



**CSRC**

**CSRC Workshop on Computational  
Approach to Correlated Systems**

**Program**

November 26 ~ 30, 2018

Beijing, China

# *CSRC Workshop on Computational Approach to Correlated Systems*

*November 26~30, 2018 | Beijing, China*

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CSRC Workshop on *Computational Approach to Correlated Systems* will be held in Beijing on November 26-30 (Monday-Friday), 2018. It is co-organized by the Division of Simulations of Physics, Beijing Computational Science Research Center (CSRC) and Department of Physics, Beijing Normal University (BNU). This workshop aims at a pedagogical introduction to commonly used computational methods for correlated systems and their applications. It will cover the following topics:

- (A) Machine Learning Methods;**
- (B) Density Matrix Renormalization Group (DMRG);**
- (C) Tensor Network Methods;**
- (D) Quantum Monte Carlo Methods;**
- (E) Dynamical Mean-Field Theory (DMFT).**

**(Website:** <http://www.csrc.ac.cn/en/event/>)

**Workshop Venue:** CSRC Conference Room I, 1st Floor (中心一层第一会议室)

**Lunch & Dinner Place:** CSRC Canteen, B1 Floor (中心负一层餐厅)

**Accommodation:** Yitel, ZPark Building 9, No. 8 West Dongbeiwang Road, Haidian District, Beijing (和颐酒店中关村软件园五号路店, 电话: +86-10-82826677-0)

## **Organizing Committee:**

Stefano CHESI, *Beijing Computational Science Research Center*

Hai-Qing LIN (林海青), *Beijing Computational Science Research Center*

Rubem MONDAINI, *Beijing Computational Science Research Center*

Ling WANG (汪玲), *Beijing Computational Science Research Center*

Wen YANG (杨文), *Beijing Computational Science Research Center*

**Workshop Secretary:** Ms. Wei LIU (刘薇)

☎ 86-10-56981717 (Office); 86-13717776118 (Cellphone); weiliu@csrc.ac.cn (Email)

## List of Speakers (alphabetical order)

- Georges Batrouni** University of Nice-Sophia Antipolis (France)
- Zi Cai (蔡子)** Shanghai Jiao Tong University
- Kun Chen (陈锬)** Rutgers University (USA)
- Dong-Ling Deng (邓东灵)** Tsinghua University
- You-Jin Deng (邓友金)** University of Science and Technology of China
- Shou-Shu Gong (龚寿书)** Beihang University
- Hong Guo (郭鸿)** McGill University (Canada)
- Wen-An Guo (郭文安)** Beijing Normal University
- Rong-Qiang He (贺荣强)** Renmin University of China
- Li Huang (黄理)** Institute of Materials (CAEP)
- Zhong-Bing Huang (黄忠兵)** Hubei University
- Gang Li (李刚)** ShanghaiTech University
- Tao Li (李涛)** Renmin University of China
- Wei Li (李伟)** Beihang University
- Hai-Jun Liao (廖海军)** Institute of Physics (CAS)
- Zheng-Xin Liu (刘正鑫)** Renmin University of China
- Tian-Xing Ma (马天星)** Beijing Normal University
- Zi-Yang Meng (孟子杨)** Institute of Physics (CAS)
- Hui Shao (邵慧)** Beijing Normal University
- Xian-Gang Wan (万贤纲)** Nanjing University
- Lei Wang (王磊)** Institute of Physics (CAS)
- Ling Wang (汪玲)** Beijing Computational Science Research Center
- Xiao-Qun Wang (王孝群)** Shanghai Jiaotong University
- Zhi-Yuan Xie (谢志远)** Renmin University of China
- Zhi-Ping Yin (殷志平)** Beijing Normal University
- Hui Zhai (翟荟)** Tsinghua University
- Ping Zhang (张平)** Institute of Applied Physics and Computational Mathematics
- Xue-Feng Zhang (张学锋)** Chongqing University

# Workshop Information (Miscellaneous)

For your convenience, here are **Some Important Tips** (参会须知):

## Workshop Venue (会议地址)

- ✧ CSRC Conference Room I (F1), Beijing Computational Science Research Center, Building 9, East Zone, ZPark II, No. 10 Xibeiwang East Road, Haidian District, Beijing 100193, China;  
北京计算科学研究中心一层第一会议室, 北京市海淀区西北旺东路10号院东区9号楼中关村软件园二期(100193);

## Onsite Registration (现场注册)

- ✧ November 26~28, 2018 | 08:00~17:00  
Outside the Conference Room I.
- ✧ Please put the **Nametag** on to enter the **Conference Room I (F1)** and bring your **Meal Tickets** to the **B1 Canteen**.



## Dining (餐饮安排)

- ✧ Lunch/Dinner (Buffet) @CSRC Canteen (B1 Floor)
- ✧ Banquet @CSRC VIP Room (B1 Floor)

## Wi-Fi (无线网络)

- ✧ Username: csrc\_guest | Password: csrc20150308

## Invoices (发票领取):

- ✧ Time: November 27~30, 2018 | 10:30~11:00 a.m.
- ✧ Place: Outside the CSRC Conference Room I, F1

## Contact Person (会务联系)

Ms. Wei LIU (刘薇), weiliu@csrc.ac.cn

☎ 86-10-56981717 (Office); 86-13717776118 (Cellphone); 86-10-56981700 (Fax)

## Recommended Route (推荐路线)



### ➤ Taxi:

- 1) From Capital International Airport (首都国际机场): The cost is about 130 RMB (50mins).
- 2) From Beijing Railway Station (北京站): The cost is about 100 RMB (80 mins).
- 3) From Beijing West Railway Station (北京西站): The cost is about 70 RMB (60mins).
- 4) From Beijing South Railway Station (北京南站): The cost is about 105 RMB (90mins).

### ➤ Local Bus:

Bus #205 (Software Park West Stop/软件园西区站)

Bus #333 (Houchangcun East Stop/后厂村东站)

Bus #963/#982 (Dongbeiwang West Road North Stop/东北旺西路北口站)

### ➤ Subway:

Take Subway Line 13 to "SHANG DI Station(上地站)", take Exit A to catch Bus #205 to "Software Park West Stop(软件园西区站)". Enter the park and proceed toward in the north direction, CSRC will be to your right in 400 meters.

## Recommended Hotel (酒店住宿)

◇ Yitel 和颐酒店(软件园 5 号路) \*The Nearest Hotel (15~20 mins' walk)

Address: ZPark Building 9, No. 8 West Dongbeiwang Road, Haidian District, Beijing

北京市海淀区东北旺西路 8 号中关村软件园 9 号楼 (中关村软件园南门)

Telephone: +86-10-82826677



**Zoom in**



# CSRC Workshop on Computational Approach to Correlated Systems - Day 1

CSRC Conference Room I, F1 | November 26-30, 2018

Monday, November 26, 2018	
08:00 – 17:00	Registration
08:45 – 09:00	Hai-Qing Lin (林海青), Beijing Computational Science Research Center <i>Welcoming Address</i>
<b>Morning Session, Chair: Wen Yang (杨文)</b>	
09:00 – 10:30 (45+45 mins)	Xian-Gang Wan (万贤纲), Nanjing University <b>LECTURE</b> -关联电子系统的数值计算模拟研究
10:30 – 11:00	<i>Tea Break</i>
11:00 – 12:30 (45+45 mins)	Zhi-Ping Yin (殷志平), Beijing Normal University <b>LECTURE</b> -Dynamical Mean Field Theory and its Applications in Strongly Correlated Materials
12:30 – 14:00	<i>Lunch &amp; Rest</i>
<b>Afternoon Session, Chair: Xian-Gang Wan (万贤纲)</b>	
14:00 – 14:45 (45 mins)	Ping Zhang (张平), Institute of Applied Physics and Computational Mathematics <b>LECTURE</b> -First-Principles Phonon Spectra of Strongly Correlated Nuclear Materials
14:45 – 15:00	<i>Q&amp;A, Break</i>
15:00 – 15:30 (30 mins)	Gang Li (李刚), ShanghaiTech University 动力学平均场理论的非局域扩展
15:30 – 16:00 (30 mins)	Rong-Qiang He (贺荣强), Renmin University of China <i>Dynamical Mean Field Theory and Natural Orbitals Renormalization Group</i>
16:00 – 16:15	<i>Q&amp;A, Break</i>
16:15 – 17:00 (45 mins)	Hong Guo (郭鸿), McGill University (Canada) <b>LECTURE</b> -Machine Learning and Informatics for Material Discovery
17:00 – 17:30	<i>Q&amp;A, Free Discussions</i>
17:30 – 18:30	<i>Dinner</i>

# CSRC Workshop on Computational Approach to Correlated Systems - Day 2

CSRC Conference Room I, F1 | November 26-30, 2018

Tuesday, November 27, 2018

Tuesday, November 27, 2018	
08:00 – 17:00	Registration
<b>Morning Session, Chair: Ping Zhang (张平)</b>	
09:00 – 10:30 (45+45 mins)	Hui Zhai (翟荟), Tsinghua University <i>LECTURE-Explainable Machine Learning for Quantum Physics</i>
10:30 – 11:00	<i>Tea Break</i>
11:00 – 11:30 (30 mins)	Pan Zhang (张潘), Institute of Theoretical Physics (CAS) <i>Solving Statistical Mechanics using Variational Autoregressive Networks</i>
11:30 – 12:00	<i>Q&amp;A, Free Discussions</i>
12:00 – 14:00	<i>Lunch &amp; Rest</i>
<b>Afternoon Session, Chair: George Batrouni</b>	
14:00 – 15:30 (45+45 mins)	Lei Wang (王磊), Institute of Physics (CAS) <i>LECTURE-Deep Learning for Computational Scientists</i>
15:30 – 16:00	<i>Tea Break</i>
16:00 – 16:30 (30 mins)	Zhi-Yuan Xie (谢志远), Renmin University of China <i>Tensor Network State in Deep Convolutional Neural Network</i>
16:30 – 17:00	<i>Q&amp;A, Free Discussions</i>
17:00 – 18:00	<i>Dinner</i>



# CSRC Workshop on Computational Approach to Correlated Systems - Day 3

CSRC Conference Room I, F1 | November 26-30, 2018

Wednesday, November 28, 2018	
<b>Morning Session, Chair: Zhong-Bing Huang (黄忠兵)</b>	
08:00 – 17:00	Registration
09:00 – 10:30 (45+45 mins)	George Batrouni, University of Nice-Sophia Antipolis (France) <i><b>LECTURE</b>-Introduction to the World Line and Stochastic Green Function Quantum Monte Carlo Algorithms</i>
10:30 – 11:00	<i>Tea Break (Group Photo-Lobby)</i>
11:00 – 11:30 (30 mins)	Tao Li (李涛), Renmin University of China <i>Variational Construction of the Excitation Spectrum of the Heisenberg and t-J Models and Its Quantum Monte Carlo Simulation</i>
11:30 – 12:00 (30 mins)	Zheng-Xin Liu (刘正鑫), Renmin University of China <i>Quantum Spin Liquid Phases in Extended-Kitaev Model on the Honeycomb Lattice</i>
12:00 – 14:00	<i>Lunch &amp; Rest</i>
<b>Afternoon Session, Chair: Xiao-Qun Wang (王孝群)</b>	
14:00 – 15:30 (45+45 mins)	Wen-An Guo (郭文安), Beijing Normal University <i><b>LECTURE</b>-Introduction to Stochastic Series Expansion Quantum Monte Carlo Methods</i>
15:30 – 16:00	<i>Tea Break</i>
16:00 – 16:30 (30 mins)	Hui Shao (邵慧), Beijing Normal University <i>Stochastic Analytic Continuation Approach to Spectral Functions with Prominent Features</i>
16:30 – 17:00 (30 mins)	Li Huang (黄理), Institute of Materials (CAEP) <i>Combining Density Functional Theory with Dynamical Mean-Field Theory: Applications to the Strongly Correlated Actinide Materials</i>
17:00 – 17:30	<i>Q&amp;A, Free Discussions</i>
17:30 – 19:30	<i>Banquet</i>

# CSRC Workshop on Computational Approach to Correlated Systems - Day 4

CSRC Conference Room I, F1 | November 26-30, 2018

Thursday, November 29, 2018	
<b>Morning Session, Chair: You-Jin Deng (邓友金)</b>	
09:00 – 10:30 (45+45 mins)	Xiao-Qun Wang (王孝群), Shanghai Jiao Tong University <i>LECTURE</i> -密度矩阵重整化方法及其应用
10:30 – 11:00	<i>Tea Break</i>
11:00 – 12:30 (45+45 mins)	Ling Wang (汪玲), Beijing Computational Science Research Center <i>LECTURE</i> -Introduction to Matrix Product States and Tensor Network States Methods
12:30 – 14:00	<i>Lunch &amp; Rest</i>
<b>Afternoon Session, Chair: Wen-An Guo (郭文安)</b>	
14:00 – 14:30 (30 mins)	Shou-Shu Gong (龚寿书), Beihang University <i>Quantum Spin Liquids in Spin-1/2 Triangular-Lattice Antiferromagnet with Competing Interactions</i>
14:30 – 15:00 (30 mins)	Wei Li (李伟), Beihang University <i>Two Temperature Scales in the Triangular Lattice Heisenberg Antiferromagnet</i>
15:00 – 15:30	<i>Tea Break</i>
15:30 – 16:00 (30 mins)	Hai-Jun Liao (廖海军), Institute of Physics (CAS) <i>Ground State of the Spin-1/2 Honeycomb Gamma Model: Zigzag Magnetic Order</i>
16:00 – 16:30 (30 mins)	Dong-Ling Deng (邓东灵), Tsinghua University <i>Quantum Artificial Intelligence</i>
16:30 – 17:00	<i>Q&amp;A, Free Discussions</i>
17:00 – 18:00	<i>Dinner</i>

# CSRC Workshop on Computational Approach to Correlated Systems - Day 5

CSRC Conference Room I, F1 | November 26-30, 2018

Friday, November 30, 2018	
<b>Morning Session, Chair: Stefano Chesi</b>	
09:00 – 10:30 (45+45 mins)	Zhong-Bing Huang (黄忠兵), Hubei University <i><b>LECTURE</b>-Determinant Quantum Monte Carlo Algorithm and Its Applications in Multi-Orbital Hubbard Models</i>
10:30 – 11:00	<i>Tea Break</i>
11:00 – 11:30 (30 mins)	Xue-Feng Zhang (张学锋), Chongqing University <i>Floquet-Induced Superfluidity with Periodically Modulated Interactions of Two-Species Hardcore Bosons in a One-dimensional Optical Lattice</i>
11:30 – 12:00 (30 mins)	Zi Cai (蔡子), Shanghai Jiao Tong University <i>Dissipative Majorana Quantum Wires</i>
12:00 – 14:00	<i>Lunch &amp; Rest</i>
<b>Afternoon Session, Chair: Rubem Mondaini</b>	
14:00 – 15:30 (45+45 mins)	You-Jin Deng (邓友金), University of Science and Technology of China <i><b>LECTURE</b>-Clock Monte Carlo Methods and Lifted Worm Algorithms</i> Kun Chen (陈锬), Rutgers University (USA) <i><b>LECTURE</b>-Cluster Diagrammatic Monte Carlo Method for Interacting Electrons</i>
15:30 – 16:00	<i>Tea Break</i>
16:00 – 16:30 (30 mins)	Tian-Xing Ma (马天星), Beijing Normal University <i>Magnetic and Superconducting Correlation in Monolayer and Twisted-Bilayer Graphene</i>
16:30 – 17:00 (30 mins)	Zi-Yang Meng (孟子杨), Institute of Physics (CAS) <i>Large-Scale Numerical Investigations of Correlated Electron Systems</i>
17:00 – 17:30	<i>Q&amp;A, Closing Remarks</i>
17:30 – 18:30	<i>Dinner</i>