http://www.phy.pku.edu.cn/~icmp/forum/njt.xml

凝聚态物理–北京大学论坛

2013年第 24 期（No.299 since 2001）

Trapped Ion system for condensed matter physics

Kihwan Kim（金奇奂）博士

时间：11月21日（星期四）15:00—16:30

地点：北京大学物理大楼中212教室

Kihwan Kim, Prof. Kihwan Kim studied and received a Bachelor, Master, and Ph. D at the Physics Department of Seoul National University in Korea. He did a post-doctoral research at the Innsbruck University in Austria with Prof. Rainer Blatt and at the Joint Quantum Institute of the University of Maryland in USA with Prof. Chris Monroe. Around 2011, he joined the Center for Quantum Information of Institute for interdisciplinary information sciences in Tsinghua University as an Associate Professor. He has been actively performing the research program of developing a large scale quantum computation with trapped ions for the fundamental understanding of quantum mechanics and for the application of quantum simulations, quantum optics and quantum device. The email contact is kimkihwan@mail.tsinghua.edu.cn.

Abstract: In this form, I'd like to discuss how a trapped ion system can be an important vehicle to study complex condensed matter physics with three examples. The first is the quantum simulation. Quantum simulation can provide a solution to a certain complex problem that is intractable with classical computation. Here I describe an experimental demonstration [1] that was performed before I come to Tsinghua, which contains the essence of quantum simulation with trapped ions and discuss how this research is extending nowadays. Second, I introduce an experimental study performed at Center for Quantum Information of Tsinghua University, which can be considered as the simplest quantum simulation. We realize a Landau-Zener-Stuckelberg interferometer with our trapped ion system and demonstrate that the quantum interference in the system greatly robust again many imperfections [2]. Finally, we briefly discuss the experimental progress towards the test of the Jarzynski Equality in quantum regime [3]. [1] Quantum Simulation of Frustrated Ising Spins with Trapped Ions, K. Kim, M.-S. Chang, S. Korenblit, R. Islam, E. E. Edwards, J. K. Freericks, G.-D. Lin, L.-M. Duan, and C. Monroe, Nature 465, 590 (2010). [2]Realization of Geometric Landau-Zener-Stuckelberg interferometery, Junhua Zhang, Jing -Ning Zhang, Xiang Zhang, and Kihwan Kim, arXiv:1304.0271 [3] Quantum Extension of the Jarzynski Relation: Analogy with Stochastic Dephasing, Shaul Mukamel, Phys. Rev. Lett. 90, 170604 (2003).

: htquan@pku.edu.cn

Photoed by Xiaodong Hu