复旦大学物理系物质科学报告

Physics Department Colloquium

New foundation of quantum statistical mechanics

Prof. Biao Wu

Peking University

According to the quantum ergodic theorem and quantum H-theorem proved by von Neumann in 1929 and their recently improved versions, a non-integrable quantum system can relax dynamically to an equilibrium state, where the entropy is maximized and the fluctuations of observables are small. These results imply that quantum statistical mechanics can be derived from microscopic theory without any hypothesis or postulates. This new understanding can lead to new physics, e.g., the prediction of quantum equilibrium state of multiple temperatures. I'll show you a recent BEC experiment, where dynamical relaxation of a quantum system is convincingly seen. At last, I'll comment on eigenstate thermalization hypothesis and future outlook.

References

[1] J. von Neumann, Z. für Phys. **57**, 30 (1929).

[2] J. von Neumann, EPJH **35**, 201 (2010) (English translation).

[3] P. Reimann, PRL. **101**, 190403 (2008).

[4] X. Han and B. Wu, PRE **91**, 062106 (2015).

Time：2:00pm, Tuesday, 2016.10.11

Location：Physics Building, Room 221B

(Cookies and coffee are served from 1:30 pm)