International Symposium

on Frontier of Superconductivity Research (IV)

STM on Unconventional Superconductors

Program and Abstracts

October 23-26, 2014

National Lab for Superconductivity

Institute of Physics, Chinese Academy of Sciences

Beijing National Laboratory for Condensed Matter Physics

No.8, 3rd South Street, Zhongguancun, Haidian District,
Beijing 100190, China

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Organizing Committee:

Chair: Prof. Zhong-xian ZHAO
Chairman of Academic Committee,
National Lab for Superconductivity

Co-Chair: Prof. Xingjiang ZHOU
Director, National Lab for Superconductivity

Co-Chair: Prof. LeiSHAN
National Lab for Superconductivity

Local organizers: Prof. Dongning ZHENG
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Brief Schedule:

Thursday, October23
15:00~19:00 Registration at Hotel
(Registration continues on October 24 near the gate of M234, IOP)

Friday, October 24
Opening
Scientific program

Saturday, October 25
Scientific program
17:00 Closing remarks

Sunday, October 26
Conference excursion

Welcome

The International Symposium on Frontier of Superconductivity Research (IV) —STM on Unconventional Superconductors, organized by the National Lab for Superconductivity, will be held on the campus of Institute of Physics, Chinese Academy of Sciences, Beijing, China, between Oct. 23 and 26, 2014.

The National Lab for Superconductivity at the Institute of Physics, Chinese Academy of Sciences, Beijing (http://nlsc.iphy.ac.cn/), established in 1991, is a national premier base for superconductivity research in China and an important hub for academic exchange among domestic and foreign scholars in this field. Current research projects include searching for new superconductors, investigating the superconductivity mechanism and related physics problems, thin films synthesis as well as superconducting devices development and their applications.

Aiming to strengthen international scientific exchange and foster international scientific collaboration, the National Lab for Superconductivity has initiated an "International Symposium on Frontier of Superconductivity Research" which contains a series of symposiums held once every year. We have successfully organized the first symposium "Exploration of Novel Superconductors" in 2011, the second symposium "ARPES on Unconventional Superconductors" in 2012 and the third symposium "Neutron Scattering on Unconventional Superconductors" in 2013. This year marks the fourth symposium that focuses on "STM on Unconventional Superconductors". Leading experts will provide overview, personal experience, latest results and future perspectives on Neutron Scattering on Unconventional Superconductors, including the copper-oxide high temperature superconductors and the Fe-based superconductors.

We hope to make the Symposium informative, encouraging and inspiring, particularly to young scientists and graduate students.

Chair: Prof. Zhongxian ZHAO,
Chairman of Academic Committee,
National Lab for Superconductivity

Co-Chair: Prof. Xingjiang ZHOU,
Director
National Lab for Superconductivity

Co-Chair: Prof. Xingjiang ZHOU,
National Lab for Superconductivity

Beijing, China, October 2014

Scientific Program

(Each presentation includes 40 minutes talk plus 10 minutes Q&A)

October24, 2014, Friday, M234, IOP			
Morning Session			
Chair: Prof. Yayu Wang			
09:00- 09:05	Zhongxian Zhao	Institute of Physics, Beijing	Welcome Speech
09:05- 09:15	Xingjiang Zhou	Institute of Physics, Beijing	Brief Introduction to National Lab for Superconductivity and the Symposium
09:15- 10:05	Aharon Kapitulnik	Stanford University	Surface Superconductivity in the non-centrosymmetric half-HeuslerLuPtBi system
10:05 - 10:30 Break& Group Photo			
10:30 - 11:20	Shuheng Pan	Institute of Physics, Beijing	Effects of Single-Atom Impurities on Superconductivity
11:20 - 12:10	Mohammad Hamidian	Cornell University	Imaging the atomic-scale conflict between *d*-symmetry Cooper pairs and *d*-form factor density waves in underdopedcuprates
12:10 - 14:00 Lunch			
Afternoon Session			
Chair: Prof.Christoph Renner			
14:00 -14:50	Qikun Xue	Tsinghua University	Molecular beam epitaxy-scanning tunneling microscopy of high Tc superconductivity
14:50 -15:40	Tetsuo Hanaguri	RIKEN Advanced Science Institute	Superconducting gapand quasi-particle interference in FeSe
15:40 -16:00 Break			
16:00 -16:50	Abhay Pasupathy	Columbia University	Evolution of Electronic Nematicity across the Pnictide Phase Diagram
16:50 -17:40	Tien-Ming Chuang	Academia Sinica, Taipei	Atomic-scale Visualization of Electronic Nematicity and Cooper Pairing in Iron-based Superconductors
18:00 Dinner			

October25, 2014, Saturday, M234, IOP

Morning Session

Chair: Prof. Tetsuo Hanaguri

09:00 -09:50	Yayu Wang	Tsinghua University	Imaging the evolution from a Mott insulator to a charge ordered insulator in lightly doped cuprates
09:50 -10:40	Christoph Renner	University of Geneva	Nematic and stripe charge order in high temperature and conventional superconductors
10:40 -10:55 Break			
10:55 -11:45	Yi Yin	Zhejiang University	Applying scanning tunneling microscope to study the Fermi surface and pseudogap evolution in cuprate superconductors
12:30 -14:00 Lunch			

Afternoon Session

Chair: Prof. Lei Shan

14:00 -14:50	Hai-Hu Wen	Nanjing University	Identifying the superconductivity mechanism and pairing gap in iron based superconductors by scanning tunneling spectroscopy
14:50 -15:40	Ang Li	Shanghai Institute of Microsystem and Information Technology	Scanning Tunneling Microscope as a Powerful Tool for Exploring Materials with Knowing Whom
15:40 -16:00 Break			
16:00 -16:50	Steffen Wirth	MPI for Chemical Physics of Solids, Dresden	STM studies of correlated materials
16:50 -17:40	Jinfeng Jia	Shanghai Jiao Tong University	Majorana mode inartificial topological superconductors and single-layer FeSe on $SrTiO_3$ with a superconducting T_c above 100 K
17:40 -18:00		Summary & Closing remarks	
18:00 Dinner			

October 26, 2014

Excursion: The Great Wall + The Forbidden City.

Surface Superconductivity in the non-centrosymmetric half-Heusler LuPtBi system

Aharon Kapitulnik

Department of Physics, Stanford University, Stanford, CA 94305-4045, USA

Surfaces of three-dimensional topological insulators have emerged as one of the most remarkable states of condensed quantum matter, where exotic electronic phases of Dirac particles should arise. Of particular interest are the heavy Heusler semiconductors with 1:1:1 composition and C1b structure, which exhibit a zero band gap behavior and are topological insulators induced by their inverted band structure. Concentrating on LuPtBi which has the strongest inverted gap, band structure. This material displays a metallic band with non-trivial topological surface state. Moreover, transport measurements confirmed bulk superconductivity below ~0.9K, with possible non-BCS behavior as deduced from resistivity and susceptibility measurements in magnetic field. Here we report the discovery of surface superconductivity in the LuPtBi system, in the (111) direction, with Tc ~6.8K, much higher than the bulk Tc. Scanning Tunneling Microscopy (STM), and spectroscopy (STS) confirm uniform “v-shaped” gap, indicating unconventional surface superconductivity with lines of nodes. This superconducting gap is observed by STM at temperature as high as 2.5K, and is quenched by perpendicular magnetic field of order 1.5 tesla. Band structure calculations show that for a Bi-terminated (111) sample, a van-Hove singularity near the Fermi surface could explain such high Tc. This discovery may lead to new approach to the design of high-Tc superconductors.

Presenting author: Prof. AharonKapitulnik

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Effects of Single-Atom Impurities on Superconductivity

Shuheng H. Pan

Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China and
Department of Physics, University of Houston/Texas Center for Superconductivity

Impurities can break Cooper-pairs into quasi-particles with energy states inside the superconducting gap. The characteristics of such in-gap states reflect accordingly the properties of the superconducting ground state. Therefore, impurity effects in superconductors have always been important subjects in the fundamental study of superconductivity. A single-atom impurity is an ideal model for both experimental and theoretical study of impurity effects on superconductivity. With high resolution STM/S technique, such proposal has been successfully realized. I will first review a couple of examples applied to conventional and unconventional superconductors to illustrate the development of such approach. Then I will present some of our experimental results of single-atom impurity effects in iron-based superconductors and discuss their implications to the microscopic mechanism of iron-based superconductivity.

Presenting author: Prof. Shuheng Pan

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Imaging the atomic-scale conflict between *d*-symmetry Cooper pairs and *d*-form factor density waves in underdoped cuprates

Mohammad H. Hamidian

Cornell University

A central issue of cuprate superconductivity research is to understand the nature of the pseudgogap phase and its relationship to the *d*-wave superconductivity. Using our recently developed technique of sub-lattice phase-resolved electronic structure visualization[1] within each CuO_2 unit-cell, we discovered that the cuprate pseudogap state is a *d*-symmetry form factor density wave [2]. Although long predicted, such an unconventional density-wave state has not previously been observed in any condensed matter system. Next, our simultaneous visualizations of both real-space and momentum-space electronic structure across the cuprate phase diagram revealed that the famous (but mysterious) transition of momentum-space topology from "Fermi arc" to conventional Fermi surface occurs simultaneously with the disappearance of the *d*-form factor density wave[3]. Taken together these results provide the first atomic scale understanding of the antagonism between the *d*-symmetry density waves and *d*-symmetry Cooper pairing in underdoped cuprates.

1. *Nature*,***466,*** 347 (2010)
2. *PNAS*,**111**, E3026 (2014)
3. *Science*, **344**, 612 (2014)

Presenting author: Prof. Mohammad Hamidian

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Molecular beam epitaxy-scanning tunneling microscopy of high Tc superconductivity

Qi-kun Xue

Department of Physics, Tsinghua University, Beijing 100084, China

Searching for superconducting materials with high transition temperature (T_C) is one of the mostexciting and challenging fields in physics and materials science. By using MBE technique, we are able to prepare stoichiometric and superconducting FeSe single crystalline films on various substrates,which enables us investigate superconductivity mechanism of FeSe thin films in well-controlled way.Most importantly, by using scanning tunneling spectroscopy (STS), a superconductive gapas large as 20 meV and the vortex state under magnetic field are revealed in the single unit-cell thick FeSe films on $SrTiO_3$(001) substrate. Such an interface enhanced high Tc superconductor is further confirmed byrecent transport measurements. The study not only demonstrates a way for finding newsuperconductors with high T_C, but also provides a well-defined platform for systematic study ofthe pairing mechanism of unconventional superconductivity by using different superconducting materials andsubstrates.

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Superconducting gap and quasi-particle interference in FeSe

Tetsuo Hanaguri

RIKEN Center for Emergent Matter Science, Wako 351-0198, Japan

In spite of its simple crystal structure, FeSe exhibits various interesting phenomena including nodal superconductivity and tetragonal-to-orthorhombic structural phase transition which may be related to the orbital ordering. We performed low-temperature spectroscopic-imaging STM on high-quality single crystals of FeSe to investigate the superconducting gap and the electronic states in the orthorhombic phase. Because of the orthorhombic distortion, the sample is naturally twinned. It was found that the twin boundaries affect the superconducting gap in an interesting way. We also succeeded in observing quasi-particle interference (QPI) patterns. Unidirectional electron- and hole-like QPI branches are clearly identified in the Fourier-transformed QPI images and they disperse in orthogonal directions. We argue the relationship between QPI and superconducting gap.

Presenting author: Prof. Tetsuo Hanaguri

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Evolution of Electronic Nematicity across the Pnictide Phase Diagram

Abhay Pasupathy

Department of Physics, Columbia University, New York, NY 10027, USA

In several recent STM experiments, electronic nematicity in the iron pnictides has been observed as spatial patterns in the local density of states that break four fold rotational symmetry. These include measurements in the 122, 111 and 11 families of compounds. I will discuss STM data primarily obtained on the 111 family, where we now have a complete set of data available across the temperature-doping phase diagram. I will show that the spatial structure of the nematic features evolve strongly as a function of doping, and pose the question of whether a single mechanism can account for all the nematic features seen in the data. I will also make comparisons between the nematic features seen across different families of compounds and identify commonalities.

Presenting author: Prof. Abhay Pasupathy

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Atomic-scale Visualization of Electronic Nematicity andCooper Pairing in Iron-based Superconductors

Tien-Ming Chuang

Institute of Physics, Academia Sinica, Nankang, Taipei 11529, Taiwan

The work presented here is in collaboration with Milan P. Allan, Andreas W. Rost, Ni Ni,P. C. Canfield, H. Eisaki,Eun-Ah Kim, A.P. Mackenzie, G. S. Boebinger and J.C.Séamus Davis.

In iron-based superconductors (FeSC), superconductivity emerges when the antiferromagnetic-orthorhombicparent state is suppressed upon chemical doping.One of the key features of this parent state is the existence of electronic nematicity, first identified by using Spectroscopic Imaging-Scanning Tunneling Microscope (SI-STM)[1]. Moreover, the related in-plane transport anisotropy becomesinitially more pronouncedwith increasing doping concentrationfrom the ‘parent‘ nematic state andthen vanishes when the it disappears near the maximum superconducting T_C. The interplay between the electronic structure surrounding each dopant atom, quasiparticle scattering therefrom, and the transport anisotropyhas therefore become a keyfocus. By direct imaging the atomic-scale electronic structure, we show thatanisotropic impurity states induced by dopant atoms can provide simple explanations for these phenomena in the normal state of FeSC[2].

Finally, we show that Cooper pairing in FeSCleads to highly anisotropic gap structures, with different orientation on different bands, consistent with antiferromagnetic spin fluctuation pairing[3].One could further distinguish between models postulating antiferromagnetic spin-fluctuations or orbital fluctuations byexploringthe electron-boson coupling signatures in the electronic self-energy.We recently demonstrate that the energy-momentum characteristics of these self-energyfeatures are highly consistent with the antiferromagnetic spin fluctuation scenario for FeSC[4]. In particular, the strong modification of the self-energy along the interband (π,π) directionat the relevant energies in the superconducting state comprises the predicted QPI signatures due to antiferromagnetic spin-fluctuations.

1 Science 327, 181 (2010).
2 Nat Phys 9, 220 (2013).
3 Science 336, 563 (2012).
4 arXiv: 1402. 3714 (2014).

Presenting author: Prof. Tien-Ming Chuang

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Imaging the evolution from a Mott insulator to a charge ordered insulator in lightly doped cuprates

Yayu Wang

Department of Physics, Tsinghua University, Beijing 100084, China

Although the mechanism of superconductivity in the cuprates remains elusive, it is generally agreed that at the heart of the problem is the physics of doped Mott insulators. A crucial step for solving the high temperature superconductivity puzzle is to elucidate the electronic structure of the parent compound and the behaviour of doped charge carriers. In this talk we report recent scanning tunneling microscopy studies of the atomic-scale electronic structure of the parent and lightly doped cuprates in the antiferromagnetic insulating regime. In the parent Mott insulator, the full electronic spectrum across the Mott–Hubbard gap is uncovered for the first time. Defect-induced charge carriers are found to create broad in-gap electronic states that are strongly localized in space. In lightly doped Bi-2201 compounds, we show that the main effect of charge doping is to induce a spectral weight transfer from the high energy Hubbard band to the low energy in-gap states. At sufficiently high doping, a sharp energy gap starts to form near the Fermi level, and is accompanied by the emergence of a charge ordered pattern. Our results demonstrate that the first ordered phase in the doped Mott insulator is a charge ordered insulator, which will gradually evolve into the superconducting state upon further doping.

Presenting author: Prof. Yayu Wang

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Nematic and stripe charge order in high temperature and conventional superconductors

Christoph Renner

MaNEP - DPMC, University of Geneva, 1205 Geneva, Switzerland

The interplay between superconductivityand ordered electronic phases remains an open questionin a range of superconducting compounds. We present new STM/STS studies revealing real space ordered electronic phases in YBCO and in copper intercalated 1T-$TiSe_2$. In YBCO, we find a spatial charge modulation associated with low energy spectral features previously associated with vortex cores. Intercalating a small amount of copper into 1T-$TiSe_2$alters the 2x2 CDW of the pristine phase into a striped CDW. The phase diagrams of these two materials share common features and we discuss possible implications of our STM/STS experiments on the current understanding of these superconducting materials.

Presenting author: Prof. Christoph Renner

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Applying scanning tunneling microscope to study the Fermi surface and pseudogap evolution in cuprate superconductors

Yi Yin

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We observed a Fermi surface reconstruction slightly below optimal doping for a single bismuth-based cuprate family, by tracking the hole-doping (p) dependence of the quasi-particle interference pattern. In addition, we provide a phase-sensitive proofthat d-wave superconductivity coexists with the pseudogap on the antinodal Fermi surface of an overdopedcuprate. The Fermisurface reconstruction indicates a quantum phase transition in proximity to the maximum Tc, with no effect on smoothly evolving pseudogap. Then we discussed the relationship between cuprate superconductivity and the pseudogap state.

Presenting author: Prof. Yi Yin

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Identifying the superconductivity mechanism and pairing gap in iron based superconductors by scanning tunneling spectroscopy

Hai-Hu Wen

Center for Superconducting Physics and Materials, National Laboratory of Solid State Microstructures and Department of Physics, Nanjing University, Nanjing 210093, China

The pairing mechanism and gap structure in the iron pnictides remains unresolved yet. We have conducted low temperature and high magnetic field scanning tunneling spectroscopy (STS) study on the $Ba_{1-x}K_xFe_2As_2$, $Na(Fe_{1-x}T_x)As$ (T=Co, Cu, Mn) and KFe_2As_2 single crystals. First, we show the clear evidence of the in-gap quasi-particle states induced by the non- or very weak magnetic Cu impurities in $Na(Fe_{0.97-x}Co_{0.03}Cu_x)As$ by measuring the scanning tunneling spectroscopy, giving strong evidence of the $S^{\pm}$ pairing[1]. Furthermore, we show the presence of the bosonic mode[2,3] with the energy identical to that of the neutron resonance with a simple linear relation $\Omega/k_BT_c \approx 4.3$. This mode can also be explained very well as the consequence of the S± pairing.

Recently we accomplished the STS measurements on the KFe_2As_2 and discovered a huge peak at about -4 meV on the STS below and above T_c. After a detailed analysis, we conclude that this peak is induced by the Von Hove singularity[4] and explains many interesting features in this interesting material. Our data together with the ARPES data can give a very strong constraint on the pairing mechanism. These observations strongly suggest that the antiferromagnetic spin fluctuation is the key factor for superconductivity.

In collaboration with: Huan Yang, Zhenyu Wang, Delong Fang, Lei Shan, Qianhua Wang, Chenglin Zhang, Pengcheng Dai, Hong Ding, Jiangping Hu and Pierre Richard et al..

[1]Huan Yang et al., Nature Communications **4**, 2947 (2013).
[2] Zhenyu Wang, et al., Nature Physics **9**, 42-48(2013).
[3]Lei Shan, et al. Phys. Rev. Lett. **108**, 227002 (2012).
[4] Delong Fang et al., To be published.

Presenting author: Prof. Hai-Hu Wen

E-mail of presenting author: hhwen@nju.edu.cn

Scanning Tunneling Microscope as a Powerful Tool for Exploring Materials with Knowing Whom

Ang Li

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Scanning tunneling microscopy/spectroscopy (STM/S) is a powerful tool for characterizing materials at atomic level. People like it because it brings the object under investigation right in front their eyes. However, the situation is not always so simple and straightforward, particularly for those emergent complex compound. Surface identity as well as defects atop or even underneath could affect the material properties in an unexpected manner. Knowing what objects are being studied is the prerequisite for correctly interpreting the experimental observations. In this talk I will demonstrate how the surfaces are identified in "122" iron-based pnictide superconductors with versatile STM work. In addition to the chemical identity, a variety of topographic defects on these surfacesarerecognized and their electronic behaviors will be compared. Our latest study on another group of functional material, magnetically doped topological insulator, will be shown as another example to demonstrate the power of STM to explore the microscopic world.

Presenting author: Prof. Ang Li

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STM studies of correlated materials

Steffen Wirth

MPI for Chemical Physics of Solids Dresden, Germany

Electronic correlations give rise to a plethora of interesting phenomena and phases. For example, hybridization between 4*f* and conduction electrons in heavy fermion metals may result in the generation of low-energy scales that can induce quantum criticality and unconventional superconductivity. One of the most important techniques that helped shaping our understanding of nonlocal correlations, both magnetic and superconducting, has been tunneling spectroscopy (STS) with its unique ability to give local, microscopic information that directly relates to the one-particle Green's function.

We studied the temperature evolution of hybridization effects and Kondo lattice coherence as observed by STS, focusing on the model heavy fermion metal YbRh2Si2 and the intermediate-valence insulator SmB6. Our STM and STS studies on high-quality single crystals of Yb(Rh1-x*M*x)2Si2 (*M* = Co, Ir) focus on the evolution of the signatures of the development of Kondo lattice coherence. The findings by STS are augmented by magnetotransport and thermodynamic measurements, which allows us to generalize our findings to other materials. Low-temperature in-situ cleaving of SmB6 single crystals mostly resulted in reconstructed surfaces, while non-reconstructed patches were found only occasionally. Spectroscopy on the latter can be described by a Fano resonance and hence, the hybridization picture typically considered for this material could be fully confirmed. All types of surfaces, reconstructed and non-reconstructed, displayed a finite zero-bias conductance of considerable magnitude confirming the robustness of the metallic surface states.

For the two superconducting classes of materials Ce*M*In5 and FeSe we found by STS indications for pseudogap-like behavior in the local density of states. Combining STM with magneto-transport measurements on CeIrIn5 indicated the presence of weak scattering of the quasiparticles by magnetic excitations and revealed a model-independent, single-parameter scaling of the Hall angle governed solely by this pseudogap state. The pseudogap-like density of states could directly be visualized by STS on CeCoIn5. In the archetypal Fe-based super-conductor FeSe the pseudogap-like depression of the density of states is clearly distinct in nature from the superconducting gap. Our results suggest that an orbital-ordered phase is responsible for the pseudogap and competes with superconductivity.

Work done in collaboration with Z. Fisk, C. Geibel, S. Kirchner, C. Koz, C. Krellner, S. Rößler, U. Schwarz, S. Seiro, Q. Si, F. Steglich and L. H. Tjeng.

Presenting author: Prof. Steffen Wirth

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Majorana mode inartificial topological superconductors and single-layer FeSe on $SrTiO_3$ with a superconducting T_c above 100 K

Jin-Feng Jia

Key Laboratory of Artificial Structures and Quantum Control (Ministry of Education), Department of Physics and Astronomy, Shanghai Jiao Tong University, Shanghai 200240, China

In the first part, I will talk about our efforts to identify Majorana fermions in the vortex core of artificial topological superconductors. We systematically investigated the spatial profile of the Majorana mode and the bound quasiparticle states within a vortex in $Bi_2Te_3/NbSe_2$. While the zero bias peak in local conductance splits right off the vortex center in conventional superconductors, it splits off at a finite distance ~20nm away from the vortex center in $Bi_2Te_3/NbSe_2$, primarily due to the Majorana fermion zero mode. While the Majorana mode is destroyed by the interaction between vortices, the zero biaspeak splits as a conventional superconductor again. This work provides consistent evidences of Majorana fermions and also suggests a possible route to manipulatingthem. In the second part, I will talk about a direct transport measurement of high T_c superconductivity in the FeSe/STO system. By *in situ* 4-point probe technique that can be conducted at an arbitrary position of the single-layer FeSe films on STO, we detected superconductivity transition at a temperature above 100 K.

* In cooperation with Jin-Peng Xu, Mei-Xiao Wang, Zhi Long Liu, Jian-Feng Ge, Xiaojun Yang, Canhua Liu, Zhu An Xu, Dandan Guan, Chun Lei Gao, Dong Qian, Ying Liu, Qiang-Hua Wang, Fu-Chun Zhang, Qi-Kun Xue

Presenting author: Prof. Jin-Feng Jia

E-mail of presenting author: jfjia@sjtu.edu.cn

Meeting Venue

Building M, Room 234, Institute of Physics (IOP), Chinese Academy of Sciences
Address: No.8, 3rd South Street, Zhongguancun, Haidian District, Beijing 100190. It is close to the Beijing Jade Palace Hotel, about 10 minutes walking distance. In the Morning of Oct. 24, we will guide you from the Beijing Jade Palace Hotel to IOP.

Accommodation

Beijing Jade Palace Hotel 北京翠宫饭店.

http://www.jadepalace.com.cn/en/index.html

Address: No.76 Zhi Chun Road, Hai Dian District, Beijing

地址:中国·北京海淀区知春路 76 号邮编:100086

Telephone: 86-10-62628888

Reservation: We have made reservations for all the invited speakers from the US, Europe, Japan and some people from the mainland China.

Coverage: According to the agreement, we will cover the lodging fee for the hotel for the invited speakers.

Transport

From the Airport to the Hotel

Taxi: The driving distance from the Beijing International Airport to the Hotel is about 30 kilometers.The most convenient way to get to IOP and the Beijing Jade Palace Hotel from the Beijing Capital International Airport (BCIA) is by taxi, which costs around RMB 100 with no tips required.

Taxi to Beijing Jade Palace Hotel: 北京翠宫饭店北京海淀区知春路 76 号，电话：62628888

Taxi to IOP: 中国科学院物理研究所，北京市海淀区中关村南三街8号

Since it is quite straightforward to get to the Beijing Jade Palace Hotel from the Beijing International Airport by Taxi, we will NOT arrange pick-up at the Airport. We have made a map below showing the way from the airport to the hotel. On the top of the map is the name of the hotel written in Chinese so you can show to the Taxi Driver. We will arrange Ms Ling-Qian Wang to wait for you in the Hotel in the afternoon of October 23; her cell phone is 86-15210902192. In case you have any problems, please contact: Prof. Xingjiang Zhou at the cell phone: 86-13810857154.

Metro: Another easy way is to take the airport express railway from any terminal of the international airport to Sanyuanqiao Station(三元桥站) and take Metro line No.10 to Zhichunli station, exit B or exit D (知春里站 B 或 D 出口), then you can walk 10 minutes to IOP and 5 minutes to Hotel.

Shuttle Bus: One may also take shuttle bus from Beijing International Airport to ZhongGuanCun. It is RMB 24/person (single trip).

Operation time: 7:00~24:00 every 20 minutes.

Route: T3 --T2 --T1 --Xiaoying–Asian Games Village (Anhui Bridge) – XueyuanBridge – Zhongguancun(Fourth Bridge)

行驶线路:T3 航站楼--T2 航站楼--T1 航站楼--小营--亚运村（安慧桥）--学院桥--中关村（四号桥）

Please get off at the stop of Zhongguancun (Anhui Bridge) (中关村）and then walk around 1~2 minutes to IOP or 10 minutes to Beijing Jade Palace Hotel.

Travel Information

Weather: It is cold and dry in October in Beijing. The average temperature is about 12^{o}C. It may range from about 7^{o}C to 20^{o}C.

Currency: Chinese Yuan(CNY) is in general the only currency accepted in regular stores and restaurants in China. Payment in cash is still the most welcome way, although VISA and Master Card are widely acceptable in hotels, shopping centers and large restaurants. Local currency exchange is possible at foreign currency exchange counters (at the airport or some hotel counters) and banks on presentation of your passport.

For Your Electronics: The power supply in China is 220Volts/50Hz AC. The power sockets are for two or three pronged plugs.

Getting Around in China: If you would like to travel a bit further in China, you may find the following website useful in booking air tickets and hotel rooms. http://english.ctrip.com/

Reminders: Please note that tap water in China is not drinkable. Please drink water only from boiled thermal bottles, designated drinking buckets, or bottled water.

Conference Excursion

A) Great Wall(Ba Da Ling) + Forbidden City;

http://www.badaling.gov.cn/language/en.asp

http://www.dpm.org.cn/shtml/2/@/8797.html

B) Great Wall(Mu Tian Yu) + Heaven Temper;

http://www.mutianyugreatwall.com/mty_3/index_en.asp

http://en.tiantanpark.com/default.aspx

C) Beijing 798 Art Zone + National Museum of China;

http://www.798art.org/

http://en.chnmuseum.cn/default.aspx?AspxAutoDetectCookieSupport=1

D) Summer Palace + National Stadium;

http://www.summerpalace-china.com/en/index.html

http://www.n-s.cn/

E) National Centre for the Performing Arts + Shi Cha Hai;

http://www.chncpa.org/

http://en.wikipedia.org/wiki/Shichahai

International Symposium
on Frontier of Superconductivity Research (I)

Exploration of Novel Superconductors

Beijing, China, November 4-7, 2011

Scope:

The National Lab for Superconductivity at the Institute of Physics, Chinese Academy of Sciences, Beijing, is a national premier base for superconductivity research in China and an important hub for academic exchange among domestic and foreign scholars in this field. Aiming to strengthen international scientific exchange and collaboration, the National Lab for Superconductivity plans to hold "International Symposium on Frontier of Superconductivity Research" once a year.

This first 2011 symposium will focus on "Exploration of Novel Superconductors". Leading experts will provide overview, personal experience, latest results and future perspectives on various novel superconductors, including cuprate superconductors, iron-based superconductors, heavy Fermion superconductors, C60-based and organic superconductors, and more. We hope to make the Symposium informative, encouraging and inspiring, particularly to young scientists and graduate students.

http://nlsc.iphy.ac.cn/scis/

List of invited speakers:

Jun Akimitsu (Kanagawa, Japan)
Eric D. Bauer (Los Alamos, USA)
Ernst Bauer (Wien, Austria)
Xianhui Chen (Hefei, China)
Ming-Hu Fang (Hangzhou, China)
Hideo Hosono (Yokohama, Japan)
Chang-Qing Jin (Beijing, China)
Dirk Johrendt (München, Germany)
Kazushi Kanoda (Tokyo, Japan)
Yoshihiro Kubozono (Okayama, Japan)
Kosmas Prassides (Durham, UK)
You-Guo Shi (Beijing, China)
Frank Steglich (Dresden, Germany)
Li-Ling Sun (Beijing, China)
Hai-Hu Wen (Nanjing, China)
Zhu-An Xu (Hangzhou, China)

Conference organizers:
Chair: Zhong-xian ZHAO
Co-Chair: Xingjiang ZHOU
Local organizing committee:
Dongning ZHENG Fang ZHOU
Conference Secretaries:
Beiyi ZHU Jin CHEN

Conference contact:
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International Symposium
on Frontier of Superconductivity Research (II)

ARPES on Unconventional Superconductors

Beijing, China, October 25 -28, 2012

The National Lab for Superconductivity at the Institute of Physics, Chinese Academy of Sciences, Beijing, is a national premier base for superconductivity research in China and an important hub for academic exchange among domestic and foreign scholars in this field. Aiming to strengthen international scientific exchanges and collaborations, the National Lab for Superconductivity plans to hold "International Symposium on Frontier of Superconductivity Research" once a year.

This second symposium in 2012 will focus on “Angle-Resolved Photoemission Spectroscopy (ARPES) on Unconventional Superconductors”. Leading experts will provide overview, personal experience, latest results and future perspectives on ARPES studies of unconventional superconductors, including cuprate superconductors and iron-based superconductors. We hope to make the Symposium informative, encouraging and inspiring, particularly to young scientists and graduate students.

List of Invited Speakers

Arun Bansil (Boston, USA)
Sergey V. Borisenko (Dresden, Germany)
Juan Carlos Campuzano (Argonne, USA)
Hong Ding (Beijing, China)
Dong-Lai Feng (Shanghai, China)
Atsushi Fujimori (Tokyo, Japan)
Peter D. Johnson (Brookhaven, USA)
Adam Kaminski (Ames, USA)
Makoto Hashimoto (Stanford, USA)
Kozo Okazaki (Tokyo, Japan)
Zhe Sun (Hefei, China)
Shan-Cai Wang (Beijing, China)
Xing-Jiang Zhou (Beijing, China)

Conference organizers:
Chair: Zhong-Xian ZHAO
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Local organizing committee:
Dong-Ning ZHENG Fang ZHOU
Conference Secretaries:
Bei-Yi ZHU Ling-Qian WANG
Shao-Peng CUI

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International Symposium
on Frontier of Superconductivity Research (III)

Neutron Scattering on Unconventional Superconductors

Beijing, China, October 24 -27, 2013

The National Lab for Superconductivity at the Institute of Physics, Chinese Academy of Sciences, Beijing, is a national premier base for superconductivity research in China and an important hub for academic exchange among domestic and foreign scholars in this field. Aiming to strengthen international scientific exchanges and collaborations, the National Lab for Superconductivity has decided to hold "International Symposium on Frontier of Superconductivity Research" once a year.

This third symposium in 2013 will focus on “Neutron Scattering on Unconventional Superconductors”. Leading experts will provide overview, personal experience, latest results and future perspectives on Neutron Scattering studies of unconventional superconductors, including cuprate superconductors, iron-based superconductors and other unconventional superconductors. We hope to make the Symposium informative, stimulating and fruitful, particularly to young scientists and graduate students.

List of Invited Speakers

Wei Bao (Beijing, China)
Markus Braden (Köln, Germany)
Dongfeng Chen (Beijing, China)
Pengcheng Dai (Beijing, China)
Alan Goldman (Ames, USA)
Martin Greven (Minnesota, USA)
Bernhard Keimer (Stuttgart, Germany)
Yuan Li (Beijing, China)
Christopher Stock (Edinburgh, UK)
John M. Tranquada (Brookhaven, USA)
Fangwei Wang (Beijing, China)
Jinsheng Wen (Nanjing, China)
Kazuyoshi Yamada (Tsukuba, Japan)

Conference organizers:
Chair: Zhong-Xian ZHAO
Co-Chair: Xing-Jiang ZHOU
Co-Chair: Peng-Cheng DAI
Local organizing committee:
Dong-Ning ZHENG Fang ZHOU
Conference Secretaries:
Bei-Yi ZHU Ling-Qian WANG
Shao-Peng CUI

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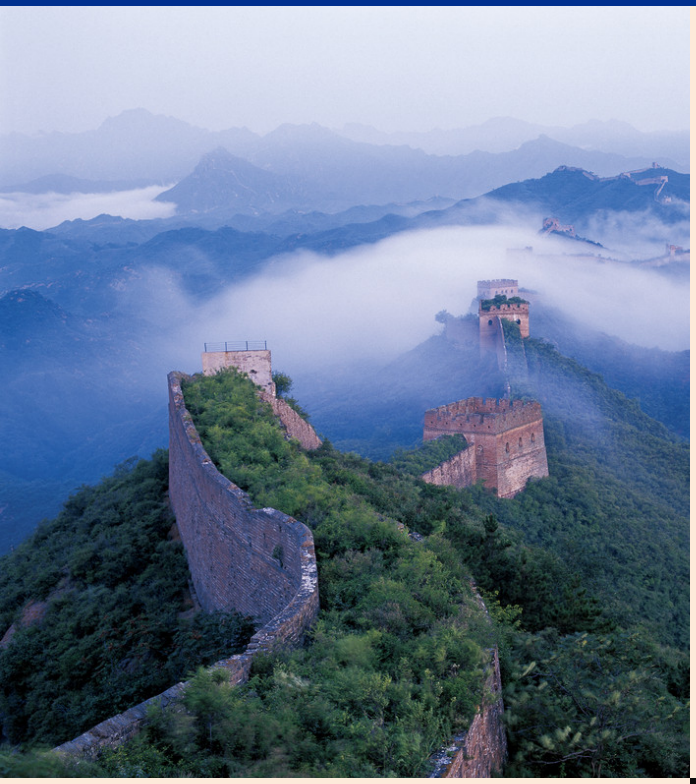
International Symposium
on Frontier of Superconductivity Research (IV)

STM on Unconventional Superconductors

Beijing, China, October 23 - 26, 2014



The National Lab for Superconductivity at the Institute of Physics, Chinese Academy of Sciences, Beijing, is a national premier base for superconductivity research in China and an important hub for academic exchange among domestic and foreign scholars in this field. Aiming to strengthen international scientific exchanges and collaborations, the National Lab for Superconductivity has decided to hold "International Symposium on Frontier of Superconductivity Research" once a year.

This fourth symposium in 2014 will focus on “STM on Unconventional Superconductors”. Leading experts will provide overview, personal experience, latest results and future perspectives on Scanning Tunneling Microscopy(STM) studies of unconventional superconductors, including cuprate superconductors, iron-based superconductors and other unconventional superconductors. We hope to make the Symposium informative, stimulating and fruitful, particularly to young scientists and graduate students.

List of Invited Speakers

Tien-Ming Chuang (Taiwan)
Mohammad Hamidian (Cornell, USA)
Tetsuo Hanaguri (RIKEN, Japan)
Jinfeng Jia (Shanghai, China)
Aharon Kapitulnik (Stanford, USA)
Ang Li (Shanghai, China)
Shuheng Pan (Beijing, China)
Abhay Pasupathy (New York, USA)
Christoph Renner (Genève, Switzerland)
Yayu Wang (Beijing, China)
Hai-Hu Wen (Nanjing, China)
Steffen Wirth (Dresden, Germany)
Qi-kun Xue (Beijing, China)
Yi Yin (Hangzhou, China)

Conference organizers:
Chair: Zhong-Xian ZHAO
Co-Chair: Xing-Jiang ZHOU
Co-Chair: Lei SHAN
Local organizing committee:
Dong-Ning ZHENG Fang ZHOU
Conference Secretaries:
Bei-Yi ZHU Ling-Qian WANG

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