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PHYSICS DISCUSSIONS

FEBRUARY 24, 2021 · 10:40am

STEVEN STROGATZ (DEPARTMENT OF MATHEMATICS, CORNELL U.)

NETWORKS OF OSCILLATORS THAT SYNCHRONIZE THEMSELVES

Populations of coupled oscillators are pervasive in the natural world, from swarms of rhythmically flashing fireflies to groups of pacemaker cells in the heart. Some systems of oscillators have the amazing ability to synchronize themselves, such that all the oscillators end up firing in unison, no matter how disorganized they were at the start. In this Zoom talk, Prof. Strogatz will discuss the simplest mathematical model of a self-synchronizing system, the so-called Kuramoto model, and discuss how it behaves on different kinds of networks. Using techniques from nonlinear dynamics, numerical linear algebra, and computational algebraic geometry, we will discuss new bounds, conjectures, and open problems about the densest networks that do not always synchronize and the sparsest ones that do.

STEVEN STROGATZ is an applied mathematician who works in the areas of nonlinear dynamics and complex systems, often on topics inspired by the curiosities of everyday life. Prof. Strogatz is a Fellow of the Society for Industrial and Applied Mathematics, the American Academy of Arts and Sciences, the American Physical Society, and the American Mathematical Society.

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