

**Presenter:** Whitney Griggs

**Title:** Functional ultrasound neuroimaging reveals heterogenous organization of posterior parietal cortex in nonhuman primates

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**Abstract:** The posterior parietal cortex (PPC) is an important area for the transformation of spatial information into accurate motor movements. PPC sub-regions such as the lateral intraparietal area (LIP) and the parietal reach region (PRR) are especially important for saccades and reaches, respectively. However, our understanding of these areas' functional organization is incomplete, in part due to technical challenges. While electrophysiology recordings can only record from small regions of the PPC at a time, fMRI and other 'whole-brain' techniques have insufficient spatiotemporal resolution. Now, functional ultrasound (fUS) is available as an innovative neuroimaging technique that measures cerebral hemodynamics with exceptional spatiotemporal resolution ( $<100\ \mu\text{m}$ ;  $\sim 100\ \text{ms}$ ) and a large field of view (several cm) – specifications ideally suited to recording detailed activity of entire cortical regions in parallel. In this study, we used fUS to record changes in cerebral blood volume (CBV) in PPC of two awake behaving monkeys. Each monkey performed memory-guided eye movements to targets throughout their visual field. We then analyzed the distribution of response fields within each coronal plane of PPC. We found that many subregions within the PPC, including within LIP, PRR, ventral intraparietal area (VIP), Area 5, and medial parietal cortex (MP), had direction-specific tuning curves. These results address a fundamental gap in our understanding of PPC's functional organization by developing mesoscopic maps of direction specificity previously unattainable with fMRI or electrophysiology methods. These mesoscopic maps reveal a highly heterogenous organization within each PPC subregion with many small patches of cortex encoding different combinations of directions.