Project #18: **Mingliang Pu** and **Garrett Stanley**: *Adaptive Enhancement of Depth Perception in Visual Cortex*

The laboratory of Prof. Stanley has recently conducted an extensive set of studies in the somatosensory (tactile) pathway, showing that adaptation serves to enhance discriminability of sensory inputs at the expense of detectability (Wang et al., Nat. Neurosci., 2010). A ubiquitous property of sensory pathways is that they continuously adapt to transient changes in the statistical properties of the sensory input (Ahissar et al., 2000; Chung et al., 2002; Fairhall et al., 2001). Adaptation is not simply fatigue or attenuation of neural activity, but instead can fundamentally change the features to which the sensory pathway are sensitive (Movshon and Lennie, 1979; Malone et al., 2002; Ulanovsky and Nelken, 2003; von der Behrens et al., 2009; Maravall et al., 2007) and thus changes what the pathway encodes. Through collaborative research between the Pu and Stanley laboratories, there is an exciting opportunity to expand this finding to the visual pathway, and to prove the more general importance of the finding in the context of 3-dimensional vision. We perceive depth in our visual experience through disparity of the inputs to the two eyes. Neurons in the retina of the eye, and in sub-cortical neurons, respond to light entering one eye. However, in visual cortex, the presence of neurons that are sensitive to input to the two eyes start to emerge. Here, we propose to extend the primary finding from the Stanley lab related to touch to neurons in the visual cortex that respond to binocular disparity that provides us with depth perception.