One of the major aims in neuroscience is a better understanding of complex brain networks during learning and behavior. With recent advances in fluorescent proteins, such as calcium and voltage indicators, researchers now have the ability to measure neural activity using optical microscopy. Additionally, opsins such as channelrhodopsin, can modulate activity in response to light and can unravel further details in brain function. Thus, optical microscopy in freely moving animals undergoing complex behavior tasks is the next major step for neuroscience research. I will discuss our development of a lightweight head-mounted miniature multiphoton microscope that can image over hundreds of neurons in three dimensions in freely moving mice. The technology is the first to use electrowetting optics for non-mechanical steering of the excitation laser and enables single cell resolution imaging. Additionally, I will discuss next steps for patterned holographic stimulation and super-resolution imaging in freely moving animals.