

Education	2008 Stanford University <ul style="list-style-type: none">▪ Ph.D. in neuroscience
	2002 Princeton University <ul style="list-style-type: none">▪ A.B. in physics, magna cum laude (certificate in biophysics)
Research positions	2018-present. <i>Associate Professor</i> , Princeton Neuroscience Institute and Department of Psychology, Princeton University. 2012-2018. <i>Assistant Professor</i> , Princeton Neuroscience Institute and Department of Psychology, Princeton University. 2008-2012. <i>Postdoctoral Scholar</i> , Bioengineering laboratory of Professor Karl Deisseroth, Stanford University. 2003-2008. <i>Graduate Student</i> , Neuroscience laboratory of Professor Eric Knudsen, Stanford University.
Honors & Awards	2018-2022 NIH CRCNS R01 (co-PI) 2017 Daniel X Freedman Prize for Exceptional Basic Research 2017-2022 NYSCF-Robertson Neuroscience Investigator Award 2017-2022 Simons Collaboration on the Global Brain Investigator 2017-2022 BRAIN Initiative U19 (co-PI) 2017-2020 ARO grant 2015-2019 NIH R01 (from NIMH) 2015 PNI Innovation Award 2014-2016 McKnight Scholars Award in Neuroscience 2014-2017 Co-PI on BRAIN Initiative U01 2014-2015 NARSAD Young Investigator Award 2014 Award from Essig and Enright '82 Innovation Fund 2013-2017 Pew Scholarship in the Biomedical Sciences 2013-2015 Alfred P. Sloan Research Fellowship 2013 Winter Conference Brain Research Travel Award 2012-2017 NIH Director's New Innovator Award 2009-2012 Helen Hay Whitney Foundation Postdoctoral Fellowship 2008 Swartz Travel Fellowship for CoSyNe 2008 2003-2006 NSF Graduate Research Fellowship 2002 Allen G. Shenstone Prize in physics 2002 High honors awarded by the Princeton Department of Physics 2002 Sigma Xi Research Honor Society nomination 2000 Lucent Technology Prize of the Princeton Department of Physics 1998 Edward J. Bloustein Scholarship
Awards to trainees	2013-2015 NSF GRFP to Hessam Akhlaghpour (graduate student) 2015-2017 NSF GRFP to Joel Finkelstein (graduate student) 2015-2017 NSF GRFP to Nathan Parker (graduate student) 2016-2017 EMBO fellowship to Ben Engelhard (postdoctoral fellow) 2016-2018 SCGB fellowship to Malavika Murugan (postdoctoral fellow) 2017-2019 NSF GRFP to Weston Fleming (graduate student) 2017-2019 NRSA fellowship to Courtney Cameron (postdoctoral fellow) 2017-2019 NRSA fellowship to Julia Cox (postdoctoral fellow)

Publications

- Specialized and spatially organized coding of sensory, motor and cognitive variables in midbrain dopamine neurons. Engelhard B, Finkelstein J, Cox J, Fleming W, Koay S, Thiberge S, Daw N, Tank DW, **Witten IB**. *bioRxiv*, Oct 2018. & *In revision at Nature*.
- Increased cocaine motivation is associated with degraded spatial and temporal responses in IL-NAc neurons. Cameron C, Choi JY, Murugan, M, **Witten IB**. *In revision at Neuron*.
- Value representations do not explain movement selectivity in DMS-projecting DA neurons. Lee R, Mattar M, Parker NF, **Witten IB**, Daw N. *bioRxiv*. Oct 2018. & *In review at eLife*.
- An accumulation-of-evidence task using visual pulses for mice navigating in virtual reality. L Pinto, SA Koay, B Engelhard, AM Yoon, B Deverett, SY Thiberge, **Witten IB**, Tank DW, Brody C. *Front Behav Neuro*. Mar 2018.
- Combined social and spatial coding in a descending projection from prefrontal cortex. Murugan M, Park M, Jang HJ, Miller E, Taliaferro J, Cox J, Parker NF, Bhave V, Nectow A, Pillow J, **Witten IB**. *Cell*. Dec 2017.
- Modular Organization of the Brainstem Noradrenaline System Coordinates Opposing Learning States. Uematsu A, Tan B, Sulkes J, Ycu E, Junyent F, Koivumaa J, Kremer E, **Witten IB**, Deisseroth K, Johansen J. *Nature Neuroscience*. 2017. doi:10.1038/nn.4642.
- Dissociated sequential activity and stimulus encoding in striatal neurons during spatial working memory. Akhlaghpour H, Wiskerke J, Choi JY, Taliaferro J, Au J, **Witten IB**. *eLife*. 2016; 10.7554/eLife.19507.
- Linking cholinergic interneurons, synaptic plasticity, and behavior during the extinction of a cocaine-context association. Lee J, Finkelstein J, Choi JY, **Witten IB**. *Neuron*. 2016 May 18.
- Reward and choice encoding in terminals of midbrain dopamine neurons depends on striatal target. Parker NF, Cameron C, Taliaferro J, Choi JY, Lee J, Davidson T, Daw ND, **Witten IB**. *Nature Neuroscience*. 2016 Apr 25. doi: 10.1038/nn.4287.
- Adaptive optimal training of animal behavior. Bak JH, Choi JY, Akrami A, **Witten IB**, Pillow J. *Neural Information Processing Systems*. 2016.1947-1955.
- Gaining on reward prediction errors. Parker NF, **Witten IB**. *Nature Neuroscience*. 2016 Feb 23;19(3):418-9. doi: 10.1038/nn.4246.
- Segregated cholinergic transmission modulates dopamine neurons integrated into distinct functional circuits. Dautan D, Souza AS, Huerta-Ocampo I, Valencia M, Assous M, **Witten IB**, Deisseroth K, Tepper JM, Bolam JP, Gerdjikov TV, Mena-Segovia J. *Nature Neuroscience*. Jun 27 2016. doi: 10.1038/nn.4335.
- Wiring and molecular features of molecular ensembles representing distinct experiences. Ye L, Allen WE, Thompson KR, Tian Q, Hsueh B, Ramakrishnan C, Wang AC, Jennings JH, Adhikari A, Halpern CH, **Witten IB**, Barth AL, Luo L, McNab JA, Deisseroth K. *Cell*. 2016 May 25.
- Coordination of brainwide activity by dopamine neurons. Decot HK, Namboodiri VM, Gao W, McHenry JA, Jennings JH, Lee SH, Katak PA, Jill Kao YC, Das M, **Witten IB**, Deisseroth K, Shih YI, Stuber GD. *Neuropsychopharmacology*. 2016 Sep 14. doi: 10.1038/npp.2016.151.
- Mesolimbic dopamine dynamically tracks, and is causally linked to, discrete aspects of value-based decision making. Saddoris MP, Sugam JA, Stuber

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GD, **Witten IB**, Deisseroth K, Carelli RM. *Biol Psychiatry*. 2015 May 15;77(10):903-11. doi: 10.1016/j.biopsych.2014.10.024. Epub 2014 Nov 13.

Optical suppression of drug-evoked phasic dopamine release. McCutcheon JE, Cone JJ, Sinon CG, Fortin SM, Kantak PA, **Witten IB**, Deisseroth K, Stuber GD, Roitman MF. *Front Neural Circuits*. 2014 Sep 17;8:114. doi: 10.3389/fncir.2014.00114. eCollection 2014.

Positive reinforcement mediated by midbrain dopamine neurons requires d1 and d2 receptor activation in the nucleus accumbens. Steinberg EE, Boivin JR, Saunders BT, **Witten IB**, Deisseroth K, Janak PH. *PLoS One*. 2014 Apr 14;9(4):e94771. doi: 10.1371/journal.pone.0094771.

A major external source of cholinergic innervation of the striatum and nucleus accumbens originates in the brainstem. Dautan D, Huerta-Ocampo I, **Witten IB**, Deisseroth K, Bolam JP, Gerdjikov T, Mena-Segovia J. *J Neurosci*. 2014 Mar 26;34(13):4509-18. doi: 10.1523/JNEUROSCI.5071-13.2014.

A causal link between prediction errors, dopamine neurons, and learning. Steinberg EE, Keiflin R, Boivin JR, **Witten IB**, Deisseroth K, Janak PH. *Nature Neuroscience*. 2013 May 26. doi: 10.1038/nn.3413.

Dopamine neurons modulate neural encoding and expression of depression-related behavior. Tye KM, Mirzabekov JJ, Warden MR, Ferenczi EA, Tsai HC, Finkelstein J, Kim SY, Adhikari A, Thompson KR, Andalman AS, Gunaydin LA, **Witten IB**, Deisseroth K. *Nature*. 2013 Jan 24;493(7433):537-41.

Glutamatergic neurotransmission between the C1 neurons and the parasympathetic preganglionic neurons of the dorsal motor nucleus of the vagus. DePuy SD, Stornetta RL, Bochorishvili G, Deisseroth K, **Witten IB**, Coates M, Guyenet PG. *J Neurosci*. 2013 Jan 23;33(4):1486-97.

Recombinase-driver rat lines: tools, techniques, and optogenetic application to dopamine-mediated reinforcement. **Witten IB***, Steinberg E*, Lee SY, Davidson TJ, Zalocusky KA, Brodsky M, Yizhar O, Cho SL, Gong S, Ramakrishnan C, Stuber GD, Tye K, Janak P, Deisseroth K. *Neuron*. 2011 Dec 8;72(5):721-33.

Optetrode: a multichannel readout for optogenetic control in freely moving mice. Anikeeva P*, Andalman AS*, **Witten IB**, Warden MR, Goshen I, Grosenick L, Gunaydin LA, Frank LM, Deisseroth K. *Nature Neuroscience*. 2011 Dec 4. doi: 10.1038/nn.2992.

Cholinergic interneurons control local circuit activity and cocaine conditioning. **Witten IB***, Lin S*, Brodsky M*, Prakash R*, Diester I, Anikeeva P, Gradinaru V, Ramakrishnan C, Deisseroth K. *Science*. 2010. 330(6011):1677-81.

A dominance hierarchy of auditory spatial cues in barn owls. **Witten IB**, Knudsen PF, Knudsen EI. *PLoS ONE*. 2010; 5(4): e10396.

A Hebbian learning rule mediates asymmetric plasticity in aligning sensory representations. **Witten IB**, Knudsen EI, Sompolinsky H. *Journal of Neurophysiology*. 2008; 100(2): 1067-79.

Dynamic shifts in the owl's auditory space map predict moving sound location. **Witten IB***, Bergan JF*, Knudsen EI. *Nature Neuroscience*. 2006; 9(11):1439-45.

Why seeing is believing: merging auditory and visual worlds. **Witten IB**, Knudsen EI. *Neuron*. 2005; 48(3):489-96.

**Selected
Departmental**

Stanford Neuroscience Institute. Stanford U. Stanford, CA. Mar 2019.
Department of Neuroscience. Einstein. New York, NY. Mar 2019.

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Seminars

Neuroscience Seminar. Cornell Weill. New York, N. Jan 2019.
Simons Center. MIT. Cambridge, MA. Nov 2018.
Neuroscience Seminar. Boston University. Boston, MA. Nov 2018.
Emory/Georgia Tech Kavli Brain Forum. Atlanta, GA. Oct 2018.
Neuroscience Seminar. ICM Institute. Paris, France. May 2018.
Neurobiology Seminar Series. Duke. Durham, NC. Mar 2018.
Department of Physiology. Northwestern. Chicago, IL. Jan 2018.
Neuroscience Center. UNC. Chapel Hill, NC. Nov 2017.
Neuroscience Department. Johns Hopkins. Baltimore, MD. Oct 2017.
Neuroscience Department. U Penn. Philadelphia, PA. Sept 2017.
Neuroscience Department. UC Davis. Davis, CA. May 2017.
Center for Brain Science. Harvard University. May 2017.
Neuroscience Department. Columbia University. May 2017.
Gladstone Institute. San Francisco, CA. Apr 2017.
Neurobiology Department. U Chicago. Apr 2017.
Psychology Department. Cornell University. Feb 2017.
Center for Neural Systems. NYU. Jan 2017.
NIMH Intramural Research Program. Washington, DC. Jan 2017.
Penn Center for Cognitive Neuroscience. U Penn. Nov 2016.
NIDA Intramural Research Program. Baltimore, MD. Nov 2016.
Psychology Department. Rutgers University. May 2016.
Department of Neurobiology seminar. Weizmann Institute. Jan 2016.
Neuroscience seminar. Jenalia Farms Research Campus. July 2015.
Neuroscience seminar. Rockefeller. June 2015.
Behavior, Genetics, and Neuroscience @ Yale. New Haven. Mar 2015.
Neuroscience Seminar. CSHL. Dec 2014.
NIDA Intramural Research Program. Baltimore, MD. June 2012.
Department of Biology. Pasadena, CA. March 2011.
Princeton Neuroscience Institute. Princeton, NJ. March 2011.
Departments of Biology & Physics. Columbia University. March 2011.
Department of Cell & Mol Physiology. Yale. Feb 2011.
Keck Center & Dept of Otolaryngology. UCSF. Feb 2011.
Neuroscience Dept. Columbia. Feb 2011.
Neurobiology Dept. Northwestern. Feb 2011.
Department of Biology. Stanford. Jan 2011.
Department of Biological Sciences. Carnegie Mellon. Jan 2011.
McGovern Institute. MIT. Jan 2011.
Department of Neurobiology. U Chicago. Dec 2010.
Redwood Center. UC Berkeley. March 2008.
Keck Center. UCSF. March 2008.

Selected Conference Talks

Catecholamine GRC 2019. Sunday River, ME. Aug 2019.
Cosyne Main Meeting 2019. Lisbon, Portugal. Feb 2019.
Kavli Workshop. Society for Neuroeconomics. Philadelphia, PA. Oct 2018.
Center for Neuroscience U Pittsburgh Retreat. Wheeling, WV. Sept 2018.
FENS 2018. Berlin, Germany. July 2018.
Giessbachmeeting 2018. Giessbach, Switzerland. May 2018
IBL Annual Meeting. Paris, France. June 2018.
Brain Conference (plenary talk). Rungstedgaard, Denmark. Apr 2018.
Basal Ganglia GRC. Ventura, CA. March 2018.
Symposium at SFN 2017. Washington, DC. Nov 2017.
Neural coding, computation, and dynamics. Capberton, France. Sept 2017.

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SCGB Annual Meeting. NYC, NY. Sept 2017.
OptoDBS. Geneva, Switzerland. June 2017.
McKnight Conference. Aspen, CO. June 2017.
Pew Conference. Santa Barbara, CA. March 2017.
BRAIN Initiative Investigator meeting. Washington, DC. Dec 2016.
Knudsen Festschrift Symposium. Stanford, CA. Sept 2016.
Dopamine 2016. Vienna, Austria. Sept 2016.
Optogenetics GRC. Sunday River, ME. July 2016.
Cosyne Workshop. Feb 2016.
ELSC annual retreat (keynote speaker). Hebrew University. Jan 2016.
Panel speaker at ACNP 2015 annual conference. Dec 2015.
RLDM2015. Edmonton, CA. June 2015.
FENS 2014. Milan, Italy. June 2014.
2014 Genetics Society. Royal Society, London. Dec 2014.
Minisymposium at SfN 2013. San Diego. Nov 2013.
Optogenetics & Chemogenetics. Short Course. SfN. San Diego. Nov 2013.
Winter Conference in Brain Research. Breckenridge, CO. Jan 2013.
The 10th International Catecholamine Symposium. Monterey, CA. Sept 2012.
Society of Biological Psychiatry. Philadelphia, PA. May 2012.
Mathematical Biology Institute, Workshop on Neural Development (Ohio State University). Columbus, OH. April 2009.
 Spotlight Presentation at *Computational and Systems Neuroscience (CoSyNe)*. Salt Lake City, UT. Feb 2008.

Advanced Coursework

Methods in Computational Neuroscience (MBL). Woods Hole, MA. Aug 2005.

Intellectual Property

Optogenetic control of reward related behavior. USPTO filing date: 2011-1104. PCT/US2011/059295

Undergrad & graduate teaching

2018	Basal Ganglia in Health and Disease (NEU475)
2015-	Principles of Neuroscience (NEU201/PSY258). Princeton.
2012-	From Molecules to Mind (NEU501A/B). Princeton.
2012, 2013	Cellular and Systems Neuroscience (NEU408). Princeton.
2006, 2008	Mathematical Tools in Neuroscience (NBIO 218). Stanford.
2005	Computational Neuroscience (NENS 220). Stanford.

Lectures in summer schools

2017	Imaging Structure & Function in the Nervous System. CSHL, NY.
2015-	Neurotech. for Analysis of Neural Dynamics. Princeton, NJ.
2012-2013	Biophysics & Computation in Neurons & Networks. Princeton, NJ.
2012	Cell Biology of Addiction (CSHL). Barcelona, Spain.
2011	Cell Biology of Addiction. CSHL, NY.

Service to Princeton	2012-	Member of committee for PNI graduate student admissions
	2016-2018	Faculty co-organizer of the PNI retreat
	2015-	Participant in lecture series for PNI summer outreach program
	2014-	Member of committee to select CV Starr candidates
	2014-	Member of committee to organize PSY colloquium series
	2015	Chair of committee to oversee PNI viral core
	2015	Participant in Rutgers-Princeton Neuroscience Seminar Series
	2014-2015	Member of committee to select URMs for PNI summer program
	2014	Member of committee to update PNI graduate student curriculum
	2013	Member of committee to select molecular equipment for PNI
2013	Oral presentation for the PSY Graduate Student Reunion	

Service to neuroscience community	2022	Basal Ganglia GRC Chair
	2020	Basal Ganglia GRC Vice-chair
	2018	EAB member for NIH U19 grant at Columbia (BRAIN Initiative).
	2018	Ad-hoc reviewer for NIH study section (LAM).
	2018	General Chair for Cosyne 2018.
	2017	Program Chair for Cosyne 2017.
	2014	Program committee member for Cosyne 2015.
	2014-2015	Reviewer for BRAIN Initiative Study sections.
	2013	Ad-hoc reviewer for NIH study section (MNPS).
	2012-	Reviewer for scientific journals.
2012	Reviewer for Cosyne 2012.	

Thesis students

Undergraduate students: Joshua Taliaferro '15 (CBE), Michelle Park '16 (PSY), Hee Jae Jang '17 (PHY), Jennifer Au '17 (MOL), Duc Nguyen '17 (PSY), Katherine Pizano (MOL), Jessica Chambers (MOL).

Graduate students: Hessam Akhlaghpour '17 (PNI), Joel Finkelstein '18 (PSY), Clare Choi (PSY), Nathan Parker (PNI), Lili Cai (PNI), Weston Fleming (PNI), Ellia Miller (PNI), Anna Zhukovskaya (PNI).

Committee member for the following graduate students: Miriam Bocarsly '12 (PSY), Ann Duan '15 (PNI), Maya Opendak '15 (PSY), Kevin Miller '17 (PNI), Gary Kane '18 (PSY), Tom Pisano (MOL), Brandy Briones (PSY), Diksha Gupta (PNI), Nick Roy (PNI), Tyler Boyd-Meredith (PNI).