

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Liqun Qi**

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报告题目:

Following Galileo Galilei

邀请人: **戴彧虹 研究员**

报告时间: **2017 年 8 月 29 日 (周二)**

下午 16:30-17:30

报告地点: **科技综合楼楼三层**

311 报告厅

Abstract:

Tensors, as geometric objects that describe linear or multi-linear relations between geometric vectors, scalars and other tensors, have provided a concise mathematical framework for formulating and solving practical physics problems in various areas such as relativity theory, fluid dynamics, solid mechanics and electromagnetism, etc. The concept of tensors can be traced back to the works by Carl Friedrich Gauss (1777-1855), Bernhard Riemann (1826-1866) and Elwin Bruno Christoffel (1829-1900), etc., in the 19th century on differential geometry. It was further developed and analyzed by Gregorio Ricci-Curbastro (1853-1925), Tullio Levi-Civita (1873-1941), and others, in the very beginning of the 20th century. A mathematical discipline on tensor analysis gradually emerged and was even applied in general relativity by the great scientist Albert Einstein (1879-1955) in 1916.

While tensors such as piezoelectric tensors and elasticity tensors have been used in physics and mechanics for more than one century, the study on spectral properties of these tensors is still very new. The fundamental principle of Galileo Galilei (1564-1642) who has played a pioneer role in the scientific revolution of the seventeenth century and is regarded as the father of science, is to study the rules and insights of the nature, while mathematics is the basic tool in this process. Inspired by this principle, the mathematical analysis on spectral properties have been studied for tensors in liquid crystal study, piezoelectric effects, solid mechanics, quantum entanglement problems, etc. More spectral properties of tensors in physics and mechanics awaits being exploited.

Bio:

Professor Liqun Qi received his B.S. in Computational Mathematics at Tsinghua University in 1968. his M.S, and Ph.D. degree in Computer Sciences at University of Wisconsin-Madison in 1981 and 1984 respectively. Professor Qi has taught in Tsinghua University, China, University of Wisconsin-Madison, USA, University of New South Wales, Australia, and The City University of Hong Kong. He is now a Chair Professor at Department of Applied Mathematics, The Hong Kong Polytechnic University. Professor Qi has published more than 300 research papers in international journals. He established the superlinear and quadratic convergence theory of the semismooth Newton method, and played a principal role in the development of reformulation methods in optimization. Professor Qi's research work has been cited by the researchers around the world. According to the authoritative citation database www.isihighlycited.com in 2003, he was one of the world's most highly cited 345 mathematicians then. He is ranked No. 16 in H-index among 27033 authors of Control and Optimization in the world by Microsoft Academic. Professor Qi is an editor or an associate editor of ten international journals. He has chaired more than fifteen international conferences and workshops held at Australia, Italy, Hong Kong and the Mainland China. In 2005, Professor Qi pioneered the research on eigenvalues for higher order tensors, which now has applications in biomedical engineering, statistical data analysis, spectral hypergraph theory, solid mechanics, quantum mechanics, etc. He has more than 110 papers on tensors, published or accepted for publication in international journals. His book ``Tensor Analysis: Spectral Theory and Special Tensors, is published by SIAM in April 2017. Another book ``Tensor Eigenvalues and Their Applications'' will be published by Springer.

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