davis, T.S., **Merricks, E.M.**, Kundu, B., Shofty, B., Rahimpour, S., Schevon, C.A., Rolston, J.D., Smith, E.H. “*Cell-type-specific responses to single-pulse electrical stimulation of the human brain.*” **Brain Stimulation**, 18 (4), 1266–1278.
- 2025 Goldberg, A.R., Dovas, A., Torres, D., Pereira, B., Viswanathan, A., Das Sharma, S., Mela, A., **Merricks, E.M.**, Megino-Luque, C., McInvale, J.J., Olabarria, M., Abrishami Shokoo, L., Zhao, H.T., Chen, C., Kotodis, C., Calvaresi, P., Banu, M.A., Razavilar, A., Sudhaker, T.D., Saxena, A., Chokran, C., Humala, N., Mahajan, A., Xu, W., Metz, J.B., Bushong, E.A., Boassa, D., Ellisman, M.H., Hillman, E.M.C., Hargus, G., Bravo-Cordero, J.J., McKhann, G.M., Gill, B.J.A., Rosenfeld, S.S., Schevon, C.A., Bruce, J.N., Sims, P.A., Peterka, D.S., Canoll, P. “*Glioma-induced alterations in excitatory neurons are reversed by mTOR inhibition.*” **Neuron**, 113 (6), 858–875.E10.
- 2025 Zarr, V.M., Liou, J.Y., **Merricks, E.M.**, Davis, T.S., Thomson, K., Greger, B., House, P.A., Emerson, R.G., Goodman, R.R., McKhann, G.M., Sheth, S.A., Schevon, C.A., Rolston, J.D., Smith, E.H. “*Protocol for detecting and analyzing non-oscillatory traveling waves from high-spatiotemporal-resolution human electrophysiological recordings.*” **STAR protocols**, 6 (1), 103659.
- 2025 Rifkin, R.A., Wu, X., Pereira, B., Gill, B.J.A., **Merricks, E.M.**, Michalak, A.J., Goldberg, A.R., Humala, N., Dovas, A., Rai, G., McKhann, G.M., Slesinger, P.A., Canoll, P., Schevon, C.A. “*A selective small-molecule agonist of G protein-gated inwardly-rectifying potassium channels reduces epileptiform activity in mouse models of tumor-associated and provoked seizures.*” **Neuropharmacology**, 265, 110259.
- 2023 Agopyan-Miu, A.H.¹, **Merricks, E.M.¹**, Smith, E.H., McKhann, G.M., Sheth, S.A., Feldstein, N.A., Trevelyan, A.J., Schevon, C.A. “*Cell-type specific and multiscale dynamics of human focal seizures in limbic structures.*” **Brain**, 146 (12), 5209–5223.
(¹ **co-first author**)
- 2023 Lee, S., Deshpande, S.S., **Merricks, E.M.**, van Putten, M.J.A.M., Schevon, C.A., van Drongelen, W. “*Spatiotemporal spike-centered averaging reveals symmetry of temporal and spatial components of the spike-LFP relationship during human focal seizures.*” **Communications Biology**, 6 (1), 317.
- 2023 Juan, E., Górska, U., Kozma, C., Papantonatos, C., Bugnon, T., Denis, C., Kremen, V., Worrell, G., Struck, A.F., Bateman, L.M., **Merricks, E.M.**, Blumenfeld, H., Tononi, G., Schevon, C.A., Boly, M. “*Distinct signatures of loss of consciousness during focal impaired awareness versus focal to bilateral tonic clonic seizures.*” **Brain**, 146 (1), 109–123.
- 2022 Gill, B.J.A.¹, Khan, F.A.¹, Goldberg, A.R.¹, **Merricks, E.M.¹**, Wu, X., Sosunov, A.A., Sudhaker, T.D., Dovas, A., Lado, W., Michalak, A.J., Liou, J-Y., Frankel, W.N., McKhann, G.M., Canoll, P., Schevon, C.A. “*Single unit analysis and wide-field imaging reveal alterations in excitatory and inhibitory neurons in glioma.*” **Brain**, 145 (10), 3666–3680.
(¹ **co-first author**)

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- 2022 Schlaflly, E., Marshall, F., **Merricks, E.M.**, Eden, U.T., Cash, S.S., Schevon, C.A., Kramer, M.A. "Multiple sources of fast traveling waves during human seizures: resolving a controversy." *Journal of Neuroscience*, 42 (36), 6966-6982.
- 2022 Smith, E.H., Liou, J.Y., **Merricks, E.M.**, Davis, T.S., Thomson, K., Greger, B., House, P.A., Emerson, R.G., Goodman, R.R., McKhann II, G.M., Sheth, S.A., Schevon, C.A., Rolston, J.D. "Human interictal epileptiform discharges are bidirectional traveling waves echoing ictal discharges." *eLife*, 11:e73541.
- 2022 Norman-Haignere, S.V., Long, L.K., Devinsky, O., Doyle, W., Irobunda, I., **Merricks, E.M.**, Feldstein, N.A., McKhann, G.M., Schevon, C.A., Flinker, A., Mesgarani, N. "Multiscale temporal integration organizes hierarchical computation in human auditory cortex." *Nature Human Behaviour*, 6 (3), 455-469.
- 2021 **Merricks, E.M.**, Smith, E.H., Emerson, R.G., Bateman, L.M., McKhann, G.M., Goodman, R.R., Sheth, S.A., Greger, B., House, P.A., Trevelyan, A.J., Schevon, C.A. "Neuronal firing and waveform alterations through ictal recruitment in humans." *Journal of Neuroscience*, 41 (4), 766-779.
- 2020 Smith, E.H., **Merricks, E.M.**, Liou, J-Y., Casadei, C., Melloni, L., Friedman, D., Doyle, W., Goodman, R.R., Emerson, R.G., McKhann, G.M., Sheth, S.A., Rolston, J., Schevon, C.A. "Dual mechanisms of ictal high frequency oscillations in rhythmic onset seizures." *Scientific Reports*, 10(1), 19166.
- 2019 Tryba, A.K.¹, **Merricks, E.M.**¹, Lee, S., Pham, T., Cho, S., Nordli, D.R., Jr., Eissa, T.L., Goodman, R.R., McKhann, G.M., Emerson, R.G., Schevon, C.A., van Drongelen, W. "Role of paroxysmal depolarization in focal seizure activity." *Journal of Neurophysiology*, 122, 1861–1873. PMC6879965.
(¹ co-first author)
- 2019 Schevon, C.A., Tobochnik, S., Eissa, T.L., **Merricks, E.M.**, Gill, B.J., Bateman, L.M., McKhann, G.M., Emerson, R.G., Trevelyan, A.J. "Multiscale recordings reveal the dynamic spatial structure of human seizures." *Neurobiology of Disease*, 127, 303–311. PMC6588430.
- 2016 Smith, E.H., Liou, J.-Y., Davis, T.S., **Merricks, E.M.**, Kellis, S.S., Weiss, S.A., Greger, B., House, P.A., McKhann, G.M., Goodman, R.R., Emerson, R.G., Bateman, L.M., Trevelyan, A.J., Schevon, C.A. "The ictal wavefront is the spatiotemporal source of discharges during spontaneous human seizures." *Nature Communications*, 711098. PMC4820627.
- 2015 **Merricks, E.M.**, Smith, E.H., McKhann, G.M., Goodman, R.R., Bateman, L.M., Emerson, R.G., Schevon, C.A., Trevelyan, A.J. "Single unit action potentials in humans and the effect of seizure activity." *Brain*, 138(10), 2891–2906. PMC4671476.
- 2015 Trevelyan, A.J., Muldoon, S.F., **Merricks, E.M.**, Racca, C., Staley, K. "The role of inhibition in epileptic networks." *Journal of Clinical Neurophysiology*, 32(3), 227–234.
- 2015 Alfonsa, H., **Merricks, E.M.**, Codadu, N.K., Cunningham, M.O., Deisseroth, K., Racca, C., Trevelyan, A.J. "The contribution of raised intraneuronal chloride to epileptic network activity." *Journal of Neuroscience*, 35(20), 7715–7726. PMC4438123.

Peer-Reviewed Book Chapters

- 2024 **Merricks, E.M.**, Schevon, C.A. "Human Single Neuron Recordings in Epilepsy." In: *Jasper's Basic Mechanisms of the Epilepsies* (eds.: Noebels, J.L., Avoli, M., Rogawski, M.A., Vezzani, A., Delgado-Escueta, A.V.). Oxford University Press.

Conference presentations (see above for Talks)

Oral platform presentations

- 2020 **Merricks, E.M.**, Agopyan-Miu, A.H., Smith, E.H., Bozdemir, E., Emerson, R.G., Bateman, L.M., McKhann, G.M., Goodman, R.R., Sheth, S.A., Greger, B., House, P.A., Sosunov, A.A., Trevelyan, A.J., Schevon, C.A. "Interneuronal firing patterns through ictal recruitment in humans." *American Epilepsy Society Annual Meeting. Platform presentation. (Virtual)*
- 2019 **Merricks, E.M.**, Smith, E.H., McKhann, G.M., Goodman, R.R., Sheth, S.A., Greger, B., House, P.A., Trevelyan, A.J., Schevon, C.A. "Action potential alterations and cell-type specific activity through ictal recruitment in humans." *Society for Neuroscience Annual Meeting. Chicago, IL Dynamic platform presentation.*

Poster presentations (listing first-author presentations only)

- 2022 **Merricks, E.M.**, Agopyan-Miu, A.H., Smith, E.H., Sheth, S.A., McKhann, G.M., Schevon, C.A. "Single neuron activity in the mesial temporal lobe during human seizures shows reduction of both excitatory and inhibitory firing." *6th International Human Single Neuron Meeting. UCLA, Los Angeles, CA*
- 2018 **Merricks, E.M.**, Smith, E.H., McKhann, G.M., Goodman, R.R., Sheth, S.A., Greger, B., House, P.A., Trevelyan, A.J., Schevon, C.A. "Spike sorting and cell-type specific activity through ictal recruitment in humans." *4th International Human Single Neuron Meeting. California Institute of Technology, Pasadena, CA*
- 2018 **Merricks, E.M.**, Smith, E.H., McKhann, G.M., Goodman, R.R., Sheth, S.A., Greger, B., House, P.A., Trevelyan, A.J., Schevon, C.A. "Single neuron waveform alterations and cell-type specific activity at seizure onset in humans." *Gordon Conference: Mechanisms of Epilepsy and Neuronal Synchronization. Mount Snow, VT*
- 2017 **Merricks, E.M.**, Smith, E.H., Bateman, L.M., Sheth, S.A., McKhann, G.M., Columbia Comprehensive Epilepsy Center, Schevon, C.A. "Postictal alterations in population single unit spatiotemporal activity." *American Epilepsy Society Annual Meeting. Washington, DC*
- 2017 **Merricks, E.M.**, Trevelyan, A.J., Smith, E.H., Sheth, S.A., McKhann, G.M., Columbia Comprehensive Epilepsy Center, Schevon, C.A. "Longterm and ictal spike shape changes in human microelectrode recordings." *CRCNS PI Meeting. Brown University, Providence, RI*
- 2015 **Merricks, E.M.**, Smith, E.H., McKhann, G.M., Goodman, R.R., Bateman, L.M., Emerson, R.G., Schevon, C.A., Trevelyan, A.J. "Distinct spatial patterns of neuronal firing during human seizures." *British Neuroscience Association. Edinburgh, UK*
- 2013 **Merricks, E.M.**, Emerson, R.G., McKhann, G.M., Goodman, R.R., Weiss, S.A., Schevon, C.A., Trevelyan, A.J. "Analysis of single unit firing patterns preceding human seizures." *Society for Neuroscience Annual Meeting. San Diego, CA*
- 2013 **Merricks, E.M.**, Emerson, R.G., McKhann, G.M., Goodman, R.R., Weiss, S.A., Schevon, C.A., Trevelyan, A.J. "Single unit firing patterns preceding human seizures." *International League Against Epilepsy. Glasgow, UK*
- 2013 **Merricks, E.M.**, Emerson, R.G., McKhann, G.M., Goodman, R.R., Weiss, S.A., Schevon, C.A., Trevelyan, A.J. "Analysis of single unit firing patterns preceding human seizures." *North East Epilepsy Research Meeting. Newcastle upon Tyne, UK*

Code & Software

Languages:	<i>Fluent:</i>	MATLAB; JavaScript; PHP; HTML; CSS
	<i>Proficient:</i>	Python; MySQL; C++
	<i>Familiar:</i>	Swift; Julia; Processing
	<i>Tools/frameworks:</i>	BASH; Z shell (Zsh); Git; Maintaining Linux server
Toolboxes:	<u>NSxFile</u>	Object-oriented neural data file handler
(Selection,	<u>NeuroClass</u>	Object-oriented classes for analyses of neuronal activity
available at	<u>PatientDB</u>	Object-oriented database for managing patient recordings
github.com/	<u>SplitMerge</u>	A fast, modern GUI for spike sorting of single neurons
edmerix)	<u>Pres</u>	A JavaScript framework to develop interactive presentations
	<u>UnitSubclassify</u>	Semi-automatic probabilistic cell-type sub-classification

Mentoring and Training

Post-doctoral co-trainees:

Andrew J. Michalak, M.D.	2021 – 2023	Epilepsy Fellow
<i>Current position: Clinical Assistant Professor, Dept. of Neurology, NYU School of Medicine</i>		
Eda Bozdemir, M.D.	2020 – 2023	Post-Doctoral Research Scientist
<i>Current position: Hospital Resident, Dept. of Neurology, Yale School of Medicine</i>		

Students:

Marcus P. Talke, B.S., M.S.	2023 – 2025	Medical Student
<i>Current position: Medical Student, Columbia University Medical Center</i>		
Alexander H. Agopyan-Miu, M.D.	2020 – 2022	Medical Student
<i>Current position: Neurosurgery Resident, Columbia University Medical Center</i>		
Farhan A. Khan, M.D.	2020 – 2022	Medical Student
<i>Current position: Neurosurgery Resident, Columbia University Medical Center</i>		
Hart P. Fogel, B.A.	2021 (Summer)	Medical Student
<i>Current position: Medical Student, Columbia University Medical Center</i>		
Nav Ravindranath, M.S.	2018 (Summer)	Master's Student
<i>Current position: Senior Software Engineer, Amazon</i>		
Heather Bixler, B.S.	2018	Undergraduate Student
<i>Current position: Medical Laboratory Technician, Columbia University Medical Center</i>		