

UCLA Department of Physics & Astronomy

COLLOQUIUM

Thursday, May 13, 2021 at 4 p.m.

Weaving together machine learning, theoretical physics, and neuroscience.

Surya Ganguli
Stanford University



An exciting area of intellectual activity in this century may well revolve around a synthesis of machine learning, theoretical physics, and neuroscience. The unification of these fields will likely enable us to exploit the power of complex systems analysis, developed in theoretical physics and applied mathematics, to elucidate the design principles governing neural systems, both biological and artificial, and deploy these principles to develop better algorithms in machine learning. We will give several vignettes in this direction, including: (1) determining the best optimization problem to solve in order to perform regression in high dimensions; (2) developing interpretable machine learning to derive and understand state of the art models of the retina; (3) analyzing and explaining the origins of hexagonal firing patterns in recurrent neural networks trained to path-integrate; (4) understanding the geometry and dynamics of high dimensional optimization in the classical limit of dissipative many-body quantum optimizers.

Undergraduates Welcome!

Selected References:

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