



# THE UNIVERSITY OF CHICAGO

## Department of Statistics STATISTICS COLLOQUIUM

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## Estimation Schemes Based on Distributed Observations

**WEDNESDAY, January 16, 2013, at 12:00 PM**

110 Eckhart Hall, 5734 S. University Avenue

### ABSTRACT

Often distributed information is accumulated over a population of neurons, agents and sites, leading to the study of estimation approaches that are based on relatively cheap local computation and information sharing, which is the focus of this talk.

The first part of the talk will focus on a network of observers making low signal-to-noise observations concerning an unknown vector. I will show that the mean square error based on local computations and information sharing can be very close to the error of centralized maximum likelihood estimation.

In the second part of the talk, I will consider information transmission and maximum likelihood estimation in a GLM network as a simplified model for the spiking activity of a neural population. It turns out that for large neural populations carrying a finite total amount of information, the asymptotic sufficient statistics of the stimulus is a Gaussian process. This has two consequences: (i) the non-linear optimization problem of maximum-likelihood estimation can be implemented by parallel linear-nonlinear operations, (ii) neural populations with strong history-dependent (non-Poisson) effects carry exactly the same information as do simpler equivalent populations of non-interacting Poisson neurons with matched firing rates.

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<https://lists.uchicago.edu/web/arc/statseminars>.