

## Acknowledgements

This year's HLMA is significant as it marks the first time the competition is being held after the world has resumed normality from the pandemic. I am delighted that all members of the Scientific Committee and all finalist teams were able to participate in the face-to-face oral defense in person.

First and foremost, I would like to express my gratitude to Professor Richard Schoen, a Wolf Prize Laureate and a world-renowned expert in Differential Geometry, for continuing to chair the Scientific Committee. His leadership role in the committee is absolutely crucial in maintaining the esteemed intellectual excellence and high standards of HLMA. The adjudication process of HLMA is highly rigorous. Each submitted paper undergoes initial screening by the Screening Panel and is then sent to two or three professional reviewers. These reviewers are all PhDs in mathematics currently holding academic positions in universities around the world, and are working in fields related to the submitted papers. Each reviewer is given approximately a month to thoroughly review the submitted paper and provide their comments and recommendations to the Scientific Committee for consideration. This year, the Scientific Committee selected 15 teams to participate in the oral defense. I would like to extend my thanks to every member of the Scientific Committee, the Screening Panel, and all our reviewers for upholding the integrity and high academic standards of HLMA.

HLMA has also greatly benefited from the excellent guidance of the Steering Committee, chaired by Nobel Prize Laureate Professor George F. Smoot, in expanding the recognition of HLMA not only within the education sector but also within the community as a whole. I would also like to express my gratitude to the Executive Committee, chaired by Professor Shing Yu Leung, as well as the secretariat led by Ms. Niki Chan and the team led by Ms. Susan Wong and Ms. Sonia Choi from Hang Lung Properties, who have been responsible for the administration, promotion, and organization of HLMA.

The publication of this compilation of winning papers from the 2023 HLMA has been made possible by the generous donations from Hang Lung Properties. This marks the tenth volume of winning papers being published. The goal of publishing this compilation is multifaceted. It not only showcases the dedication and academic excellence of the winning teams but also sets a benchmark for the standards of HLMA, inspiring students and teachers towards potential research directions for future participation in HLMA and for future academic research. I hope that this volume will continue to be well-received by schools and the community.

Frederick Tsz-Ho Fong

“The role of mathematics in society has experienced a profound transformation, opening up abundant opportunities for students in academia and beyond. I believe that it is crucial for students to acquire a solid mathematics education across a wide range of areas. The rigorous work involved in preparing for this competition will undoubtedly prove to be immensely valuable for students in their future endeavors.”

**Professor Richard Schoen**

*Chair*, 2023 Hang Lung Mathematics Awards Scientific Committee  
2017 Wolf Prize Laureate in Mathematics  
Stanford University  
University of California, Irvine

“Why is math so important? The key lies in cultivating a deep appreciation for rational understanding and reasoning through rigorous challenges. And that’s precisely what the HLMA competition accomplishes. It goes beyond mere challenges for high school students; it demands a high level of rigor and excellence that is truly impressive. This competition is dedicated to celebrating the bright young minds and their mathematics teachers.”

**Professor George F. Smoot**

*Chair*, 2023 Hang Lung Mathematics Awards Steering Committee  
2006 Nobel Laureate in Physics  
The Hong Kong University of Science and Technology