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Searching for signal of Quantum Collapse and Quantum Gravity in the cosmic silence of the Gran Sasso Underground Laboratories

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The VIP experiment is pursuing experimental studies of Quantum Mechanics (QM) foundations, investigating models of dynamical wave function collapse and performing high sensitivity tests of the Pauli Exclusion Principle (PEP) for electrons.
Unification of QM and General Relativity is probably the main ambition of modern physics. Motivated by the awareness that space-time fluctuations would induce decoherence in quantum systems, the idea to "gravitize"the QM aroused growing interest in the last decades, especially for the privileged role that gravity may play to solve the measurement conundrum. We will report on the strong experimental constrains on the gravity-related collapse models, obtained by searching for an unavoidable side-effect of the collapse mechanism known as "spontaneous radiation emission".
It was recently shown that violation of the PEP may be induced by Quantum Gravity (QG). X-ray surveys, searching for atomic transitions prohibited by the PEP, represent stunning candidates to test QG models, at unexpectedly high energy scales. The extreme sensitivity bounds obtained by VIP will be presented.

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