

Chaos/nonintegrability from String theory

Pinaki Dutta

Research Scholar

Department of Physics

IIT Kharagpur, Kharagpur

In recent years, we witness several breakthroughs in the field of ADS/CFT correspondence as well as in quantum many body systems -e.g, some condensed matter systems are dual to the dynamics of black holes.

Quantum/semiclassical chaos turns out to be a good probe to understand what happens inside a black hole. Also, nonlinearity of GR/Einstein field equation, string sigma model makes them a potential candidate for exploring chaotic dynamics.

Motion of a point particle in a variety of backgrounds- rotating black holes, perturbed schwarzschild space-time turns out to be chaotic. The situations become much more complicated if one considers a string which is an extended object and can vibrate. Here, at the semiclassical level, we study the motion of a circular string embedded in a class of black brane backgrounds (with dimension p) – which are solutions of higher dimensional Einstein equations. Depending on the control parameters, we find the signature of both weak and strong chaos. Finally, we present a roadmap to incorporate quantum mechanical chaos in these models.