

JOINT TUFTS/MIT COSMOLOGY SEMINAR

Detecting single gravitons with quantum sensing

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The study of experimental signatures at the interface between gravity and quantum theory at low energies has recently become an active field of research, building on insights and developments from quantum information processing. After giving a brief overview of the field, I will focus on a specific recent result from our group: The possibility to detect single gravitons. We demonstrate how signatures of single-graviton-exchange can be observed in laboratory experiments. We show that stimulated and spontaneous single-graviton processes can become relevant for massive quantum acoustic resonators and that stimulated absorption can be resolved through continuous quantum sensing of quantum jumps. We analyze the feasibility of observing the exchange of *single* energy quanta between matter and gravitational waves. Our results show that single graviton signatures are within reach of experiments. In analogy to the discovery of the photo-electric effect for photons, I will discuss how such signatures can provide the first (weak) experimental evidence of the quantization of gravity.

Tuesday, November 28, 2023, 2:30 pm

Zoom link will be distributed to joint cosmology seminar mailing list. See <https://cosmos.phy.tufts.edu/mailman/listinfo/cosmology-seminar> to join.

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