Postdoc positions:
Development of Advanced Neuro-Imaging Technologies

The Rockefeller University, New York, NY

Background

Over the last decade neuroscience has been revolutionizing our understanding of the brain. A major driver underlying this transformation has been the emergence of new optical technologies combined with advanced statistics and machine learning tools. Our lab has a major focus on the development and application of advanced optical imaging technologies with applications for systems neuroscience.

What we do

We have pioneered optical techniques that allow near-simultaneous stimulation [1, 2] and functional imaging of neuronal activity on the whole-brain level at single-cell level in small model organisms [3, 4] and more recently in the more scattering rodent brain, both by using multi-photon excitation [5] and computational imaging approaches [6,7]. Thereby, we are also for the first time in a unique position to discover the underlying principle of some of the most fundamental questions about the brain: How does the brain represent sensory inputs? How does the spatiotemporal dynamics of neuronal populations generate animal behavior? How does the brain make decisions? We are addressing these questions in model organisms including larval zebrafish and rodents.

Positions

We are currently looking for several of highly motivated and ambitious candidates for the following projects:

- **Development of new optical methods for large scale functional recoding of neuronal circuits**
- **Imaging and optical detection through scattering media**
- **Development of computational imaging techniques and big-data analysis using machine learning & advanced statistics**
- **Application of quantum optics and ultrafast optics to biology**

Qualifications

Ideally, the candidate should have the following profile:

- Highly motivated, ambitious and passionate about science
- PhD / Masters in **physics,** ideally with focus on **optics, quantum optics, optical / electrical engineering or neuroscience**
- Basic programming skills (e.g. Matlab, Python, LabView)
- Experience with one and more of these areas would be highly desired: optics or optical engineering, ultra-fast laser optics, fiber optics, AMO physics/light matter interaction, RF electronics, craniotomy surgery, rodent behavioral experiments, large-scale data processing and cluster computing
- Ability to work in an interdisciplinary team, managing multiple tasks, good organizational and communication skills and willingness to work outside their core expertise.

The successful candidates will join the lab at the Rockefeller University and will be embedded in our network of active collaborations in the New York area and beyond which are supported by dedicated recent awards. Interested candidates should send their CV including publications, copy of transcripts as well as the contact information of two references to Prof. **Alipasha Vaziri** (vaziri@rockefeller.edu). For more information please visit our website www.vaziria.com or http://www.rockefeller.edu/research/faculty/labheads/Vaziri.

References

1. Andrasfalvy, B., et al., *Two-photon Single Cell Optogenetic Control of Neuronal Activity by Sculpted Light.* **Proc. Natl. Acad. Sci. USA 107**, 11981 (2010).
2. Losonczy, A., et al., *Network mechanisms of theta related neuronal activity in hippocampal CA1 pyramidal neurons.* **Nature Neuroscience 13**, 967 (2010).
3. Schrödel, T., et al., *Brain-wide 3D imaging of neuronal activity in Caenorhabditis elegans with sculpted light.* **Nature Methods 10**, 1013 (2013).
4. Prevedel, R., et al., *Simultaneous whole-animal 3D imaging of neuronal activity using light-field microscopy.* **Nature Methods 11**, 727 (2014).
5. Prevedel, R., et al., *Fast volumetric calcium imaging across multiple cortical layers using sculpted light.* **Nature Methods 13**, 1021 (2016).
6. Nöbauer, T., et al., *Video rate volumetric Ca^{2+} imaging across cortex using seeded iterative demixing (SID) microscopy.* **Nature Methods 14**, 811 (2017).
7. Skocek, O., et al., *High-speed volumetric imaging of neuronal activity in freely moving rodents.* **Nature Methods 15**, 429 (2018).