

Neutrino Spectroscopy with atoms

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Although recent oscillation experiments have advanced neutrino physics impressively by discovering finite neutrino masses along with their mixing, there still exist important uncovered neutrino properties such as absolute neutrino masses and the nature of neutrino masses, Majorana/Dirac distinction. The SPAN (Spectroscopy with Atomic Neutrino) group at Okayama University aims to uncover these neutrino properties by using de-excitation processes of atoms or molecules.

In processes emitting a single photon and a neutrino pair, which we call RENP (Radiative Emission of Neutrino Pair), energy spectra of the photon have information about these neutrino properties. One of the most serious problem when we use this process is its extremely small emission rate. In order to overcome this problem, our group proposed to amplify the emission rate by atomic coherence in macroscopic volume. In this talk, I will present the principle of this coherent amplification mechanism and recent experimental progresses.

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