



THE UNIVERSITY OF  
CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

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YING NIAN WU

Department of Statistics  
University of California, Los Angeles

A Representational Theory of Grid Cells

MONDAY, April 22, 2019 at 4:30 PM  
Eckhart 133, 5734 S. University Avenue

### ABSTRACT

Imagine walking in your living room in the dark. Purely based on your self-motion, you can calculate your self-position, and you can also plan your path to light switch. The grid cells in your brains play a key role in these tasks. The grid cells were discovered by Dr. May-Britt Moser and Dr. Edvard Moser, who won the 2014 Nobel Prize for their surprising discovery that such cells fire at regular hexagon grids imposed on the spatial environment. In this talk, I shall present a representational theory of grid cells, where the self-position is represented by a vector and the self-displacement is represented by a matrix that rotates the vector. I will show that hexagon grid patterns can be learned from simulated trajectories. I will also discuss a similar representational scheme for primary visual cortex.

The talk is based on joint work with Ruiqi Gao, Jianwen Xie and Song-Chun Zhu.

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For further information and inquiries about building access for persons with disabilities, please contact Jonathan Rodriguez at 773.702.8333 or send him an email at [jgrodriguez@galton.uchicago.edu](mailto:jgrodriguez@galton.uchicago.edu). If you wish to subscribe to our email list, please visit the following website:  
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