



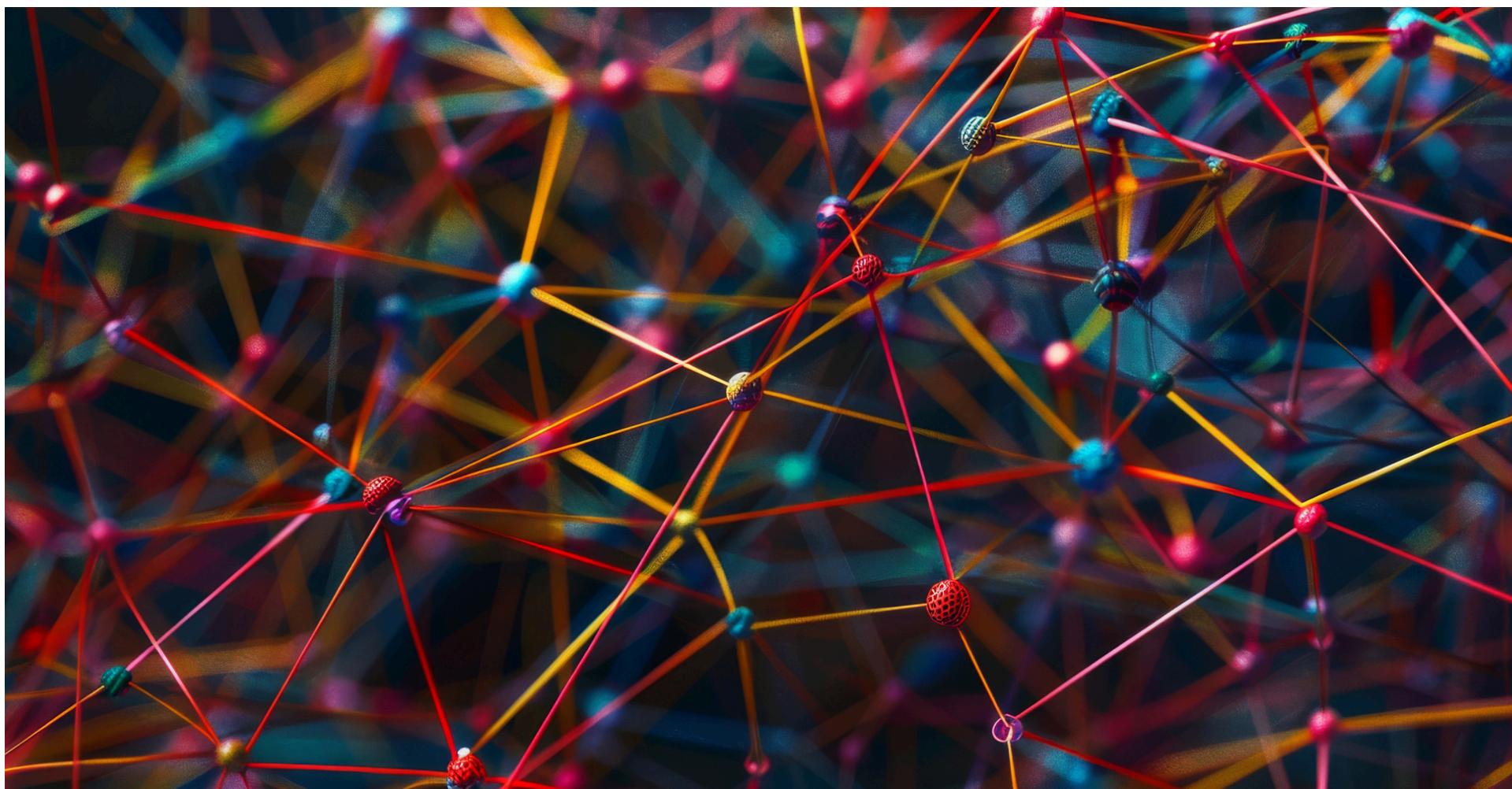
PADOVA  
neuroscience  
CENTER

8 MAY 2025, 3:00 PM  
SALA SEMINARI VIMM

# PNC DISTINGUISHED LECTURES

***A talk by William Bialek***  
*(Princeton University, USA)*

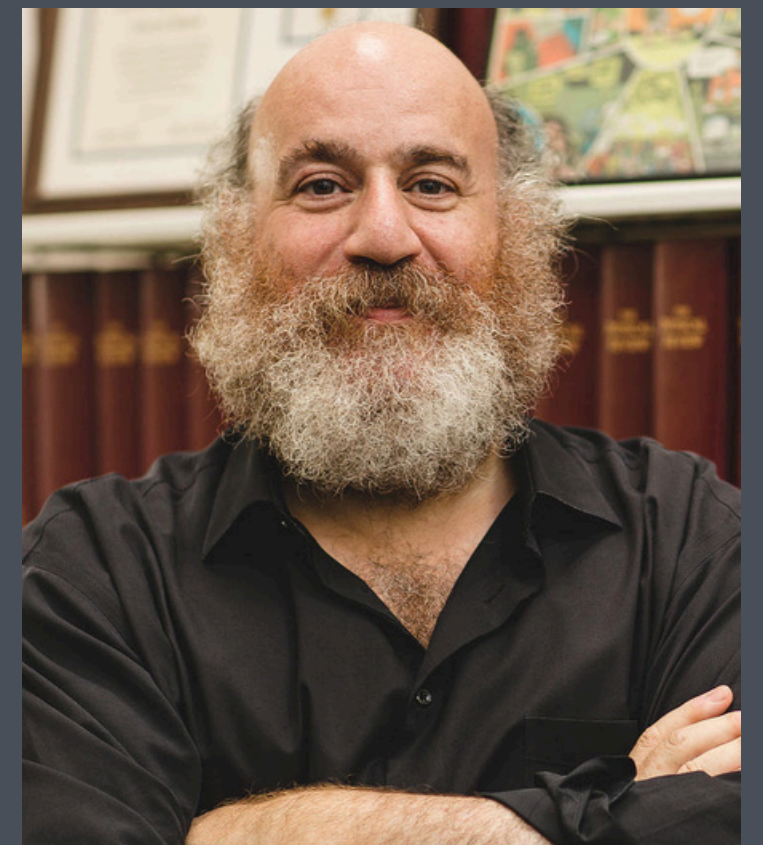
## THINKING ABOUT THOUSANDS OF NEURONS



Thoughts, memories, percepts, and actions all involve coordinated activity in thousands of neurons. We can now observe these patterns of activity directly in the brains of model organisms, and there are many ideas about the emergence of collective behavior in these large networks.

This talk will review recent progress in connecting theory and experiment, emphasizing concepts from statistical physics: maximum entropy models, the renormalization group, mean-field theories, and more. We will see that these relatively simple physics-style models capture myriad quantitative details in many different systems, in some cases with essentially no free parameters.

These analyses also point to scaling behavior as networks become larger, and these may be related to recent observations on scaling in animal behavior.



William Bialek is the John Archibald Wheeler/Battelle Professor in Physics, and a member of the multidisciplinary Lewis-Sigler Institute for Integrative Genomics, at Princeton University.

He received his Ph.D. in biophysics from the University of California, Berkeley. His research has addressed a wide range of theoretical physics problems motivated by the phenomena of life, across scales ranging from single molecules to flocks of birds. He is the recipient of numerous honors, including the Max Delbruck Prize in Biological Physics from the American Physical Society and the Swartz Prize for Theoretical and Computational Neuroscience from the Society for Neuroscience.

He is a Fellow of the American Physical Society and a member of the National Academy of Sciences.