

International workshop "Positronium - from Quantum Physics to Medical Applications"

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Opportunities to do experiments in an underground laboratory

Wednesday 26 April 2023 17:00 (50 minutes)

I shall discuss opportunities to do underground experiments by presenting our investigations of possible departures from the standard quantum mechanics' predictions at the Gran Sasso underground laboratory in Italy. In particular, with refined radiation detectors we are searching signals predicted by the dynamical collapse models (spontaneous emission of radiation) which were proposed to solve the "measurement problem" in quantum physics, and signals indicating a possible violation of the Pauli Exclusion Principle.

I shall discuss our recent results which ruled out the natural parameter-free version of the gravity-related collapse model. I shall then present more generic results on testing CSL (Continuous Spontaneous Localization) collapse models and discuss future perspectives.

Finally, I shall briefly present the VIP experiment, with which we look for possible violations of the Pauli Exclusion Principle by searching for "impossible" atomic transitions, and comment the impact of this research in relation to Quantum Gravity models.

I shall take this opportunity to stimulate discussions about possibilities to use positronium in future underground experiments.

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Session Classification: Positronium in fundamental investigations

Track Classification: Positronium in fundamental research