1128-92-349 **Ramakrishnan Iyer***, Allen Institute for Brain Science, 615 Westlake Ave N, Seattle, WA 98109, and **Gabriel Koch Ocker**, Allen Institute for Brain Science, 615 Westlake Ave N, Seattle, WA 98109. *Modeling approaches to the understanding of cortical computations at the Allen Institute for Brain Science.*

A primary goal of the Allen Institute for Brain Science is to understand the computations performed in the corticothalamic system, and their mechanisms. Models deriving the activity and structure of neuronal networks from postulated coding tasks provide predictions for the structure and dynamics of cortical networks. Conversely, a theoretical understanding of the dynamics and statistics of network activity can link specified structure and dynamics with potential functions.

We present a characterization of cortical neurons using data-driven point and spatially extended models of single neurons from brain slices, to construct networks using such components and connectivity hypotheses. We also discuss two approaches to the prediction of the statistics of population activity in neuronal networks from the single-neuron dynamics. Populations of integrate-and-fire type models admit a representation of the distribution of voltages through a partial differential equation with displacement. On the other hand, stochastically spiking network models admit techniques from statistical field theory to calculate arbitrary joint cumulant densities of the spike trains. Each of these approaches reveals different potential computations carried out by cortical circuits. (Received February 28, 2017)