Department of Theoretical Physics

String Theory and Mathematical Physics Seminar

Speaker	:	Indranil Halder
Topic	:	On maximal chaos exponent for theories with a global symmetry
Day, Date & Time	:	Friday, August 09, 2019 at 10:15 a.m.
Place	:	Theoretical Physics Seminar Room (A304)

Abstract :

In this note we study chaos in generic quantum systems with a global symmetry generalizing seminal work [arXiv : 1503.01409] by Maldacena, Shenker and Stanford. We conjecture a bound on chaos exponent in a thermodynamical ensemble at temperature T and chemical potential μ for the global symmetry under consideration. For local operators which could create excitations upto some fixed charge, the bound on chaos (Lyapunov) exponent is independent of chemical potential $\lambda_L \leq \frac{2\pi T}{\hbar}$. On the other hand when the operators could create excitations of arbitrary high charge, we find that exponent must satisfy $\lambda_L \leq \frac{2\pi T}{(1-\frac{\mu}{\mu_c})\hbar}$, where μ_c is the maximum value of chemical potential for which the thermodynamic ensemble makes sense. As specific examples of quantum mechanical systems we consider conformal field theories. In a generic conformal field theory with internal $U(1)$ symmetry living on a cylinder the former bound is applicable, whereas in more interesting examples of holographic two dimensional conformal field theories dual to Einstein gravity, we argue that later bound is saturated in presence of a non-zero chemical potential for translation or rotation.

(Aniket Surve)