



OpenScope 2025-2026 Annual Report

Principal Investigators

Jerome Lecoq

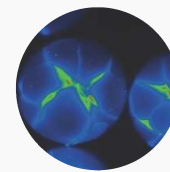
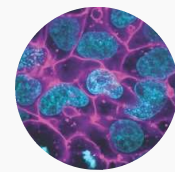
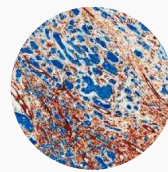
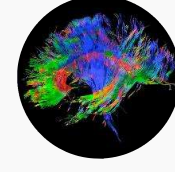
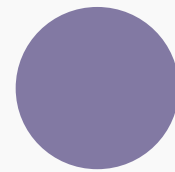
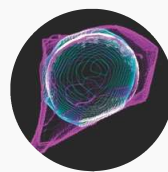
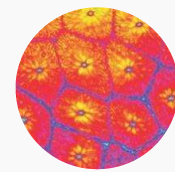
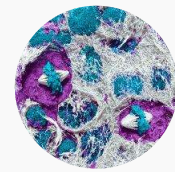
Christof Koch



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NEURAL DYNAMICS



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About OpenScope

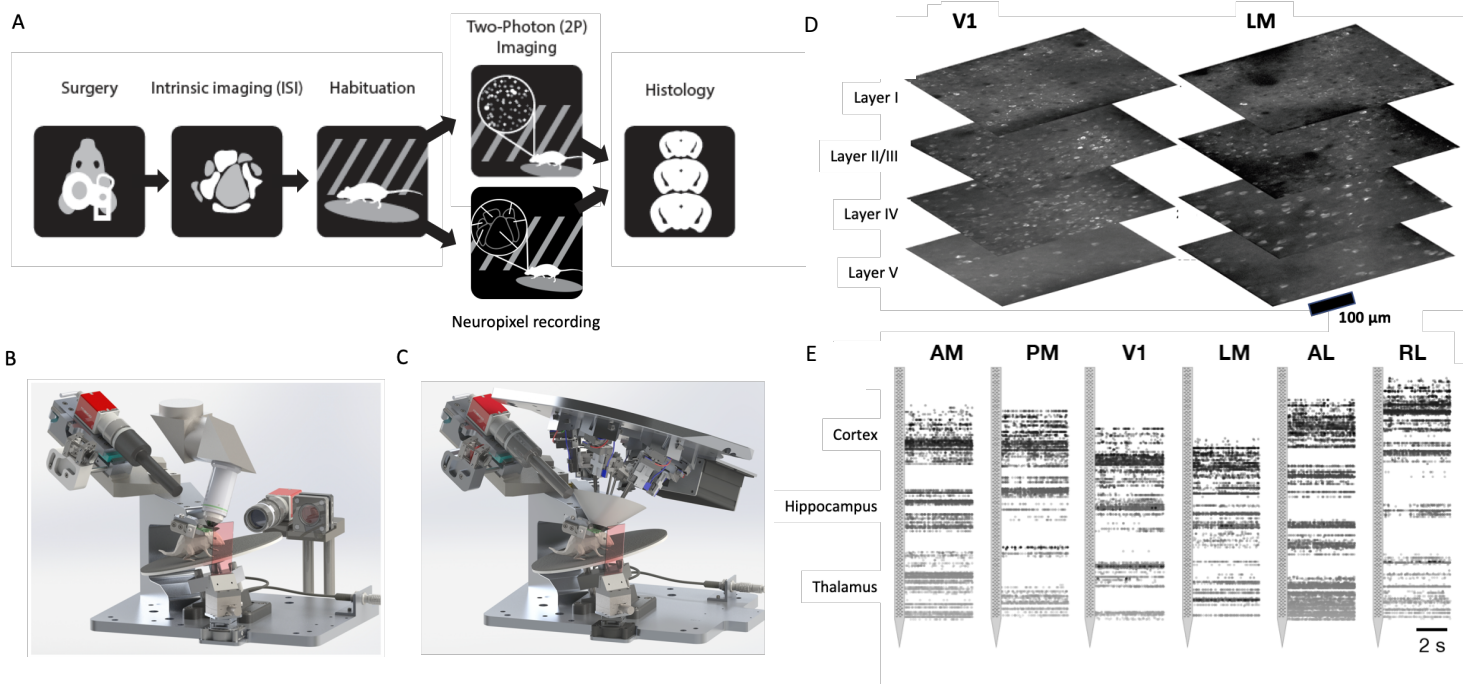


OpenScope

OpenScope opens the Allen Brain Observatory pipeline to the community—enabling theoretical, computational, and experimental scientists to test sophisticated hypotheses on brain function in a program analogous to astronomical observatories that survey the night sky.

Once a year, OpenScope invites external scientists to propose experiments to be run on the Allen Institute pipeline. These proposals are competitively reviewed for scientific merit and feasibility by a panel of leading experts from the international community. If selected, the proposed experiments are performed with the Allen Institute's verified, reproducible, and open protocols for *in vivo* Neuropixels electrophysiology or two-photon calcium imaging. Any resulting data is made freely available to the selected applicants and to the broader community. The goal is to lower barriers to testing new hypotheses about brain function, bring new computational and theoretical talents to the field, and enhance the reproducibility of results in brain research—thereby accelerating progress toward an integrated understanding of neural activity in health and disease.

The OpenScope Program is supported by the National Institute Of Neurological Disorders And Stroke of the National Institutes of Health under Award Number U24NS113646. (This content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health)



Two End-to-End data pipelines

The OpenScope platform tests novel hypotheses on brain function using an established data collection pipeline. The platform utilizes cutting-edge behavioral training, Neuropixels recordings, and two-photon calcium imaging. The resulting data is curated, standardized, and disseminated with open standards and is eventually released to the public after a one-year embargo.

The OpenScope program provides the community access to:

- End-to-end standardized experimental platform including brain surgery, animal training, neuronal recordings (*in vivo* Neuropixels electrophysiology or two-photon calcium imaging), and brain reconstruction.
- Animal behavior training to test novel hypotheses of brain function.
- Data standardization and sharing via NWB files in the cloud.
- Datasets that are cross-referenced through shared standards and data access, allowing further meta-analysis by the community.
- Dissemination of results as selected teams analyze and submit their outcomes to bioRxiv and peer-reviewed journals.

Scientific outcomes

Project selected in 2024-2025

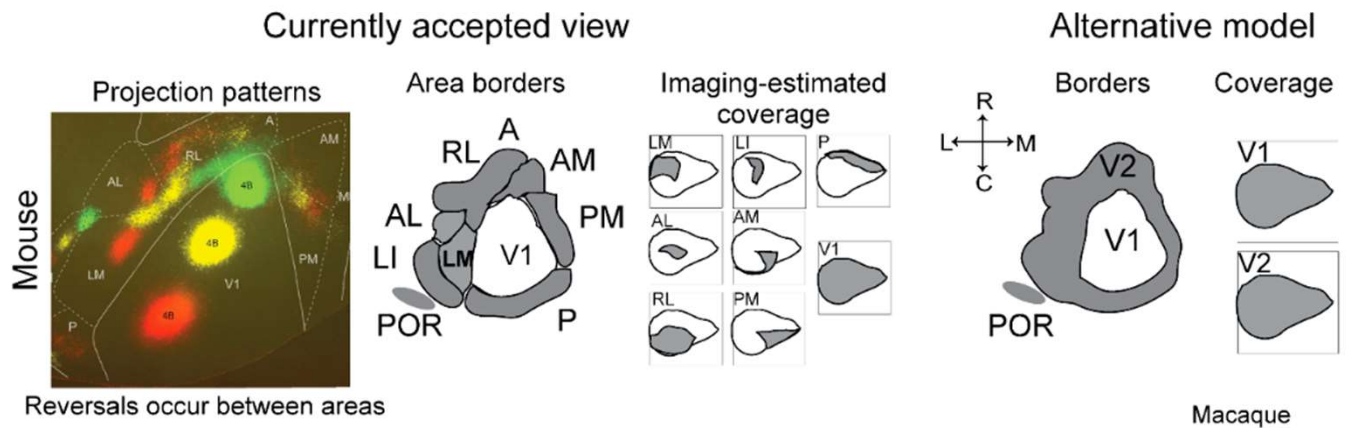
“A critical re-examination of the mouse visual system”

Neuropixels / Two-photon

Madineh Sedigh-Sarvestani - Cornell University / HHMI

Declan Rowley - UCLA

IE



This project proposes an alternative hypothesis regarding how the mouse visual system is organized.

This project was selected in January 2025. The data collection started in the spring of 2025 and ended in the winter of 2026.

In September 2026, before the end of its embargo, the external scientific team decided to release their dataset to the community along with a new publication on bioRxiv.

To learn more :

A single complex V2 as an alternative hypothesis for the organization of mouse higher visual cortex

Declan P. Rowley, Mary Beth Cassity, Jimin Park, Ryan Gillis, Julien Corbo, CaseyLennon-Jones, Severine Durand, R.\Carter Peene, Avalon Amaya, Hannah Belski, IvanaBussi, Tye Johnson, Jaimie Kenney, Henry Loeffler, Robyn Naidoo, Ben Ouellette, AlexStearns, Jackie Swapp, Madeline Tom, Julie Weber, Josh Wilkes, Allison Williford, ShiellaCaldejon, Peter A. Groblewski, Jérôme A. Lecoq, Madineh Sedigh-Sarvestani

bioRxiv 2024.10.10.617533; doi: <https://doi.org/10.1101/2024.10.10.617533>

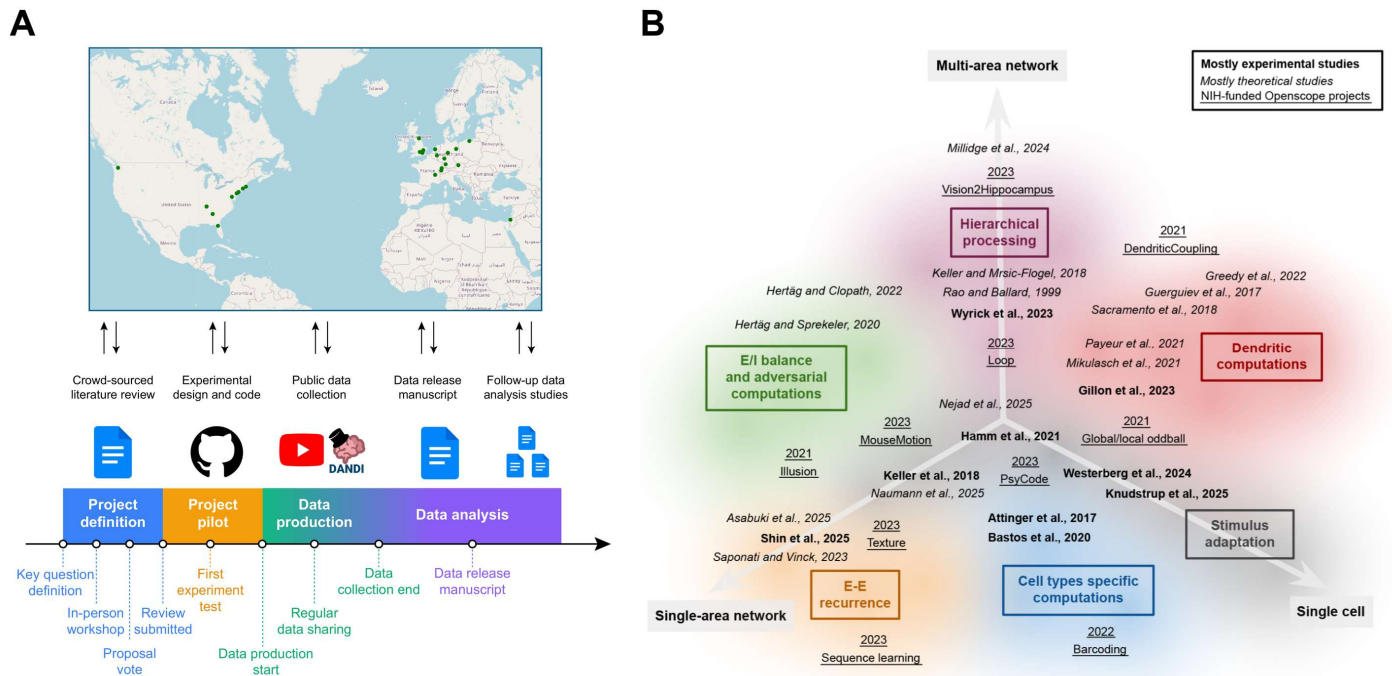
Slide 6

IB1

@Jerome we'll need some project updates here

Ivana Bussi, 2026-10-06T23:53:36.911

Predictive processing community project



OpenScope's predictive-processing community project showed that the observatory could support a community in deciding what to measure, not only execute individual proposals. Over two years, participants jointly reviewed evidence, designed experiments, and analyzed newly acquired data (see map in **A**)

Through a 2024 workshop at MIT and a global collaboration, we synthesized advances in predictive processing within the sensory cortex. Predictive processing theorizes that the brain continuously predicts sensory inputs, refining neuronal responses by highlighting perception by prioritizing prediction errors.

In 2026, our review (see **B**) was submitted to Physiological Review and is ongoing its second revision (Current manuscript: <https://arxiv.org/abs/2504.09614>).

Weekly discussions, a workshop, and a community vote turned that synthesis into coordinated Neuropixels, mesoscope, and SLAP2 measurements.

Those experiments were conducted in 2026 and are now available on DANDI. We are now drafting a data release manuscript in collaboration with this distributed network of scientists: https://allenneuraldynamics.github.io/openscope_p3_data_release_paper/

- Project was defined **in the open**, on a public forum
- No embargo: All data immediately available.
- Data analysis can be performed by anyone in community.

Slide 7

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Update needed [@Jerome Lecoq]

Ivana Bussi, 2026-10-07T16:59:35.378

Publications and preprints linked to OpenScope projects

Journal articles (2)

Koch C et al. (2022). Next-generation brain observatories. *Neuron* 110(22):3661-3666. doi:[10.1016/j.neuron.2022.09.033](https://doi.org/10.1016/j.neuron.2022.09.033)

Shin H et al. (2025). Recurrent pattern completion drives the neocortical representation of sensory inference. *Nature Neuroscience* 28:2319-2329. doi:[10.1038/s41593-025-02055-5](https://doi.org/10.1038/s41593-025-02055-5)

Preprints (6)

Aizenbud I et al. (2025; revised 2026). Neural mechanisms of predictive processing: a collaborative community experiment through the OpenScope program. arXiv preprint, v2. doi:[10.48550/arXiv.2504.09614](https://doi.org/10.48550/arXiv.2504.09614)

Sennesh E et al. (2025). Ubiquitous predictive processing in the spectral domain of sensory cortex. eLife reviewed preprint, v1. doi:[10.7554/eLife.109053.1](https://doi.org/10.7554/eLife.109053.1)

Westerberg JA et al. (2026). Hierarchical substrates of prediction in visual cortical spiking. bioRxiv preprint, v5. doi:[10.1101/2024.10.02.616378](https://doi.org/10.1101/2024.10.02.616378)

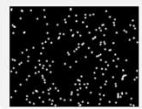
De Filippo R et al. (2026). Psilocybin collapses visual change detection and drives cortical dynamics toward a state of surprise. bioRxiv preprint, v1. doi:[10.64898/2026.08.21.745777](https://doi.org/10.64898/2026.08.21.745777)

Rowley DP et al. (2026). A single complex V2 as an alternative hypothesis for the organization of mouse higher visual cortex. bioRxiv preprint, v4. doi:[10.1101/2024.10.10.617533](https://doi.org/10.1101/2024.10.10.617533)

Purandare CS et al. (2026). Moving object generates topographic responses in the majority of entorhinal neurons. bioRxiv preprint, submitted October 5, 2026. doi:[10.64898/2026.10.05.756590](https://doi.org/10.64898/2026.10.05.756590)

Software and executable analyses

Ager K et al. (2026). OpenScope Databook: Mystified and Modernized, v2.1.0. Zenodo. doi:[10.5281/zenodo.15359874](https://doi.org/10.5281/zenodo.15359874)

	Vismo Random-dot motion probes how visual areas and cell types integrate object and background motion. 16 mice / 91 sessions DANDI 001196	Sessions Databook DANDI Stimulus code Webinar
	Texture Comparing visual texture representations during passive viewing and learned discrimination. 14 mice / 140 sessions DANDI 001461	Sessions Databook DANDI Stimulus code Webinar
	Loop How prior experience with natural-movie sequences shapes later visual representations. 14 mice / 14 sessions DANDI 001191	Sessions Databook DANDI Stimulus code Webinar
	PsyCode Visual responses and change-detection behavior before and after psilocybin administration. 10 mice / 20 sessions DANDI 001417	Sessions Databook DANDI Stimulus code Webinar

Data releases

Between May and August 2026, following our one-year embargo policy, we released four datasets on the DANDI Archive.

- **Dataset 1196:** Allen Institute OpenScope - Vismo
- **Dataset 1461:** Allen Institute OpenScope – Texture
- **Dataset 1191:** Allen Institute OpenScope – Loop
- **Dataset 1417:** Allen Institute OpenScope – Psycode

In addition to the detailed descriptions on Dandi Archive, we updated the OpenScope DataPortal (<https://openscopedatafront.web.app>) to share detailed meta-data for all recorded sessions, along with additional project descriptions and comprehensive Jupyter notebooks. Those resources were created in collaboration with the 2024-2025 OpenScope teams and extensively described during our Data Release Webinar (see **Outreach** section).

Outreach





Scientific workshop

We organized a two-hour online webinar on March 4, 2026, to showcase datasets generated through the OpenScope program. The webinar featured four previous OpenScope awardees, who presented their experimental designs and the datasets they collected and released to the community. Attendees also learned about the OpenScope Databook, a resource designed to support data reuse within and across DANDI projects.

Program:

Time (PT)	Topic	Speaker(s)
8:00–8:30 am	Intro to OpenScope program	Jérôme Lecoq (Allen Institute)
8:30–9:00 am	Vismo – Project Presentation	Julia Veit (University of Bremen)
9:00–9:30 am	Psycode – Project Presentation	Roberto de Filippo (Humboldt University of Berlin); Torben Ott (Humboldt University of Berlin)
9:30–10:00 am	Loop – Project Presentation	Noa Barnea (Weizmann Institute of Science); Daniel Deitch (Weizmann Institute of Science)
10:00–10:30 am	Texture – Project Presentation	Federico Bolaños (University of British Columbia); James Gardner (University of Calgary)
10:30–11:00 am	Overview of the OpenScope Databook	Carter Peene (Allen Institute)
11:00–11:15 am	Closing remarks	Jérôme Lecoq (Allen Institute)

The webinar recording is available online: [OpenScope Webinar Recording](#).



Summer School

The OpenScope team participated in NeuroDataReHack, a summer school organized by the DANDI and NWB teams. The school was held at Janelia farm during the week of July 12th

OpenScope was showcased among the hundreds of datasets available through the DANDI archive. We presented the program, along with the OpenScope Databook. Several teams built their project on top of OpenScope datasets. Our community project on predictive processing as well as our recently released dataset on Psilocybin were highlight of the course.



NeuroDataReHack continues as the [NeuroData AI Summer School](https://nwb.org/events/hck26-2026-janelia-ndrh/). Applications for the 2027 school at HHMI-Janelia are open until January 29, 2027.

To see the program: <https://nwb.org/events/hck26-2026-janelia-ndrh/>

OpenScope Scientific Steering Committee

External Steering Committee Members



Natalie Trzcinski
Program Director at
National Institute of
Neurological Disorders
and Stroke (NINDS)



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MIT

Assistant Professor
Harvard Medical School



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Learning and Intelligent
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University Professor
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Assistant Professor
Department of Biological
Structure
University of Washington



Joel Zylberberg
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York University



Adrienne Fairhall
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Adjunct Professor
Department of Physics

Adjunct Professor
Department of Applied Mathematics

Co-Director
UW Computational Neuroscience Center
University of Washington

Allen Institute OpenScope Leadership



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Meritorious Investigator
Brain & Consciousness
The Allen Institute

Co-PI on OpenScope
Award



Jerome Lecoq
Associate Investigator
Neural Dynamics Program
The Allen Institute

Co-PI on OpenScope award



THANK YOU

We wish to thank the Allen Institute founder, Paul G. Allen, for his vision, encouragement, and support.

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