



Contribution ID: 29

Type: **invited talk**

## Quantum Mechanics studies in the Cosmic Silence

*Tuesday, 25 June 2019 11:40 (20 minutes)*

The VIP-2 at the Underground Gran Sasso Laboratory (LNGS) experiment aims to perform high precision tests of the Pauli Exclusion Principle for electrons. The spin-statistics connection can be only demonstrated within Quantum Field Theory, hence experimental evidence of even a tiny violation of the PEP would be an indication of physics beyond the Standard Model. The method consists in circulating a DC current in a copper strip, searching for the X radiation emission due to a prohibited transition (from the 2p level to the 1s level of copper when this is already occupied by two electrons).

VIP already set the best limit on the PEP violation probability for electrons  $\frac{1}{2}\beta^2 < 4.7 \times 10^{-29}$ , the goal of the upgraded VIP-2 experiment is to

improve this result of two orders of magnitude at least. The experimental apparatus and the results of the analysis of a first set of collected data will be presented.

The extremely low background environment of LNGS is also suitable for investigating one of the main mysteries of Quantum Mechanics Foundations: the measurement problem. Dynamical reduction models of the wave function collapse are at test at LNGS, with an experimental setup based on High Purity Ge Detectors and an utmost radio-pure Roman lead target. Preliminary results will be shown.

**Primary author:** PISCICHIA, Kristian (Centro Fermi, LNF (INFN))

**Presenter:** PISCICHIA, Kristian (Centro Fermi, LNF (INFN))

**Session Classification:** Tuesday