

Bei-Lok Hu

[back to namelist](#)

Bei-Lok Hu

University of Maryland, College Park, USA

Gravitational Decoherence and Alternative Quantum Theories*

Will quantum matter be decohered by a gravitational field at low energy (in contrast to Planck energy quantum gravity [1])? If so, to what degree and how? How different is this from decoherence by a non-gravitational environment such as a matter field or via intrinsic decoherence [2]? Here we derive from first principles a master equation for a nonrelativistic particle interacting with a weak gravitational field based on bona fide quantum field theory and general relativity. From it we show the particularities and special features of gravitational decoherence. With this we point out the ambiguities and inconsistencies of alternative quantum theories based on stochastic Schrodinger equations with a phenomenological noise term added in an ad hoc manner, their benign physical motivations notwithstanding.

* Based on C. Anastopoulos and B. L. Hu, "A Master Equation for Gravitational Decoherence: Probing the Textures of Spacetime" *Class. Quant. Grav.* [arXiv:1305.5231]

[1] C. Anastopoulos and B. L. Hu, "Decoherence in Quantum Gravity: Issues and Critiques", *J. Phys. Conf. Ser.* 67 (2007) 012012.

[2] C. Anastopoulos and B. L. Hu, "Intrinsic and Fundamental Decoherence : Issues and Problems", *Class. Quant. Grav.* 25 (2008) 154003.

Please consult references therein for relevant earlier work.

[Watch presentation video](#)



[Download presentation pdf](#) (2 MB)



[Download abstract pdf](#)



