

John Widloski

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Li Ka Shing

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University of California, Berkeley

Education

Ph.D. in Physics, 2015

University of Texas, Austin

Thesis: Grid cell attractor models: Development and implications

B.S., in Physics 2008 (w/ minor in mathematics)

Georgia Institute of Technology

Publications

1. **Widloski, J.**, Kleinman, M & Foster, D. Single cell measures of tuning to imagined position during replay shows enhanced spatial coding and preserved neural variability. (*in prep*).
2. **Widloski, J.** & Foster, D. Flexible rerouting of hippocampal replay sequences around changing barriers in the absence of global place field remapping. *Neuron*, 110 (2022).
Commentaries: Epsztein, J. (*Nature*), McNaughton & Saxena (*Neuron*)
3. **Widloski, J.**, Marder, M. & Fiete, I. Inferring circuit mechanisms from sparse neural recording and global perturbation in grid cells. *Elife*, 7 (2018).
4. **Widloski, J.** & Fiete, I. A model of grid cell development through spatial exploration and spike time-dependent plasticity. *Neuron*, 83 (2014).
5. Vainchtein, D., **Widloski, J.** & Grigoriev, R. Resonant mixing in perturbed action-action-angle flow. *Phys. Rev. E*, 78 (2008).
6. Vainchtein, D., **Widloski, J.** & Grigoriev, R. Resonant chaotic mixing in a cellular flow. *Phys. Rev. Lett.*, 99 (2007).
7. Vainchtein, D., **Widloski, J.** & Grigoriev, R. Mixing properties of steady flow in thermocapillary driven droplets. *Phys. Fluids*, 19 (2007).

Invited Reviews

1. **Widloski, J.** & Foster, D. Spoiled for choice, pressed for time. *Nature Neuroscience*, **21** (2018).

Book Chapters

1. **Widloski, J.** & Fiete, I. How does the brain solve the computational problems of spatial navigation? *Space, Time, and Memory in the Hippocampal Formation*. Eds. D. Derdikman and J. Knierim. Springer-Verlag (2013).

Awards

1. Burroughs Wellcome Fund Collaborative Research Travel Grant (\$4,460), 2012
2. Biedenharn Fellowship (\$10,000), University of Texas, Austin, Department of Physics, 2008
3. Outstanding Oral Presentation, Undergraduate Research Opportunities Program, Georgia Institute of Technology, 2007

Research Experience

Postdoctoral Fellow, Fall 2017 - present

University of California, Berkeley

Department of Psychology

PI: David Foster

Experimental investigation of how replay sequences respond to changing spatial contingencies.

Postdoctoral Fellow, Fall 2015 - Fall 2017

Johns Hopkins University
Department of Neuroscience
PI: David Foster

Experimental investigation of how replay sequences respond to changing spatial contingencies.

Graduate Research Assistant, Fall 2009 - Fall 2015

University of Texas, Austin
Department of Neuroscience and Department of Physics
Advisors: Ila Fiete, Michael Marder

Developing theoretical and computational models of grid cells using attractor networks.

Graduate Research Assistant, Fall 2008 - Fall 2009

University of Texas, Austin
Department of Physics
Advisors: Harry Swinney, Mark Mineev-Weinstein, Michael Marder

Computational modeling of the problem of Laplacian growth of fluids in narrow channels.

Undergraduate Research Assistant, Fall 2005 - Fall 2008

Georgia Institute of Technology
Department of Physics
Advisors: Roman Grigoriev, Dmitri Vainchtein

Computational and theoretical modeling of mixing in micro-confined volumes.

Teaching Experience

Instructor, Fall 2018

University of California, Berkeley
Department of Neuroscience
Neuro boot camp: History of Animal Experiments in Psychology

Teaching Assistant, Fall 2014

University of Texas, Austin
Department of Neuroscience
UGS 303 Building Brains: Mind, Brains, and Computers

Lab Instructor, Fall 2008

University of Texas, Austin
Department of Physics
PHYS - 101L Mechanics

Teaching Assistant, Fall 2005 - Fall 2007

Georgia Institute of Technology
Department of Mathematics
MATH 1502: Calculus II (Single variable calculus, Linear algebra)
MATH 2401: Calculus III (Multivariate calculus)
MATH 2552: Differential Equations

Mentoring Experience

Lucy Wan, Spring 2022

University of California, Berkeley
Software coding project: *New software for tracking multiple animals simultaneously under different lighting conditions from live video feed.*

Mariya Leshchuk, Fall 2019 - Fall 2021

University of California, Berkeley

Data analysis project: *Investigating effects of changing spatial contingencies on sharp wave ripple rates in the Krech maze.*

Jasmine Le, Spring 2019

University of California, Berkeley

Modeling project: *Modeling hippocampal replay with continuous attractor networks and firing rate adaptation.*

Berk Gercek, Fall 2014

University of Texas, Austin

Modeling and theoretical analysis project: *Stability of multi-population grid cell attractor models.*

Conferences and Workshops

Society for Neuroscience, 2022

San Diego, CA

Poster presentation I: *Sharp-wave ripples occur selectively during replay of particular locations and paths associated with place field overrepresentation in an open field maze*

Poster presentation II: *Precise behavioral performance within an imprecise hippocampal code on a dynamics, multi-step linear maze*

Barcelona Summer School for Advanced Modeling of Behavior, 2022

Barcelona, Spain

COSYNE, 2022

Lisbon, Portugal

Poster presentation: *Single cell measures of tuning to imagined position during replay shows enhanced spatial coding and quenched neural variability.*

COSYNE, 2020

Denver, CO

Poster presentation: *Hippocampal replay rapidly and repeatedly adapts to reconfigurations of barrier wall structure in a changing complex maze.*

Society for Neuroscience, 2019

Chicago, IL

Poster presentation: *Hippocampal replay rapidly and repeatedly adapts to reconfigurations of barrier wall structure in a changing complex maze.*

COSYNE, 2015

Denver, CO

Poster presentation: *A feasible probe of the detailed microcircuit architecture of grid cells.*

Society for Neuroscience, 2014

Washington, D. C.

Poster presentation: *A feasible probe of the detailed microcircuit architecture of grid cells.*

Society for Neuroscience, 2013

San Diego, CA

Poster Presentation: *Spike time-dependent synaptic plasticity can organize a recurrent network of principal cells and interneurons to generate 2-d grid cell responses and achieve path-integration functionality.*

Society for Neuroscience, 2012

San Diego, CA

Poster Presentation: *Spike time-dependent synaptic plasticity can organize a recurrent network to generate grid cell responses*

Society for Neuroscience, 2010

San Diego, CA

Poster Presentation: *Spike time-dependent synaptic plasticity can organize a recurrent network to generate grid cell responses*

Complex Motion in Fluids, DTU Summer School, 2009

Krogerup, Humbelaek (Copenhagen)

Poster Presentation: *Selection rules in Laplacian growth*

Center for Nonlinear Science, 2009

Los Alamos National Lab

Host: Mark Mineev-Weinstein

Lecture presentation: *Selection rules in Laplacian growth*

Complex Motion in Fluids, DTU Summer school, 2007

Krogerup, Humbelaek (Copenhagen)

Poster Presentation: *Mixing by steady flows in thermocapillary-driven microdroplets*

SIAM Conference on Applications of Dynamical Systems, 2007

Snowbird, UT

Lecture Presentation: *Mixing by steady flows in thermocapillary-driven microdroplets*