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Recent Advances in Plasma Physics

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Deadline for manuscript submissions:
closed (31 December 2022)

Message from the Guest Editor

The field of plasma physics has undergone renewed scientific interest due to the special host environment that plasmas offer to charged particles and electromagnetic fields. In fact, plasmas represent the fourth state of matter, where the atomic structure is broken down. This circumstance paves a unique way towards high-field applications and non-linear dynamics. As fluids with important electromagnetic susceptibility, plasmas respond and evolve non-linearly with respect to external forces so that particles and waves can mix, generating secondary sources of fields. As the most brilliant examples, cold plasmas are considered the proper physical environment for particle transport and acceleration, while hot plasmas are best for nuclear fusion. Relativistic plasmas can generally be exploited for non-linear optics studies and applications. Anisotropic systems and other relevant symmetries in physics can be explored within magnetized plasmas. Therefore, the interaction of plasmas with particles and fields, in particular at high intensity, is indeed very promising for scientific and technological advances.

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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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