



Department of  
Theoretical Physics

# THE QUANTUM SPACETIME SEMINAR SERIES

## The Noise of Gravitons (Zoom Seminar)

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**Date:** September 7, 2020

**Time:** 11:00 am IST



Zoom link shall be shared separately

For the purpose of describing observed phenomena, it has thus far been sufficient to regard gravity as a classical field obeying Einstein's equations. But the laws of physics are ultimately quantum-mechanical. Here we treat the spacetime metric as a quantum field. We present a formalism, based on the Feynman-Vernon influence functional, to obtain the quantum effects of gravity on matter. We find that a falling body in gravity is subject to random fluctuations ("noise"), which can be regarded heuristically as due to the bombardment of the body by gravitons. Moreover, the classical geodesic deviation equation is replaced by a stochastic equation. The statistical characteristics of the noise depend on the quantum state of the gravitational field; for certain classes of quantum states, the noise can be greatly enhanced. Detection of this fundamental noise, which may be measurable at gravitational wave detectors, would constitute direct evidence for the quantization of gravity.