Coordinated activity and implications for coding in neural circuits

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Feedforward networks are notoriously susceptible to runaway synchronization. Is asynchronous signal propagation ever stable in this architecture? I use a mean-field Markov chain model to predict the emergence of neutrally stable, yet statistically complex neural dynamics that support a variety of activity patterns. Interestingly, the stable modes of activity show higher-order (i.e., beyond pairwise) statistical structure. Such "higher-order correlations" have been observed in cortex and retina, yet the effect on coding remains unclear. In the second part of this talk, I show when and how higher-order spiking correlations in recurrent populations have a large impact on the encoded information.