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Physics and Mathematics of the Dark Universe

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Message from the Guest Editors

Dear Colleagues,

The evolution of the Universe is a fascinating topic in physics that attracts much attention. Despite remarkable progress in our understanding of the Universe during the last hundred years, there is overwhelming evidence for the existence of the Dark Universe that we do not understand. The Dark Universe includes (but is not limited to) dark energy, dark matter, cosmological inflation, and black holes. Gaining further insights demands new observational discoveries and advanced theoretical approaches in gravitational theory, quantum field theory with gravity, astroparticle physics, cosmology, and string theory, including the related mathematics. This Special Issue is devoted to current trends and new theoretical proposals in explaining the Dark Universe, including also gravity with extra dimensions, supersymmetric cosmology, string cosmology, AdS/CFT correspondence, primordial black holes and Swampland conjectures. Advanced theoretical physics and mathematics of the Dark Universe combine formal and phenomenological research and confront it to current observations, enhancing scientific knowledge about the Universe and connecting it to other branches of science.

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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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