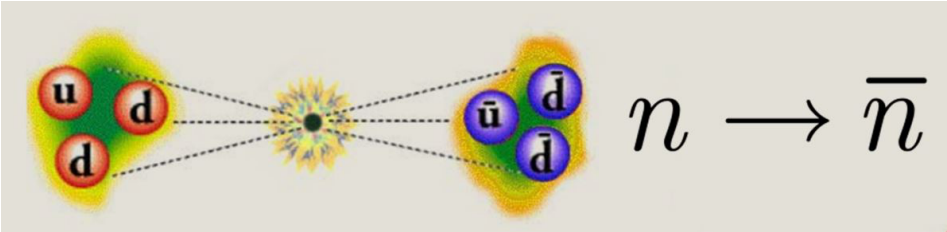

Contribution ID: **38** Type: **Oral Presentation**

New scenario for the neutron–antineutron oscillation: shortcut through mirror world

Wednesday, 5 August 2020 11:30 (30 minutes)

Existing bounds on the neutron-antineutron mass mixing, $\epsilon_{n\bar{n}} < \text{few} \times 10^{-24}$~eV, impose a severe upper limit on $n - \bar{n}$ transition probability, $P_{n\bar{n}}(t) < (t/0.1\ \text{s})^2 \times 10^{-18}$ or so, where t is the neutron flight time. Here we propose a new mechanism of $n - \bar{n}$ transition which is not induced by direct mass mixing $\epsilon_{n\bar{n}}$ but is mediated instead by the neutron mass mixings $\epsilon_{nn'}$ and $\epsilon_{n\bar{n}'}$ with the hypothetical states of mirror neutron n' and mirror antineutron $\bar{n}'$ which can be as large as $\sim 10^{-14}$~eV or so, without contradicting the present experimental limits and nuclear stability bounds. The probabilities of $n - n'$ and $n - \bar{n}'$ transitions, $P_{nn'}$ and $P_{n\bar{n}'}$, depend on environmental conditions in mirror sector, and by scanning over the magnetic field values in experiments they can be resonantly amplified. This opens up a possibility of $n - \bar{n}$ transition with the probability $P_{n\bar{n}} = P_{nn'}P_{n\bar{n}'}$ which can reach the values up to $\sim 10^{-8}$. For finding this effect in real experiments, the magnetic field should be suppressed but properly varied. This scenario points towards the scale of few TeV of new physics which can be responsible for these mixings, and can also suggest a new low scale co-baryogenesis mechanism between ordinary and mirror sectors.

Contribution Title

New scenario for the neutron–antineutron oscillation: shortcut through mirror world

Primary author: Prof. BEREZHIANI, Zurab (University of L'Aquila)

Presenter: Prof. BEREZHIANI, Zurab (University of L'Aquila)