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The Neutron Physics - Dark Matter Connection: Bridge Through the Baryon Symmetry Violation

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Deadline for manuscript submissions:
closed (31 January 2022)

Message from the Guest Editors

Dear Colleagues,

What we call Dark Matter still remains unknown. In the surge of experimental challenges to detect Dark Matter and theoretical attempts to conjecture its nature, new efforts exploring alternative mechanisms of Dark Matter and other hidden sector effects should not be neglected. In this SI, we should bring together experimental and theoretical ideas that focus on neutrons as a possible messenger of Dark Matter physics. More than four σ difference in neutron lifetime measured by appearance and disappearance methods and other anomalies seen in the disappearance of ultra-cold neutrons indicate that neutrons can decay or oscillate into a hidden sector. Oscillations of neutral particles of the Standard Model, including but not limited to photons, neutrinos, and neutrons, have been discussed in the literature. However, a large lifetime of the neutron and its strong interaction, together with availability of cold and ultra-cold neutron sources, are making this particle unique for a variety of simple experiments. Thus, a theoretically viable model of Dark Matter comprising the symmetric or asymmetric Mirror Matter can be tested experimentally appearing as ...

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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