

# xaq pitkow

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## POSITIONS

### **Baylor College of Medicine**

Assistant Professor, Department of Neuroscience 2013–

Co-director, Center for Neuroscience and Artificial Intelligence 2016–

### **Rice University**

Assistant Professor, Dept. of Electrical and Computer Engineering 2013–

### **Princeton University**

2015

C. V. Starr visiting faculty fellow, Princeton Neuroscience Institute

### **University of Rochester**

2010–2013

Postdoctoral Research Scientist (advisors: Alexandre Pouget, Greg DeAngelis)

### **Columbia University**

2007–2010

Postdoctoral Research Fellow, Center for Theoretical Neuroscience

## EDUCATION

### **Harvard University**

1999–2006

### **Ph.D. in Biophysics**

thesis: *Optimality Principles for the Visual Code* (advisor: Markus Meister)

### **Princeton University**

1993–1997

### **A.B. in Physics**, magna cum laude

thesis: *how to simulate Quantum physics on a Quantum computer using a Quantum lattice gas on a nonuniformly Quantized space* (advisor: Washington Taylor IV)

## PREPRINTS

Orhan AE, **Pitkow X** (2017). Skip connections eliminate singularities. *arXiv*: 1701.09175.

Lakshminarasimhan K, Pouget A, DeAngelis G, Angelaki D, **Pitkow X** (2017). Inferring decoding strategies for multiple correlated neural populations. *bioRxiv* 108019.

## PUBLICATIONS

**Pitkow X**, Dora Angelaki (2017). Inference in the brain: Statistics flowing in redundant population codes. *Neuron* (in press).

**Pitkow X** (2016). Probability by time. *Neuron*. 92(2): 275–277.

Kim HG, **Pitkow X**, Angelaki D, DeAngelis G (2016). A simple approach to ignoring irrelevant variables by population decoding based on multisensory neurons. *J Neurophysiol.* 116: 1449–67.

Raju RV, **Pitkow X** (2016). Inference by reparameterization in neural population codes. *Advances in Neural Information Processing Systems*.

**Pitkow X**, Liu S, Angelaki DE, DeAngelis GC, Pouget A (2015). How can single sensory neurons predict behavior? *Neuron* 87(2): 411–423.

**Pitkow X**, Meister M (2015). Neural computation in sensory systems. In *The Cognitive Neurosciences V*. Gazzaniga MS, Mangun GR, eds., MIT Press.

Moreno-Bote R, Beck J, Kanitscheider I, **Pitkow X**, Latham P, Pouget A. Information-limiting correlations (2014). *Nature Neuroscience* 17(10):1410–17.

**Pitkow X** (2012). Compressive neural representation of sparse, high-dimensional probabilities. *Advances in Neural Information Processing Systems*.

Beck J, Ma WJ, **Pitkow X**, Latham P, Pouget A (2012). Not noisy, just wrong: the role of suboptimal inference in behavioral variability. *Neuron* 74(1): 30–9.

**Pitkow X**, Meister M (2012). Decorrelation and efficient coding in retinal ganglion cells. *Nature Neuroscience.* 15(4): 628–35.

**Pitkow X** (2011). What is an image? In Elkins J, Naef M (Eds.) *What Is an Image?* Penn State University Press.

**Pitkow X**, Ahmadian Y, Miller KD (2011). Learning unbelievable probabilities. *Advances in Neural Information Processing Systems*.

**Pitkow X** (2010). Exact feature probabilities in images with occlusion. *Journal of Vision* 10(14): 42.

**Pitkow X**, Sompolinsky H, Meister M (2007). Visual acuity in the presence of fixational eye movements. *PLoS Biology*, 5(12): e331.

## FUNDING

NIH BRAIN U01, A unified cognitive network model of language. Co-I (PI: Tandon) 2016–2019

Sanderford Foundation, Compressive representation of high-dimensional probabilities. PI. 2016

NSF CAREER: Distributed nonlinear neural computations. PI. 2016–2021

IARPA MICrONS, Reverse engineering the neocortex. Co-PI (with Tolias).  
Key personnel include Baraniuk, Bethge, Patel, Paninsky, Allen Institute,  
Seung, Siapas, Urtasun, Xu, Zemel. 2016–2021

NIH BRAIN U01, Dynamic network computations for foraging in an  
uncertain environment. Co-PI (with Angelaki, Dragoi, Schrater). 2016–2019.

NIH R01 DC014589, Brain networks of noun generation. Co-I (PI: Tandon).  
2016–2021

NIH R01 DC004260, Neural mechanism of vestibular function. Co-I (PI:  
Angelaki). 2015–2020

NIH R21 DC014518-01, Cortical feedback to the vestibular brainstem. Co-PI  
(with Angelaki). 2015–2017

Simons Collaboration on the Global Brain Research Award. Dynamic neural  
computations for foraging. Co-PI (with Angelaki). 2014–2017

NSF BRAIN EAGER. Flashes of insight: Revealing dynamic mental models  
during rodent virtual reality foraging. Co-PI (with Angelaki). 2014–2016

McNair Foundation grant. 2013–2017

**HONORS** NSF CAREER Award 2016–2021  
McNair Scholar 2013–present  
C. V. Starr Visiting Faculty Fellowship, Princeton 2015  
Sloan-Swartz Fellow in Theoretical Neurobiology 2007–2009  
National Science Foundation Fellowship in Biophysics 1998–2001  
Allen G. Shenstone Prize (Princeton Physics Thesis Prize) 1997

**REFEREEING** *Journals:* Neuron, Nature Neuroscience, Current Biology, PLoS  
Computational Biology, Frontiers in Computational Neuroscience,  
Neurocomputing, Neural Computation, Journal of Neurophysiology,  
Cerebral Cortex, Journal of Computational Neuroscience, Vision Research;  
*Conferences:* Computational and Systems Neuroscience, Neural Information  
Processing Systems

**TEACHING** *Instructor, Rice University*  
Theoretical Neuroscience: Networks and Learning 2014–2017  
Introduction to Computational Neuroscience 2017  
Computational Companion Laboratory 2016  
Deep Learning 2015  
*Guest lecturer, Rice University*

	Introduction to Neuroscience	2014–2016
	<i>Guest lecturer, Baylor College of Medicine</i>	
	Systems Neuroscience	2014–2017
	<i>Guest lecturer, University of Rochester</i>	
	Learning and Plasticity	2012
	Intro to Computational Neuroscience	2011
	<i>Guest lecturer, Columbia University</i>	
	Computational Methods in Neuroscience	2008–2010
	<i>Teaching Fellow, Harvard University</i>	
	Computational Neuroscience	2003
	Function of Neural Circuits	2002
	Introduction to Molecular Biology	2001
	Complex Analysis	2000
<b>SERVICE</b>	COSYNE (Computational and Systems Neuroscience)	
	Organizing Committee, Communications Chair	2014–2017
<b>OUTREACH</b>	Roberts Elementary School, Houston	2014–2016
	University of Texas at Austin, School of Architecture	2007–2014
	Mott Hall 7th grade mentor, Harlem, New York City	2007–2009
	Art Institute of Austin	2009–2010
	School of the Museum of Fine Arts, Boston	2006