Postdoctoral Positions
Optical Neurotechnology Development and Systems Neuroscience

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The emergence of new optical technologies combined with advanced computational and molecular tools have led to major advances of our understanding of how the circuitry and dynamics of neuronal populations give rise to brain functions and behavior. Our lab has been focused on the **development and application of advanced optical imaging** technologies to advance neuroscience. Over the last years, we have developed a portfolio of optical technologies that allow for **large-scale and whole-brain optical recording and manipulation of neuroactivity** at high spatiotemporal resolution across model systems with an emphasis on development of imaging tools for highly scattering brain tissues [1-9]. In our most recent imaging technology, we have demonstrated that **up to 1 million neurons** distributed across different depths of both hemispheres of the mouse cortex can be recorded at single cell resolution [9].

How would you push microscopy and imaging technologies further, and which fundamental questions in neuroscience would you be able to uniquely address with such capabilities?

We are welcoming applications from creative, highly motivated, and ambitious candidates interested in pursuing projects based on their own ideas or within existing lines of work in the lab in either of the above areas.

Positions

Depending on candidates' background, experience, and interest, positions are available in one or more of the following projects:

- **Development of new high-speed optical methods for large scale recording of neuroactivity**
- **Imaging through scattering media**
- **Multi-regional representation and processing of information across the mammalian cortex**
- **Applications of new conceptual ideas from quantum optics and ultrafast optics to bio-imaging and biology**

Qualifications

- Highly motivated, ambitious, and creative
- Ph.D. in physics, (quantum) optics, optical engineering, electrical engineering or systems neuroscience
- Prior experimental work in one and more of these areas is highly desirable: designing and constructing optical setups or instruments, working experience with ultra-fast laser systems and optics, fiber optics, AMO physics, light/matter interaction, statistical data analysis, systems neuroscience, *in vivo* imaging and animal experience (craniotomy surgery, rodent behavior)
- Basic programming skills (e.g. Matlab, Python, LabView)
- Excellent organizational and communication skills, ability to work in an interdisciplinary team and willingness to work outside their core expertise

How to apply

Interested candidates should send their **CV** including **list of** their **publications** as well as the contact information of at least **two references** to vaziriadmin@rockefeller.edu For more information please visit our website: https://vaziri.rockefeller.edu/

References

1. Andrasfalvy, B., et al., *Two-photon Single Cell Optogenetic Control of Neuronal Activity by Sculpted Light.* **PNAS**, (2010). 107.
2. Losonczy, A., et al., *Network mechanisms of theta related neuronal activity in hippocampal CA1 pyramidal neurons.* **Nature Neuroscience**, (2010). 13(8): p. 967-72.
3. Schrodel, T., et al., *Brain-wide 3D imaging of neuronal activity in Caenorhabditis elegans with sculpted light.* **Nature Methods**, (2013). 10(10): p. 1013-1020.
4. Prevedel, R., et al., *Simultaneous whole-animal 3D imaging of neuronal activity using light-field microscopy.* **Nature Methods**, (2014). 11(7): p. 727-730
5. Prevedel, R. et al., *Fast volumetric calcium imaging across multiple cortical layers using sculpted light.* **Nature Methods,** (2016) 13, 1021-1028
6. Skocek,O., et al., *High-speed volumetric imaging of neuronal activity in freely moving rodents*. **Nature Methods,** (2018). 15, 429–432.
7. Nöbauer, T., et al., *Video rate volumetric Ca2+ imaging across cortex using seeded iterative demixing (SID) microscopy*. **Nature Methods**, (2017). 14, 811-81.
8. Weisenburger, S. et al., *Volumetric Ca2+ Imaging in the Mouse Brain using Hybrid Multiplexed Sculpted Light (HyMS) Microscopy*. **Cell** (2019), *in press*
9. Demas, J., et al., High-Speed, Cortex-Wide Volumetric Recording of Neuroactivity at Cellular Resolution using Light Beads Microscopy, Nature Methods (2021), *in revision* (bioRxiv preprint: https://www.biorxiv.org/content/10.1101/2021.02.21.432164v2)