

It is now an established fact that black holes behave as thermodynamical systems with a blackbody radiation, the Hawking radiation. Appearance of gravitational arrow of time (from gravitational collapse and formation of black hole to its evaporation due to Hawking radiation) and restoration of unitarity of black hole dynamics, as in any thermodynamical system, may be attributed to presence of an underlying microscopic statistical mechanical system. These microscopic degrees of freedom are usually called black hole microstates. Identifying the black hole microstates and counting them to get the black hole entropy, despite the progress in some very special cases, has remained a big challenge in theoretical high energy physics.

In this talk I present the proposal we recently made for identification of certain three dimensional black hole microstates, the horizon fluffs proposal, and discuss how it may be extended to more realistic rotating Kerr black holes.