

# High resolution fMRI via multiband (SMS) acquisition: opportunities and limitations

## Organizer:

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Simultaneous multi-slice (SMS, also called multiband, MB) EPI imaging is becoming widespread in functional neuroimaging, in part due to the Human Connectome Project (HCP). These sequences allow greater spatial and temporal resolution BOLD imaging, but are susceptible to additional artifacts (such as slice leakage), and possibly more sensitive to motion and physiological artifacts. These complexities mean that multiband imaging datasets cannot be treated as simply higher resolution versions of standard fMRI. The talks in this session will be in the style of tutorials and reviews, aimed at introducing multiband fMRI to a wide neuroimaging audience. The first talk (Benjamin Zahneisen) will introduce the basics of simultaneous multi-slice imaging, including how SMS differs from regular imaging, specific hardware requirements, and challenges of SMS associated with the higher temporal resolution and the limits of ever increasing multi-band factors. The second talk (Benjamin Risk) will describe the impact of multiband acceleration factors on sensitivity and specificity, particularly signal leakage (which can lead to spurious, false positive activations), providing examples from HCP and simulated datasets. The final talk (Annika Linke) will describe study designs and fMRI analysis methods (e.g., temporal ICA) that have benefited from SMS imaging, as well as its limitations for resting state and activation fMRI studies, and experiences and recommendations for infant, pediatric, and patient populations.

## Symposia Schedule:

8:00-8:20

### **Basics of Simultaneous Multi-Slice Imaging: SNR properties, g-factor penalty, multi-band artifacts, and other challenges associated with high temporal resolution**

*Benjamin Zahneisen, PhD, Stanford University, Menlo Park, CA, United States*

8:20-8:40

### **Impacts of multiband acceleration factors on sensitivity and specificity**

*Benjamin Risk, PhD, University of North Carolina, Chapel Hill, Chapel Hill, NC, United States*

8:40-9:00

### **Recent experiences using SMS imaging in BOLD fMRI studies**

*Annika Linke, San Diego State University, San Diego, CA, United States*

9:00-9:15

### **Questions and Answers**