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Testing CSL model with the spontaneous radiation emission process

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Collapse models are phenomenological models introduced to solve the measurement problem of quantum mechanics and describe the transition from the quantum to the classical regime; among them, one of the most relevant and well studied is known as Continuous Spontaneous Localization (CSL). According to this model, the linear and unitary Schroedinger dynamics is modified by adding a non-linear term and the interaction with a stochastic noise field. These modifications account for the localization of the macroscopic objects, leaving unchanged the dynamics at microscopic level, but also require the introduction of two phenomenological parameters, a collapse rate parameter (λ) and a correlation length (r_C).
The interaction with the stochastic field causes an extra emission of electromagnetic radiation for charged particles, which is not predicted by the standard quantum mechanics, known as spontaneous radiation emission. We will show that comparing the X-ray emission measured with ultra-pure Germanium detectors with the expected spontaneous radiation spectrum allows to obtain the most stringent limits on λ and r_C on a broad range of the parameters space.

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