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[back to namelist](#)

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Models of spontaneous wave function collapse: what they are, and how they can be tested

There are few proposals, which explicitly allow for (experimentally testable) deviations from standard quantum theory. Models of spontaneous wave function collapse (collapse models) are among the most-widely studied proposals of this kind. The Schrödinger equation is modified by including nonlinear and stochastic terms, which describe the collapse of the wave function in space. These spontaneous collapses are “rare” for microscopic systems, hence their quantum properties are left almost unaltered. On the other hand, collapses become more and more frequent, the larger the object, to the point that macroscopic superpositions are rapidly suppressed. I will briefly review the main features of collapse models. Next I will present an update of the most promising experimental tests, ranging from cosmological observations, to matter-wave interferometry, to optomechanics, to spectroscopy.

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