



CoCo Seminar Series

Spring 2026

On the Limits of the Scientific Study of Complex Systems

Dr. Carlos Gershenson, Empire Professor of Innovation, School of Systems Science & Industrial Engineering, Binghamton University

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Hybrid (EB-T1 & Zoom; meeting link available on <http://coco.binghamton.edu/>)



It is evident that science has limits, given the plethora of phenomena we do not understand. Nevertheless, it would be interesting to estimate which of these limits are temporal (eventually we will go beyond them) and which ones are inherent (we will never know). More pragmatically, a systematic classification of the limits of science would allow us to measure our current abilities, avoid projects doomed to fail, identify potential research programs, and alternatives for limits that seem to be unsurpassable. In this context, it would be relevant to study at least the limits of predictability, computability, classifiability, optimizability, formality, causality, objectivity, measurability, replicability, modeling, and interpretability. There are two complementary questions worth exploring: what are the particular implications of the limits of science in general for the scientific study of complex systems? And, what can complexity inform us about the limits of science? Related to the first question, we can explore how to deal with complexity when we cannot predict or optimize, how to integrate different descriptions of complex systems, how to verify models of complex systems, and more. Related to the second question, we can explore how the predictability or classifiability of a system changes with the number of relevant interactions of a system, how can emergence and downward causation be studied, how self-organization be guided to control systems, and more. So far, we have many questions and only a few answers. Still, we have to start with something. And a broad community is required to address these challenges.

Carlos Gershenson is an Empire Professor of Innovation at the School of Systems Science and Industrial Engineering, Thomas J. Watson College of Engineering and Applied Science, State University of New York at Binghamton. He was a research professor (2008-2023) at Universidad Nacional Autónoma de México. He was a Visiting Scholar at the Santa Fe Institute (2022-2023), Visiting Professor at MIT and at Northeastern University (2015-2016) and at ITMO University (2015-2019). He was a postdoctoral fellow at the New England Complex Systems Institute (2007-2008). He has more than 200 scientific publications, which have been cited more than 9000 times. He has supervised 14 postdocs, 4 PhD, 19 MSc, and 8 BSc students. He has given more than 300 presentations. He is President of the Complex Systems Society, Editor-in-Chief of Complexity Digest and member of the Board of Advisors for Scientific American.

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