北京大学量子材料科学中心
International Center for Quantum Materials, PKU

Seminar

How did I earn an Erdős number of two ?
---new adventures in quantum Monte Carlo methods

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Time: 16:00pm, April 7, 2016 (Thursday)
时间：2016年4月7日（周四）下午16:00
Venue: Room W563, Physics Building, Peking University
地点：北京大学物理楼西563

Abstract

Recently, there have been remarkable advances in quantum Monte Carlo methods. I will share the excitement with a broad audience using non-technical language.

The advances include an efficient simulation approach without time-discretization errors [1,2]; powerful and elegant ways of computing quantum information quantities such as Renyi entanglement entropy [3] and fidelity susceptibility [4,5]; and, most importantly, solutions to the sign problem in a new class of fermionic models [6,7].

I will focus on the last topic in this talk. Practically, these progresses enable accurate studies of previous untouched physical problems [8,9]. Conceptually, attempts to unify the two solutions [6,7] lead us to a truly inspiring adventure in open science. These efforts deepen our understanding in the mathematical structure of the fermion sign problem, and suggest a new “de-sign” principle for QMC simulations [10]. Amusingly, the last paper also earns me and my collaborators an Erdős number of two, the lowest value currently attainable [11].

[1] M. Iazzi and M. Troyer, PRB 91, 24118(R) (2015)
[2] L. Wang, M. Iazzi, P. Corboz and M. Troyer, PRB 91, 235151 (2015)
[3] L. Wang and M. Troyer, PRL 113, 110401 (2014).
[4] L. Wang, Y.-H. Liu, J. Imriska, P-N Ma, M. Troyer, PRX 5, 031007 (2015)
[5] L. Wang, H. Shinaoka, M. Troyer, PRL 115, 23601 (2015)
[6] E. Huffman and S. Chandrasekharan, PRB 89, 111101(R) (2014)
[7] Z.-X. Li, Y.-F. Jiang and H. Yao, PRB 91, 24117(R) (2015)
[8] L. Wang, P. Corboz and M. Troyer, NJP 16, 103008 (2014)
[9] Y.-H. Liu and L. Wang, PRB 92, 235129 (2015)
[10] L. Wang, Y.-H. Liu, M. Iazzi, M. Troyer and G. Harcos, PRL 116, 250601 (2015)
[11] http://www.comp.phys.ethz.ch/news-and-events/nc/2016/02/the-myth-of-the-erds-number.html

About the Speaker

Lei Wang received his Bachelor degree in physics from Nanjing university in 2006 and his PhD degree in theoretical physics from the Institute of Physics, Beijing in 2011. He then moved to ETH Zurich in Switzerland as a postdoctoral researcher. Since 2016, Lei Wang started as an assistant professor in the Institute of Physics, Beijing.

His main research interests are designing new numerical algorithms for strongly correlated systems and studying topological phases and nonequilibrium dynamics of ultracold atoms.