Colloquium

Department of Physics, Temple University

Entanglement, chaos and order

Xiao-Liang Qi
Physics Department, Stanford University

In classical mechanics, chaos refers to the phenomenon that an arbitrarily small perturbation leads to a dramatic change at a later time. The analogous phenomenon in quantum mechanics---quantum chaos is generic in many-body systems. Although chaos makes it difficult to solve the many-body problem exactly, it actually provides new knowledge about dynamics of the system, such as thermalization. In understanding quantum chaos and thermalization, the concept of quantum entanglement plays an essential role. In this talk, I will discuss the connection between several related phenomena, including the dynamics of quantum entanglement, thermalization of isolated systems, and measure of quantum chaos. As a concrete model to study quantum chaos, I will discuss the Sachdev-Ye-Kitaev (SYK) model and its generalizations. This model provides an example of strongly correlated systems in which new kinds of "order" emerges from chaos. Entanglement dynamics in this model suggests an interesting interplay between thermalization and many-body localization.

Monday, October 2, 2017 at 3:00pm
SERC, Room 116
Refreshments served at 2:45pm