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Information and firewall paradoxes

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Talk 1: A review on information and firewall paradoxes

Black hole information paradox has been a concomitant of realizing these objects/solutions as thermodynamic systems. The paradox can be explained as: in the semi-classical regime which gravity is dealt classically, black hole evaporation is not a unitary process. A famous resolution to this paradox was presented in 1993, which is called "black hole complementarity". This resolution can be roughly explained as: the set of observers standing outside of the black hole and the set of observers falling freely into it, should be considered complement to each other. One can not see the world from the point of view of both sets of observers. Using this complementarity, the information paradox has been considered to be resolved. But, it has been shown that black hole complimentarity yields another paradox which is known as "firewall paradox". In this talk, we will review the two paradoxes mentioned above.

Talk 2: A resolution to information and firewall paradoxes

In the second part, I will present a resolution to the paradoxes. The resolution is based on the similarity between the non-unitarity which is present in both of the information paradox and the measurement problem in quantum mechanics. Trying to complete the evolution of particles encountering the singularity at the semi-classical regime, a consistent formulation turns out to be a collapse of their states in the Hilbert space; the particles jumps outside of the black hole, after encountering the singularity at the center. In analogy with collapse of the wave function in measurement processes, gravity is analogous to an external force while the singularity is analogous to a macroscopic measuring device. I will describe how this picture resolves the information paradox, completes the complementarity and removes the firewall paradox. This talk is a review of the paper JHEP 1602 (2016) 175, in collaboration with Furkan Semih Dundar.

Date : Tuesday, August 16, 2016

Time: 13:30-16:00

Place: IMBM Seminar Room, Boğaziçi University South Campus