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Probing the Universe with Gravitational Waves

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Message from the Guest Editors

The detection of the first gravitational wave signal by the laser interferometer LIGO in September 2015 confirmed one of the predictions by Albert Einstein made almost a century ago. This detection represents a breakthrough on the experimental basis of General Relativity and the studies of compact objects like black holes and neutron stars. Moreover, gravitational waves open a new exploratory window of the early universe, since, beyond redshift ~ 1100, the universe is completely opaque to electromagnetic radiation. Hence, gravitational waves represent a unique way to probe the physical processes that may have occurred in the early universe.

Presently, the universe is dominated by matter and not by anti-matter. This asymmetry could be the consequence of various mechanisms and, in particular, the symmetry breaking between weak and electromagnetic interactions that may have occurred at temperatures around 100-200 GeV...

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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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