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Symmetry, Dark Matter and the Characterisation of Its Properties

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Message from the Guest Editors

Dark matter candidates can be detected and studied in different ways, ranging from cosmological observations, direct or indirect detection, or even by producing them at colliders, assuming such particles are within the reach of current or future machines. If experimental observations are made in any of these fields, the determination of its properties would not be straightforward, given its elusive nature. On the other hand, the possibility of characterising observations of signatures compatible with the existence of dark matter would point towards possible theoretical models which predict its existence and, possibly, exclude others. The possibility of characterising the properties of dark matter candidates is therefore one of the main goals for current and future searches. Pinpointing the nature of dark matter by combining the potentialities of colliders with results from direct and indirect detection experiments or cosmological observations is the focus of this issue. Attention is given to new and advanced statistical methods for data analysis and to the possibility to use machine learning techniques for the characterisation of new signals.

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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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