

Quantisation of Gravity or Gravitisation of Quantum Mechanics? - Meanings of semi-classical gravity, the Schroedinger-Newton equation, and experimental tests

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That gravity has to be quantised is usually considered an accepted truth among most physicists. However, there is virtually no conclusive evidence for this. The most obvious way to merge Quantum Mechanics with fundamentally classical gravity is provided by semi-classical gravity. For non-relativistic quantum systems this approach yields the Schrödinger-Newton equation, a non-linear, non-local equation for the dynamics of the wave-function. We will review the arguments for and against this approach, and discuss its consequences and prospects for experimental tests.

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