

## Ricardo Gallego Torromé

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### **Classical gravity from certain models of emergent quantum mechanics**

It is argued that gravity is an emergent interaction that appears in the equilibrium domain of certain deterministic models of emergent quantum mechanics. First we show that the interaction at the equilibrium domain has the characteristics of a classical gravitational interaction: it is classical and diffeomorphism invariance, the existence of a maximal speed for interaction and a weak equivalence principle hold good. The second argument shows that (at least) Newtonian gravity is an interaction of the type required by our models for the equilibrium domain, that is, it is a 1-Lipschitz regular interaction. As a consequence of the theory, we predict that for elementary particles the weak equivalence principle exactly holds, except to energies comparable to the Planck energy, when the principle abruptly breaks down.

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