

Institut Ruđer Bošković
ZAVOD ZA TEORIJSKU FIZIKU
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SEMINAR ZAVODA ZA TEORIJSKU FIZIKU
(Zajednički seminari Zavoda za teorijsku fiziku,
Zavoda za eksperimentalnu fiziku IRB-a i Fizičkog odsjeka PMF-a)

Spontaneous decay, quantum Zeno effect, and black holes

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Abstract:

Quantum spontaneous decay is a quantum jump happening at a random time, so its description must involve a wave-function collapse. The collapse happens due to a measurement, which is an interaction with a macroscopic environment. In this way the environment plays a crucial role for the so-called "spontaneous" decay, showing that it is not really spontaneous. In particular, if the measurement by environment is sufficiently fast, then the decay may be slowed down by a physical effect known as quantum Zeno effect. As a quantum effect, it works for microscopic systems with a small number of degrees of freedom. A macroscopic black hole, however, has some properties of a microscopic system by having only a few classical degrees of freedom (mass, charge and angular momentum). This makes it very susceptible to the quantum Zeno effect, leading to a new prediction that the actual Hawking radiation from a black hole is much weaker than predicted by the standard analysis.

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