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String-Math 2015

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December 31, 2015 – January 4, 2016
Tsinghua Sanya International
Mathematics Forum, Sanya, China

Si Li
Bong H. Lian
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American Mathematical Society
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Preface

String theory is a broad subject. It plays a central role in theoretical physics as a candidate for quantum theory, unifying gravity with other interactions. Since its birth, string theory has had profound connections with broad branches of modern mathematics. In the last decades, the prosperous interaction—built upon joint efforts from both mathematicians and physicists—has given rise to marvelous deep results in supersymmetric gauge theory, topological string, M-theory and duality on the physics side, as well as in algebraic geometry, differential geometry, algebraic topology, representation theory and number theory on the mathematics side.

The interplay is twofold. The mathematics has provided powerful tools to fulfill the physical interconnection of ideas and to clarify physical structures to understand the nature of string theory. On the other hand, ideas from string theory and quantum field theory have been a source of significant inspirations to reveal surprising mathematical structures and to create new directions in mathematics. The String-Math conference is an annual international event to bring together researchers working at the rapidly developing interface of these two academic fields to exchange current significant ideas and to explore future directions.

String-Math 2015 took place from December 31, 2015, to January 4, 2016, at Tsinghua Sanya International Mathematics Forum (TSIMF) in Sanya, China. The conference brought together around 150 talented participants, covering a variety of fast-developing topics including homological mirror symmetry, supersymmetric gauge theory, singularity theory, wall-crossing phenomenon, large N-duality, modular forms, string compactification and non-commutative geometry.

The current volume of proceedings of String-Math 2015 focuses on topics that are developing quickly, which were fruitfully discussed during this meeting. One of the main themes of the current proceedings collects frontier research on Calabi-Yau manifolds and mirror symmetry. Another main theme is concerned with the development of non-perturbative methods in supersymmetric gauge theories. The collected articles in this volume present state-of-the-art developments in these topics. We hope that their timely publication will help promote communications and broader interests in the physics and mathematics communities.

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