武汉物数所理论交叉学术交流系列报告

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The kicked rotor: from classical non-integrability to integer quantum Hall effect

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频标楼4楼报告厅

About the speaker：

Dr. Tian received his bachelor and master degree in plasma theory in Fudan University in Shanghai. From 2000-2005 he did his Ph.D. study in University of Minnesota and KITP at Santa Barbara under the supervision of late Professor Anatoly Ivanovich Larkin. After that he moved to Koeln, Germany working with Professor Alexander Altland as a postdoc. From 2011 he has become a member in Institute for Advanced Study, Tsinghua University in Beijing. Dr. Tian's recent research interests include critical and topological phenomena in chaos, wave transport in disordered photonic and electronic systems, strongly correlated electronic systems, and statistical field theory.

Abstract:

The discovery of integer quantum Hall effect (IQHE), a transport quantization phenomenon, heralded a revolution in condensed matter physics. This notwithstanding, IQHE is commonly conceived as being unrelated to chaos ubiquitous in Nature. Indeed, the salient characteristic of chaos – the sensitivity of system's behavior to disturbances – is conceptually incompatible with the robustness of transport quantization in IQHE. Moreover, while chaos occurs even in simple one-body systems, IQHE is known to be a ground-state property of many-electron systems. Surprisingly, we discover in a canonical chaotic one-body system a Planck's quantum-driven phenomenon bearing a firm analogy to IQHE but of chaotic origin. Our finding indicates that rich topological quantum phenomena can emerge from chaos.

References:

[1] Y. Chen and C. Tian, Physical Review Letters 113 (Editors'Suggestion), 216802 (2014).
[2] C. Tian, Y. Chen, and J. Wang, Physical Review B 93 (Editors'Suggestion), 075403 (2016) (38 pages).

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