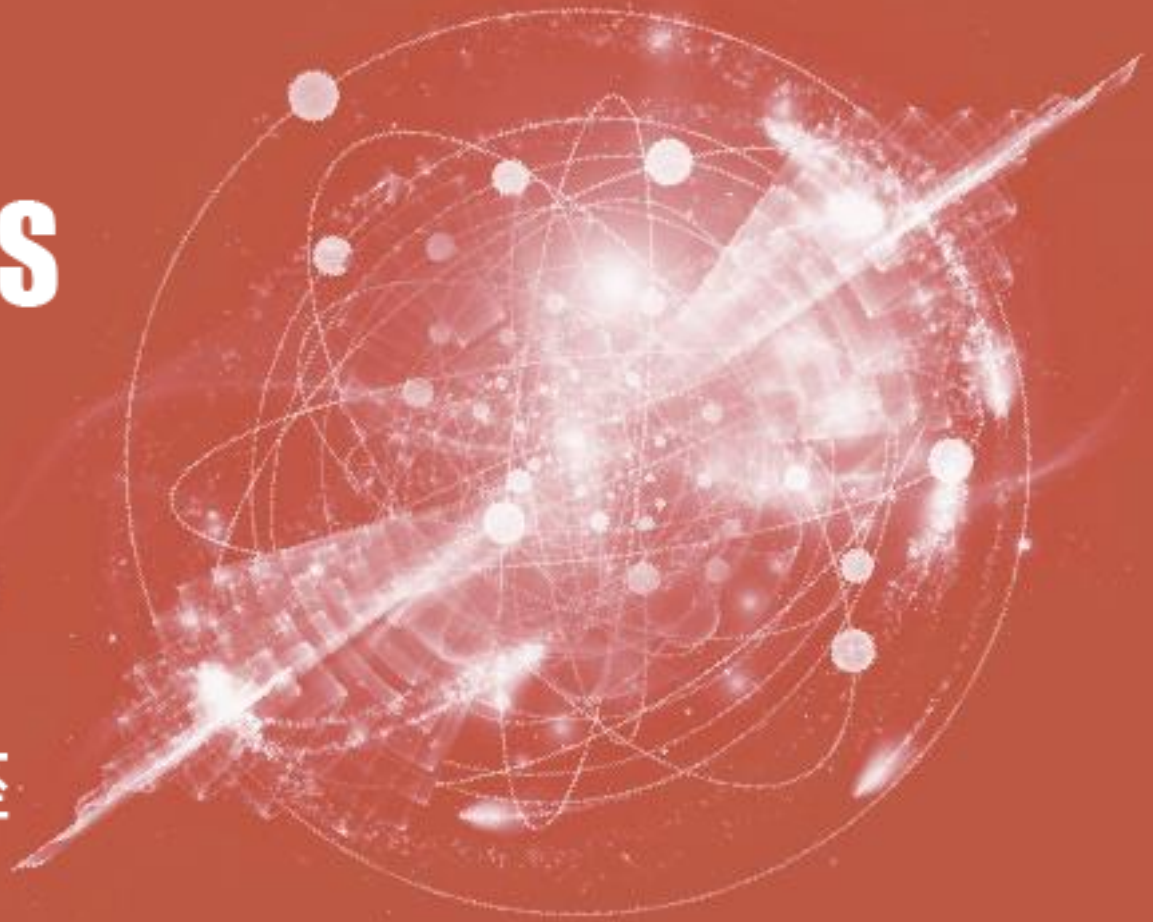# LECTURES ON FRONTIERS OF QUANTUM MATTERS

量子物质前沿讲座

清华大学
Tsinghua University

TITLE |

OTOCs in SYK-Like Models

SPEAKER |

Yingfei Gu (Harvard University)

TIME |
2:30-4:00 July 1, 2, 3, 2019

VENUE |
Room 322, Science Building
Tsinghua University

主办方：清华大学高等研究院

ABSTRACT

Out-of-time-order correlators (OTOCs) are a diagnostic of chaos in quantum many-body systems. Although OTOCs are hard to measure experimentally, they may be computed efficiently in models with a large parameter N (for systems with all-to-all interactions, N is simply the number of degrees of freedom). In these lectures, I will explain the retarded kernel method that is often used to compute the early-time OTOCs in SYK-like models. Within the framework, one can further define a time scale called the "branching time". In the near-maximal chaos, the branching time characterizes the "incoherence" in the scrambling. I will derive an identity relating the growth exponent (i.e., the Lyapunov exponent), the pre-exponential factor and the branching time. The identity has multiple applications. As a somewhat mysterious application, I will show that exact maximal chaos could occur in the butterfly wavefront of an SYK-like one-dimensional model.

The lectures are based on [arXiv: 1812.00120].