



THE UNIVERSITY OF
CHICAGO

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**COHERENT SPIKING AND NEURAL
POPULATION CODES**

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ABSTRACT

Experimental breakthroughs are yielding an unprecedented view of the brain's connectivity and of its coherent dynamics. But how does the former lead to the latter? We use graphical and point process methods to reveal the contribution of successively more-complex network features to coherent spiking. Next, we show how network features can be efficiently combined, yielding a set of low-order graph statistics we name "motif cumulants". These can be sampled experimentally, and appear to contain the necessary information to predict overall levels of coherence in a neural population. We close by asking what features of this coherence matter most — and least — for the neural "coding" of information. This is joint work with Yu Hu, James Trousdale, Kresimir Josic, and Joel Zylberberg.

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