# ABSTRACT

*Individualized spatial topography in functional neuroimaging*

Neuroimaging is poised to take a substantial leap forward in understanding the neurophysiological underpinnings of human behavior, due to a combination of improved analytic techniques and the quality of imaging data. These advances are allowing researchers to develop population-level multivariate models of the functional brain representations underlying behavior, performance, clinical status and prognosis, and other outcomes. Population-based models can identify patterns of brain activity, or 'signatures', that can predict behavior and decode mental states in new individuals, producing generalizable knowledge and highly reproducible maps. These signatures can capture behavior with large effect sizes and can be used and tested across research groups. However, the potential of such signatures is limited by neuroanatomical constraints, in particular individual variation in functional brain anatomy. To circumvent this problem, current models are either applied only to individual participants, severely limiting generalizability, or force participants' data into anatomical reference spaces (atlases) that do not respect individual functional topology and boundaries. Here we seek to overcome this shortcoming by developing new topographical models for inter-subject alignment, which register participants' functional brain maps to one another. This increases effective spatial resolution, and more importantly allows us to explicitly analyze the spatial topology of functional maps and make inferences on differences in activation location and shape across persons and psychological states. In this talk we discuss several approaches towards functional alignment and highlight promises and pitfalls.