THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF APPLIED MATHEMATICS
應 用 數 學 系

The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

From Weyl conjecture to fundamental gap conjecture and beyond

By

Prof. Weizhu Bao
National University of Singapore

Abstract

In this talk, I will begin with the Weyl's law and Weyl conjecture on the asymptotics of eigenvalues of the Laplacian and Schrodinger operators (LO/SO) on bounded domains with Dirichlet boundary condition. Based on our recent numerical results by using a spectral method, I report some information on the reminder in the Weyl conjecture for the LO/SO. In addition, a generalized Weyl's law for the fractional Schrodinger operator (FSO) is proposed. Then I review the fundamental gap conjecture -- difference between the first two smallest eigenvalues -- of the LO/SO. Again, based on our recent asymptotic and numerical results, we propose a gap conjecture on the fundamental gap of the FSO. In addition, different gaps of eigenvalues of the FSO are discussed and the ``unfolding'' gaps statistics of FSO is reported. Finally, fundamental gaps on energy and chemical potential of the Gross-Pitaevskii equation are studied asymptotically and numerically.

Bibliography

Professor Weizhu Bao received his PhD degree from Tsinghua University in 1995. He was an Associate Professor at Tsinghua University, and Visisting Assistant Professor at Georgia Institute of Technology and University of Wisconsin-Madison. Currently he is a Full Professor at Department of Mathematics, National University of Singapore. Professor Bao is well known for his work in applied mathematics with applications in quantum physics, chemistry and materials science, especially Bose-Einstein condensation and highly oscillatory partial differential equations. He has received many awards, including the Beijing Science and Technology Award in 2003, and the Feng Kang Prize in Scientific Computing in 2013. Professor Bao was also an invited speaker at the International Congress of Mathematicians in 2014. He was in the editorial board of many famous journals, including SIAM Journal of Scientific Computing, Communications in Mathematical Sciences, Journal of Computational Mathematics, and so on.

Date: 5 October 2021 (Tuesday)
Time: 15:00-16:00 (Hong Kong Standard Time GMT +8)
Venue: Online Talk via Zoom (Meeting ID: 974 8445 4123)
Speaker: Prof. Weizhu Bao, National University of Singapore
Host: Dr. Buyang Li, The Hong Kong Polytechnic University
Click to join:
https://polyu.zoom.us/j/97484454123?pwd=UHlwU1hOdGhWRnowVGN3Z04yd09qQT09

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