# Prof. Emily A. Gibson

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**Friday, September 16, 11:00 am. Osborne A204**

## A Window into the Brain

Understanding how the brain's complex neural networks perform critical functions and govern behavior, cognition and intuition is a key goal of neuroscience and can lead to improved treatment for various neurological disorders. The development of new tools for studying the brain is critical in this effort. Light microscopy has greatly expanded the capabilities for minimally invasive cellular-level biological studies and, in combination with genetically encoded fluorescent indicators, allows unprecedented real-time imaging of action potentials in individual neurons in a network. In this talk, I will discuss recent work in my lab on the development of miniature fiber-coupled microscopes for 3-D imaging using adaptive optics and their applications for studies in freely moving and behaving animals. Additionally, I will discuss how adaptive optics for control of light patterning combined with optogenetics makes it possible to modulate neuronal activity allowing new studies of how neural circuits govern behavior.

## Short Bio

Dr. Gibson is an associate professor in the department of Bioengineering, University of Colorado Anschutz Medical Campus with a joint appointment in the Neuroscience Program. She earned her Ph.D. in physics from the University of Colorado at Boulder with a specialization in nonlinear optics. Dr. Gibson did postdoctoral work in biophysics, studying protein dynamics with nonlinear optical spectroscopy as an NRC fellow. Her research interest is in development of optical technologies for clinical and basic research applications. She has expertise in a variety of microscopy and spectroscopy techniques for measurement of biological samples from cellular to *in vivo* models. She collaborates with neuroscientists for designing novel optical imaging tools to allow new studies of neural activity. That work has involved development of super resolution and deep tissue microscopes as well as flexible fiber-optic head-attached miniature microscopes incorporating adaptive lenses for two-photon imaging.