ITS @ The Graduate Center

Initiative for the Theoretical Sciences

The statistical mechanics of human behavior

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Humans exhibit a wide range of complex behaviors, from patterns of coordinated activity at the scale of entire populations to the ability to learn and communicate information at the individual level. New large-scale datasets–facilitated by online activity, crowd-sourced cognitive experiments, and non-invasive neuroimaging–now allow patterns of activity to be comprehensively mapped in populations and individuals, paving the way for a better understanding of how we interact and process information. In this talk, I will describe how tools and intuitions from statistical mechanics, information theory, and network science can be used to uncover some of the simple principles underlying complex human behaviors. Drawing on maximum entropy modeling techniques, I will show that patterns of population-wide activity (including emails, private messages, music streaming, and face-to-face contacts) emerge from simple correlations between pairs of individuals. At the individual level, I will demonstrate how natural errors in learning allow people to infer the abstract structure of networks in the world around them – from language and music to social and citation networks – and how these networks are organized to support the efficient communication of information. Finally, I will describe how these tools for studying equilibrium systems can be generalized to understand whether, and to what degree, a complex system exhibits non-equilibrium behavior, with possible applications to brain dynamics and collective activity in human and animal populations.

Seminar and a light lunch will be begin at noon

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Room 5209, The Graduate Center, 365 Fifth Ave, in Manhattan.

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