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| The Dean's Address

The Dean's Address



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| The Dean's Address

Peking University is the first institute of higher learning in modern China to conduct physics education and research. It has been over a hundred years since Peking University established its physics division in 1913. One hundred years on, we have experienced the hardships of pioneering, the prime time of the National Southwest Associated University period, the vigorous development at the foundation of the new country, and the huge progress brought by the execution of the Reform and the Opening Up policy. Generations of scholars here have consolidated the foundation for the education and research of physical science and modern science in general in China with their combined vision, perseverance and innovation. Today, Peking University School of Physics has become a highly renowned research and talent cultivation center in physics.

As it embarks on its second century, Peking University School of Physics establishes its new goal of developing into the world's top institution of physics education and academia. In order to achieve this goal, we will carry out our distinguished traditions, identify the specific target purpose, construct a scientific and sustainable mechanism, attract and train the outstanding talent groups, create a free and corporative environment, develop a rigorous and truth-seeking academic attitude, and cultivate an exceeding and innovative scholarly spirit.

The root of our work lies in promoting physics research. Based on my observations of many colleges and —both spatially

and temporally—as big as universes and galaxies, small as atoms and quarks, and as fast as attoseconds, slow as billion years. The research in Peking University School of Physics is not only devoted to the frontiers of fundamental physics but also to the innovation of advanced technology as well as to the exploration of interdisciplinary collaborations.

We strive to follow the development trend of physics research and expect to make continuous breakthroughs in the future.

The center of our work is attracting and cultivating talents. We have been engaging ourselves in discovering, attracting and training leading innovative talents, including distinguished scientists, outstanding young scholars and students. We seek to provide for them favorable research and living conditions, a free and friendly working environment and a sustainable room to develop. It is our belief that the true meaning of our lives here at Peking University School of Physics lies in the infatuated and persistent exploration into the infinite world of the unknown.

Today, Peking University School of Physics will continue to extend its great scholarly tradition of "Diligence, Rigorousness, Truth, and Innovation", make down-to-earth, united and active efforts in order to build the School into a leading institute of physics education and research that not only plays a leading role in China but also exerts an important impact on all over the world.

Xincheng Xie Dean of School of Physics, Peking University

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General View of Personnel





Divisions

•	Institute of Theoretical Physics
•	Institute of Condensed Matter and Material Physics
•	Institute of Modern Optics
•	Institute of Heavy Ion Physics
•	Institute of Plasma Physics and Fusion Studies
•	Department of Technical Physics
•	Department of Astronomy
•	Department of Atmospheric and Oceanic Sciences
•	Teaching Center for General Physics
•	Teaching Center for Experimental Physics
•	Electron Microscopy Laboratory
•	Center of High Energy Physics
•	International Center for Quantum Materials
•	Kavli Institute for Astronomy and Astrophysics

01 Institute of theoretical physics

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condensed matter and statistical physics which cover from the scale of the universe down to microscopic scales of elementary particles.

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		032 (2014)	
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		Cosmology"	" International workshop for String
		theory and cosme	ology"
2013	AdS ₃ /		
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		041	JHEP 1403 (2014) 137

Entanglement entropy is an important notion in quantum many body system, encoding the valuable information of the system, for example the active degrees of freedom. It may be used to be the quantum order parameter in condensed matter system, to characterize non-equilibrium states. In recent years, the entanglement entropy has been studied in the context of AdS/CFT correspondence. Due to infinite

to compute the entanglement entropy in a quantum field theory. People proposed a holographic way to compute such entropy in classical gravity. This holographic entanglement entropy(HEE) set up a bridge between gravity and quantum field theory. It not just provides a new computing tool, but also helps us to understand the nature of gravity. One central question about holographic entanglement entropy is to

theory. In the spring of 2013, it was proved that the holographic computation of the entanglement entropy is correct at the leading order in the context of AdS_3/CFT_2 correspondence. In the case, the quantum gravity in AdS_3 is equivalent to a kind of conformal field theory(CFT) with certain central charge. As the central charge is inversely proportional to the gravitational coupling constant, the large central charge limit in the

gravity. Therefore, the subleading contribution in CFT should correspond to 1-loop quantum correction to the HEE. It is an important question to study the HEE in the subleading order. Prof. Bin Chen in ITP and his collaborators discussed the entanglement entropy of two-interval JHEP 1311 (2013) 16 and single interval at finite temperature case (JHEP 1408, 032 (2014)). They found that in the large central charge

with the holographic computation in both the leading and subleading orders. These studies provide very strong support to the holographic computation, and open a new window to investigate the entanglement entropy and holographic principle.

Furthermore, the group extended the study on the entanglement entropy to the CFT with W symmetry (JHEP 1404 (2014) 041) and logarithmic CFT(JHEP 1403 (2014) 137), and obtained good agreements with the HEE in the dual quantum gravities. Very recently, the group investigated the large interval entanglment entropy of 2D CFT at high temperature, and proved an universal relation between thermal entropy and entanglement entropy for a CFT with discrete spectrum.

LHC

LHC

QCD

Physical

Review Letters, 110, 082001, 2013

Tevatron

LHC ^ I

the initial states and the final states. Recently, Prof. Chong Sheng Li's group and Prof. Li Lin Yang's group jointly developed a systematic framework to perform transverse momentum resummation in any process, and applied this method for top quark pair production. This work was published in Physics Review Letters, 110, 082001 (2013), which gives the most accurate QCD prediction for the transverse momentum distribution of top quark pairs. These results helps to explain the discrepancy between theory and experiment on the forwardbackward asymmetry in top quark pair production. Meanwhile, the new framework provides a new infrared subtraction method to compute the next-to-next-to-leading order (NNLO) QCD effects in top quark pair production, which are eagerly demanded by LHC experimentalists. This work was reported as a research highlights in Asia Pacific Physics Newsletter, and has been verified by the experimental results of the ATLAS collaboration

Hua Xing Zhu (now a postdoc at Stanford Linear

Accelerator Center), Hai Tao Li and Ding Yu Shao (now a postdoc at University of Bern) played an important role in this research.

How to calculated the fully differential decay rate of the top quark at NNLO in QCD was an unsettled problem in recent 20 years. Based on the softcollinear effective theory, Prof. Chong Sheng Li and his former students, Jun Gao (now a postdoc at Southern Methodist University) and Hua Xing Zhu (now a postdoc at Stanford Linear Accelerator Center), proposed a new infrared subtraction method, and

in top quark decay at NNLO in QCD. This work was published in Physical Review Letters, 110, 042001 (2013), and was quoted by Alexander Mitov (a leading international QCD expert at CERN) as "opening the door for future fully differential NNLO calculations of top pair production and decay". In the report of Snowmass 2013, 3 physicists including M. Schulze quoted both of the above works and especially, described the work on top quark decay using one page.

02 Institute of Condensed matter and Material Physics



There are 59 faculty members in the institute, consisting of 18 full professors, 20 associate professors, 14 engineering technicians, 3 Qingqian professors and 4 Bairen professors. Among the senior researchers are 4 academicians of the CAS, 4 Chang Jiang scholar professors and 5 national distinguished young scholars. The research fields covering a wide range include Devices and Physics of Wide-gap semiconductors, Condensed Matter Physics, Nanosized Semiconductors and Optoelectronic Physics, Surface physics and Scanning Tunneling

microscopy, Physics and Devices of High Temperature Superconductors, Low-dimension Nanostructure and Physics, Soft Condensed Matter Physics, and Physics of Magnetism and Advanced Magnetic Materials.



1

1935 Wigner Huntington (J. Chem. Phys. 3, 764,(1935))

pressure, the black solid line is the melting curve we established in our study.

300 GPa



Theoretical descriptions of material properties, according to the Born-Oppenheimer approximation,

ab-initio description of the electronic structures and a proper treatment of the nuclei' s propagation on the corresponding potential energy surfaces (PESs). Currently as one of the most powerful methods on fulfilling such tasks, standard ab-initio molecular dynamics (MD) addresses the electronic states well in many cases. The treatment of the nuclei' s

4, 2064 (2013). Ji Chen, a Ph.D student of our school, is the first author. Prof. Xinzheng Li is the chief

designer. This research is partially supported by the NSF of China and the MOST of China.



Nanopore-based DNA sequencing is considered to be the most active and potential candidate for next generation fast and low-cost gene sequencing technique. It features many advantages such as labelfree, amplification-free, low reagent-volume, long read length, single-molecule approach, and high

gene sequencing within 24 hours under cost below 1000 US dollars. When DNA molecule in solution is electrophoretically driven through a nanopore which separates two chambers with conductive electrolyte under an applied voltage, the ionic current through the nanopore is partially blocked by the passing molecule. The modulation of the current reveals useful information of the structure and dynamic motion of the molecule.

One of the main challenges remained in solid-state nanopore based sequencing field is the membrane containing nanopore is too thick (usually >20nm for conventional SiN nanopores) to reach single base discrimination resolution. Except graphene, few kinds of solid-state pores have capability in achieving enough high spatial resolution in DNA sequencing. BN has low dielectric constant, high mechanical strength, large thermal conductivity, and high corrosion resistance. Moreover, the thickness of a single layer BN is comparable to the spacing between nucleotides in ssDNA (0.34 nm), which makes it a competitive candidate to realize single-base resolution on superthin nanopore structures.

A nanopore group led by Prof. Qing Zhao and Prof. Dapeng Yu in Peking University has achieved progress

technique, they successfully fabricated size tunable BN nanopore devices and demonstrated the first

double-stranded DNA molecules were successfully translocated through high quality two- or three-layer BN nanopores. The BN nanopores showed much higher sensitivity in DNA single-molecule detection

of BN is around 1.1 nm, from TEM analyses and numerical simulations, indicating BN has reached the best spatial resolution of graphene, which provides another competitive candidate for DNA sequencing. The ultrathin BN nanopores provide substantial opportunities in realizing high spatial sensitivity nanopore device for various applications. The results have been published in Advanced Materials 25, 4549 (2013).

InGaN 3.39-0.64

InN In InGaN InGaN In InGaN InN In InGaN





Figure 1. CPGE measurement with ionic liquid gating. (a) The schematic diagram of the ionic liquid gating diagrams for the modulation of the CPGE with ionic liquid gating EDL transistor. (c) The CPGE current

InGaN compound semiconductor, with a continuous tunability of bandgap energy from 3.39 to 0.64 eV, covers a broad wavelength from ultraviolet to infrared and thus makes it possible to realize the optoelectronic devices with tunable wavelengths. Unfortunately, the epitaxy of InN is extremely difficult, which leads to the difficulty of epitaxy of InGaN, in particular that with high In composition. This definitely limits its application in devices. In principle, people should sovle the growth difficulty and achieve InN material satisfying the devices requirements, which definitely

of quantum structures such as In(Ga)N quantum wells with relatively high In content is somehow easier and can be used for devices much earlier. Therefore, both aspects should be concentrated on for nitrides researchers in order to fabricate In(Ga)N-based devices. Wang and Shen's group at Research Center for Widegap Semiconductors in School of Physics, has deeply studied the lattice-polarity-controlled epitaxy of InN by molecular beam epitaxy and investigated the carrier scattering mechanism in InN layers. They proposed a novel boundary-controlled-epitaxy method and improved the crystalline quality of InN. The density of threading dislocations and point defects was reduced, which leads to a record room temperature electron mobility of 3280 cm2/Vs at InN layer in 2012. This value was upgraded to more than 3500 cm²/Vs in 2013. The group further studied the p-type doping effect and the photoconductivity of InN, clarified the usual negative photoconductivity in InN and then proposed a new way to confirm the conduction

[Scientific Reports, 4, 4371 (2014)]. The group also studied the epitaxy of InGaN alloys and digital alloys, paying attention to the control of the ultrathin In(Ga) N layer. Finally, they achieved the quantum structures with one atomic layer InN and InGaN wells. In particular, the in-plane ordered arrangement of In and Ga atoms was achieved.

Taking advantages of broad tunability of carrier density in electric-double-layer transistors (EDLTs) with ionic-liquid gating, they demonstrated the evidence of parallel conduction from both p-type bulk and n-type surface in Mg-doped InN EDLTs. Large anomalous oscillation in Hall coefficients with decreasing gate bias was observed in Mg-doped samples, providing the proof for the p-type bulk conduction in Mg-doped InN. Electrically manipulating electron spins based on Rashba spin orbit coupling (SOC) is a key pathway for applications of spintronics. Two-dimensional

SOC platform, where spin polarization can be tuned with an electric field perpendicular to the 2DES. By measuring the tunable circular photogalvanic effect (CPGE), they presented an electric-field modulated spin splitting of surface electrons on InN thin films that is a good candidate to realize spin injection [Nano Letters 13, 2024 (2013)]. The clear gate voltage dependence of CPGE current indicates that the spin splitting of the surface electron accumulation layer is effectively tuned, providing a way to modulate the injected spin polarization in potential spintronic devices. The study on surface electron manipulation has been extended to the WSe2. In collaboration with Cui's group at Stanford University, a spin-coupled valley photocurrent, within an electric-double-layer transistor based on WSe2, was successfully observed [Nature Nanotechnology 9, 851, (2014)]. This research work is partially supported by the NSFC, the MOST of China and the State Key Laboratory of Artificial Microstructure and Mesoscopic Physics.

03 Institute of Modern Optics

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Cheung Kong Scholar professors in IMO. 3 faculties won the National Science Foundation of China (NSFC) support for Distinguished Young Scholars and 4 others won the Excellent Young Scholars from NSFC. There are totally 7 faculties elected into the Program for New Century Excellent Talents in University from the Ministry of Education of China. The group led by Professor Gong won a 9-year continuous support over 2006-2014 under the Foundation for Innovative Research Groups of the NSFC. Many of our faculties serve as editorial members or topical editors for important journals such as Optics Letters Chemical Physics Letters Opt. Commun.Adv. Opt. Mater.

Series G, Chin. Opt. In 2014, the "Extra for Innovative Reso Yunquan Liu was ap Talent Program" s optical detection of been selected as one on mechanism and a Hongbin Jiang and G Since inception, IM optical science. The intense optical phys information. With it for research and edu

1b QTMC

(Time-

Dependent Schrödinger Equation-TDSE)

" (not physically transparent)

(Quantum-Trajectory Monte Carlo-QTMC)

1a

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Classical-Quantum Correspondence for Above-Threshold Ionization" [M. Li et al., Phys. Rev. Lett 112, 113002 (2014)].

lc,d



Fig. 1 (a) Illustration of the QTMC model. The subsequent electron motion in the combined laser field and Coulomb potential after the tunnel exit is governed by the Newtonian equations. Electrons could follow the different paths, i.e., path

will interfere with each other. (b) The experimental PAD of Xe at the intensity of 0.75×10^{14} W/cm² (795 nm). (c) The simulated PAD of Xe at the intensity of 0.5×10^{14} W/cm² (795 nm). (d) The simulated PAD of Xe at the intensity of 0.75×10^{14} W/cm² (795 nm).

The multiphoton ionization and tunneling ionization

broad applications for molecular structural imaging and quantum control. Usually, one can solve the timedependent Schrodinger equations to understand the ionization of atoms and molecules in strong laser fields. However, this ab initio calculation is not physical transparent. In the collaborative groups of Prof. Yunquan Liu, Prof. Liang-You Peng and Prof. Qihuang Gong, they have developed an intuitive quantum-trajectory Monte Carlo (QTMC) model encoded with Feynman's path-integral approach, in which the Coulomb effect on electron trajectories and interference patterns are fully considered. Experimentally, they have measured photoelectron angular distributions (PADs) with high resolution for multiphoton ionization of xenon atoms in infrared laser fields, which exhibits distinct ATI spots and rings. They achieved an excellent agreement of QTMC calculation with the measured PADs of atoms in multiphoton regime. The QTMC theory sheds light on the role of ionic potential on PADs along the longitudinal and transverse direction with respect to the laser polarization, allowing us to unravel the classical origin of photoelectrons at the tunnel exit. The classical-quantum correspondence and build a bridge between the above threshold ionization and the tunneling theory was studied. This work was published on " Classical-Quantum Correspondence for Above-Threshold Ionization" [M. Li et al., Phys. Rev. Lett 112, 113002 (2014)].

VUV



2

2

6x 1012 W/cm2

Fig. 2 Harmonic spectra of hydrogen interacting with an intense driving laser at a peak intensity $I0=6\times 1012$ W/cm2, with the laser wavelength changed from 702 to 1080 nm. One can see many resonant structures and atomic line emissions.

EUV

Phys. Rev. Lett. 112, 233001 (2014)

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ultrafast all-optical switching based on ultrathin meta-surface.

| Highlights

of ultrahigh-speed information processing and optical

Raman laser reaches the record size - 20 nm in radius. These new methods and techniques hold potential for taking the optical detection limit to the single molecule level, and realize the real-time detection. The results were published in Proceedings of National Academy of Sciences and Advanced Materials (selected as cover articles), and were highlighted by Phys.org and Materials View. Relevant progress was also selected as Top-10 Progress in 2014 by MOE.

Professor Limin Tong's group from Zhejiang University also has contribution to the work.

> Chem. Commun. 2014, 50, 12458 Nanoscale, 2014, 6, 8171

> > 15.1%

Chem.

Commun. 2014, 50, 11196





Fig. (a) Morphology control for perovskite solar cells; (b) Interface engineering for perovskite solar cells.

20%

25%

Solar energy utilization is the frontier of multidisciplinary fields, including physics, energy, and material science et.al. During the past two years, photovoltaic technology based on organic-inorganic hybrid perovskite material has attracted extensive attention in academia and industry. The light-to-

20% (verified by NERL). The expected efficiency in near future will be 25%, which is similar to that for monocrystalline silicon cell. Compare to other type of solar cells, these mesoscopic structural perovskite solar cells possesses many advantages, such as the low fabrication cost, broad spectral absorption, high

Prof. Lixin Xiao, Prof. Rui Zhu, and CAS Academician Prof. Qihuang Gong have carried out intensive studies on perovskite solar cells and achieved

and Prof. Qihuang Gong adopted dual-step processing

Comparing to mono-step method, it is easier to control micro morphology of the perovskite active layer. Further optimization of the device fabrication has been performed. Enhancement of the light absorbing and charge transferring in the devices has been achieved, resulting in perovskite solar cells with improved efficiency. The studies were published in Chem.

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04 Institutes of Heavy Ion Physics



Research fields of the institute include physics and technology of advanced particle accelerator, nuclear technology and applications based on accelerators, nuclear and medical physics. There are many large research 14 C compact

AMS, superconducting RF electron accelerator and RFQ accelerator-based neutron radiography system. A laserplasma accelerator laboratory based on a 200 TW laser system has just been built. There are 45 faculty members in the institute, consisting of 1 CAS academician of CAS, 8 professors, 20 associate professors, 2 assistant professors and 10 engineers. Several outstanding young researchers have been introduced in recent years.



Photocathode injectors are widely used for linac accelerators as electron sources to generate high-density, high brightness electron bunches. Superconducting Radio-Frequency (SRF) injectors are expected to provide electron beam with high average beam current, low emittance and short pulse. DC-SRF injector, which combines a DC pierce gun and a

University in 2001. It is a potential candidate of SRF injector and the feasibility was demonstrated with a 1.5 cell cavity prototype. Recently an upgraded DC-SRF injector with a 3.5-cell superconducting cavity has been designed and constructed. For stable operation of the DC-SRF injector, auxiliary facilities including 2K helium cryogenic system, drive laser, photocathode

system etc. are also developed or improved.

As the first closed-loop 2K cryogenic system for superconducting accelerator in China, the performance of the 2K cryogenic system for DC-SRF injector is satisfactory after careful commissioning. The stability of the helium pressure is better than \pm 0.1 mbar, and total refrigeration capacity at 2 K is more than 65 W, which is larger than the designed value of 57.5W.

To improve the stability of drive laser, we have constructed new second harmonic generator (SHG) and forth harmonic generator (FHG). To compensate

their respective optical axes in alternating direction was adopted. The maximum UV power of 2W with stability better than 5% has been reached. The vacuum in the Photocathode preparation chamber was improved by using NEG pump and a process for better preparation which deposit more cesium on sample Cs2Te photocathode is higher than 3.5% and can be kept for more than 10 days. In order to stabilize the accelerating field in 3.5-Cell cavity, a digital Low Level Radio Frequency (LLRF) control system was developed. Field stability is better than 0.1% for amplitude and 0.1deg for phase. A new beam line has been designed and constructed for beam transport and diagnostics. Solenoid lenses, quadrupole magnets and dipole magnets are used for beam focusing and deflecting. There are many beam diagnostic devices such as YAG or quartz screens, faraday cups and a beam emmittance meter in the new beam line (See Fig.2).



Fig.1 DC-SRF injector with beam line and 2K cold box



Fig.2 THz radiation signal (yellow line) and RF signals

After systematic experiments, a stable beam current has been obtained for long-term operation. The electron beam energy is higher than 3MeV, duty factor is 7%, the average beam current is 0.55mA in macro pulse and the beam emmittance is about 3.0mm.mrad. The electron beam has been used for the preliminary experiment to generate THz radiation and will be used for other applications such as ultrafast electron

SRF linac with 1.3GHz cavity at 2K low temperature in China. This work was reported as an invited talk in 16th SRF conference.







ions, helium and hydrogen. Compared with bulk material, the sputtering yield of the SiC NW is much higher, and the sputtering yields show a different dependence to the nuclear stopping power because the NW' s limited volume stops the collision cascade from fully evolving.

Interaction of energetic ions with



Fig. 1 The TOFED spectrometer installed in the EAST torus hall.



Fig. 2 3D representation of the TOFED spectrometer (a) and a vertical plane drawing (b) showing the positions of detectors on the sphere of diameter D. Each S2 ring consists of 40 detector units of

detector assembly.

Neutron emission in a fusion device indicates how closely the fusion plasmas approach the ultimate goal of a self-sustained fusion power plant. The plasma neutron diagnostics are of increasing importance for characterization of the fusion burning process and for determination of the performance of future fusion devices such as ITER and DEMO. In recent years, the fusion neutron and plasma physics team at Peking University has been deeply involved in the advanced neutron emission spectroscopy (NES) instrumentation and the fusion plasma NES diagnosis at the EAST and HL-2A tokamak devices, and also resulted in more than 20 publications in international prestigious

The compact neutron spectrometers, based on liquid scintillators, a stilbene crystal and a scCVD diamond detector with 5 m of LiF layer, have been investigated and employed for the plasma discharges with the low neutron emission intensities from the small and midsize magnetic confinement devices. Two digital pulse shape discrimination techniques, including the moment analysis (MA) and digital

and achieved good neutron/gamma discrimination

performances in these compact systems. A quick and simple method for the determination of anisotropic light output makes it easy to characterize the stilbene crystal neutron spectrometer accurately. The evaluation

experiments and the diagnosis for plasma sawtooth instability were first performed by NES. Plasma ion temperature values, which are less than 1 keV, were deduced from the measured neutron spectra in EAST dd discharges with lower hybrid wave injection and

The advanced neutron spectrometer time-of-flight enhanced diagnostics (TOFED) (Fig. 1) has been developed and installed at EAST in June 22, 2014 and will be used to study the behavior of fast ions produced by the injection of external auxiliary power. The new design (Fig. 2), where the second scintillator is split into two spherical zones, is shown to enhance the discrimination capability compared to the TOFOR at JET tokamak and will provide fusion neutron spectra with reduced admixture of multiple scattering events which is essential for increasing the sensitivity to weak components in the neutron emission. The energy resolution of the TOFED spectrometer is

05 Institute of Plasma Physics & Fusion Studies

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	(P.W.Xi, X.Q.Xu,		rCYCLO
P.H.Diamond, Phys.	Rev.Lett, 112, 085001(2014))		
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ELM	ELM		
			APS-DPP 2014

onset of ELMs and prove that the linear criterion is just a limit of the nonlinear criterion. Their results demonstrated that the pedestal turbulence has strong impact on ELM dynamics and it is possible to control ELMs by modulating the pedestal turbulence. This work also provides a new framework to explain ELM control methods used in Tokomaks. This work was an invited oral presentation in 2013 APS-DPP meeting and is published on PRL. (P.W.Xi, X.Q.Xu, P.H.Diamond, Phys.Rev.Lett, 112, 085001(2014)) 2.Mr Chenhao Ma, a 2011 grade PhD student, and Dr. Xu deeply studied the turbulence spreading process

turbulence in the linear unstable zone can generate perturbations and turbulence in the linear stable zone, because of the radial correlation of the turbulence. This causes the inward front propagation of the MHD turbulence. The turbulence spreading process has a large impact on the total energy loss of an ELM.

on the electron, the ion and electron perturbations have a different cross-phase shift, which yield different

pedestal density decreases, the electron temperature perturbation has a large turbulence spreading effect and generate the large electron conducted energy loss, while the ion temperature perturbation almost has no spreading (C.H.Ma, X.Q.Xu, P.W.Xi, et al, Phys. Plasmas, 22, 010702 (2015)). The turbulence spreading effect explains the experimental scaling characteristics of ELM energy losses vs collisionality to a certain extent. Mr Chenhao Ma delivered an invited talk on this in 2014 APS-DPP meeting.

3.Mr Deng Zhao, a 2011 grade PhD student, and Dr. Waltz developed a flux tube nonlinear cyclokinetic code rCYCLO with the parallel motion and variation suppressed. This code dynamically follows the high frequency ion gyro-phase motion (with no averaging) which is nonlinearly coupled into the low frequency drift-waves thereby interrupting and possibly suppressing the gyro-averaging. It also couples the ion temperature gradient (ITG) modes driven by grad-B and collisional fluid electron drift modes to ion cyclotron (IC) modes. As required, rCYCLO cyclokinetic transport recovers gyrokinetics at high relative ion cyclotron frequency (*) and low turbulence levels. However, because the IC modes are stable and act as a turbulence sink, it is found that at high turbulence levels and low- * the cyclokinetic transport is lower (not higher) than the gyrokinetic transport. Further work is in progress with unstable IC modes to explore the possibility of driving cyclokinetic transport higher than gyrokinetic transport.

06 Department of Technical Physics



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	Highlights				
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LHC-CMS	BEPC-BES		RIKEN-RIBF	HIRFL	CIAE
	Nishina School				

There are 26 faculty members in the department, including 6 full professors, 1 professorship engineer, 8 associate professors, 1 " National Young QianRen Project" research professor, 2 " PKU BaiRen" research professors, 1 senior engineer, 1 lecturer and 5 engineers. The research fields covers experimental nuclear reaction and structure, theoretical nuclear structure, experimental high-energy physics, theoretical intermediate and high-energy physics, applied nuclear physics, radiation protection, detector technique and nuclear electronics. The department is an important part of the State Key Laboratory of Nuclear Physics and Technology, equipped with a facility of 2×1.7 MV tandem accelerator for applied nuclear physics, and a PKU-Lanzhou joint center for nuclear physics. It is the only department in the universities of China, which is supported by the national project for fostering talents of nuclear science and by the national project of defense in nuclear physics. The researches are supported by 973-project and several key projects from national natural science foundation (NSFC). The department has established many international and national collaborations, including the China-U.

collaboration with LHC-CMS in Europe and BEPC-BES in Beijing, nuclear physics collaboration with RIKEN-RIBF in Japan, HIRFL in Lanzhou and CIAE in Beijing. An undergraduate education program, named the Nishina School, has also been established with RIKEN in Japan.

	29 MeV	HIRFL-RIBLL 12Be		
		10.3 MeV		
0+	1 a		-	
		DWBA		



MeV resonance in ¹²Be, in comparison to the calculations with various spin components and the even-mixing MeV state in ¹²Be

Clustering is of fundamental importance in structure studies at all levels, from celestial bodies to elementary particles and appears as intriguing phenomenon in many systems, including nuclide. The stable nuclide is basically described according to the independent particle model, in which the nucleons are moving almost freely in a mean field, although clustering phenomenon may appear in some special cases. But for nuclei far from the -stability line cluster or molecular structures seem enhanced due most likely to the low-binding energy, size expansion and coupling to the continuum states. This change of the structure degree of freedom would cause dramatic evolution of the nuclear properties and their theoretical descriptions, which may have large impact on the nuclear technique applications and the understanding of the r-process in nuclear astrophysics.

So far the cluster structure has been experimentally identified in several states in stable nuclei, but its observation in unstable nuclei is still very scarce and often under disputing. A clear finding of a cluster state in a nucleus is very challenging, since it requires experimental determination of the excitation energy and spin systematics associated with a rotational band, the cluster decay partial width and the characteristic transition strength. Particularly the monopole transition strength has been proposed as a sensitive probe in featuring the cluster formation.

An inelastic excitation and decay experiment for neutron-rich 12Be at 29 MeV/nucleon was performed by our experimental nuclear physics group at the HIRFL-RIBLL facility in Lanzhou. Thanks to the application of a specially designed 0-degree telescope, a remarkably large peak around 10.3 MeV, just above

the angular correlation analysis, the spin-parity of this state is determined to be 0+ (Figure 1(a)), being the band head of the proposed molecular rational band. Furthermore according to the DWBA analysis (Figure

1(b)), an enhanced monopole matrix element of $7.0 \pm -$ 1.0 fm2 in the 4He + 8He decay channel is extracted, corresponding to the typical property of the transition among cluster states. In addition this resonant state possesses a large cluster-decay branching ratio, resulting in a large dimensionless reduced width of 0.53 ± 0.10 . These results reveal a typical cluster state in 12Be, in agreement with the GTCM prediction. In particular the observation of the enhanced monopole strength in an unstable nucleus has opened new possibilities for probing exotic structure at the vicinity of the neutron drip-line. Detection around 0-degrees with the silicon-strip telescope is essential in observing the resonance close to the cluster decay threshold. It would be desirable to further apply this method in subsequent similar studies.

The results were published recently in Physical Review Letters 112, 162501(2014) and Sci China-

is Zaihong Yang, a PhD candidate at the School of Physics, and the corresponding author is Prof. Yanlin Ye. The work has been supported by the 973 program and the NSFC projects.







(Phys.Rev.D90, 032008 (2014) 1)

Fig.1 SM Test at CMS via Electroweak process. The production cross-section of triple gauge boson is the

W boson can serve as an important probe for Electroweak physics. The high energy physics experimental group, as one of key contributors, has developed the jet substructure techniques for boosted W measurement (JHEP 12 (2014) 017), which is now being popularly used in CMS experiment. Our main physics output with W probe can be summarized

decay The 2 jets decayed from a W boson may merge closely due to Lorentz boost when the Higgs is heavy (>600GeV), which result in that the reconstruction of 2 jets is inaccurate even failed. A new technique, so called jet substructure technique, is developed to solve the problem, which treated 2 jets as one fat jet but kept detail information of its structure, such as spatial and energy distributions. Based on the technique, we analyzed the 19fb-1 pp data collected by CMS experiment in 2012 and published the best constraints on the cross-sections for SM and BSM Higgs in 600GeV – 1TeV mass region (Eur.Phys.J. C73 (2013) 2469). 2) Search for Graviton Randall-Sundrum model introduces heavy RS graviton to solve the hierarchy problem in standard model. WW final states, here one decays to the fat jet (boosted 2 jets) and other to leptons, could be a good measure for RS graviton and extending bulk graviton search as well as for the study on other high mass resonances in general. Our study gave the constraints on cross-section as 70fb – 3fb for bulk graviton in 800 – 2500 GeV mass region (JHEP08 (2014) 174). 3) Study on Anomalous Quartic Gauge

state is very important for standard model test and new physics. WV was chosen by us for the study, here W stands for one W decaying to leptons and V for W/Z to quarks and

measurement, we published upper limit of the triple

gauge coupling cross-section which is about 3.4 times of Standard Model prediction (Phys.Rev.D90, 032008 (2014) Fig.1) meanwhile the most stringent constraints on anomalous quartic gauge coupling. The work is jointly supported by the Ministry of Science and Technology and National Foundation of Science and Technology.





(a), (b)

Figure 1 HFB calculations in large coordinate spaces and a prolate halo. (a) neutron halo, (b) n-pairing halo.



(Rapid Communication))

QRPA

QRPA

024317 (2014))

Suggestion)

HFB

(Phys. Rev. C 90,

(Selected as PRC Editors'

(Phys.

Rev. C 90, 051304(2014)(Rapid Communication))

Extremely unstable nuclei are weakly bound quantum many-body systems, close to the threshold of existences, and are expected to have exotic structures and dynamics compared to stable nuclei. The study of extremely unstable nuclei has been the hot scientific objective of advanced radioactive nuclear beam facilities around the world. Theoretical studies need to describe properly and self-consistently the halo distributions, continuum effects, deformations and pairing correlations together, which is a challenge to conventional theoretical tools. Recently, the group of Professors Junchen Pei and Furong Xu have made a series of progresses in the exploration of novel structures and dynamics of weakly bound nuclei. They have developed a unique Hartree-Fock-Bogoliubov (HFB) solver in large deformed coordinate spaces, which has advantages in describing weakly bound nuclei. With calculations on Tianhe-1A

halo structure, i.e., with a spherical core and a prolate halo, showing the core-halo deformation decoupling. They are able to analyze the continuum contributions. This work has been published in Phys. Rev. C 87, 051302(2013) (R) as a Rapid Communication. In addition to studies of ground states. They have further developed the deformed coordinate-space QRPA method by iteratively solving method, to study dynamics of weakly bound nuclei. The conventional solving method based on the QRPA matrix form needs to calculate huge matrix elements, while the iteratively

solver, they have studied the soft monopole mode in deformed halo and its collectivity. It has been pointed out that the pairing-density halo vibration is responsible for the emergent soft monopole modes, in contrast to our usual understanding of particledensity halo vibrations. This work has been published in Phys. Rev. C 90, 051304(2014)(R) as a Rapid Communication. From two-dimension (2D) to threedimension (3D) calculations, the computing challenges are tremendous. They adopted a new numerical method that uses adaptive multi-resolution multiwavelet analysis and complicated parallel schemes. It is the first time to achieve such 3D coordinate-space HFB calculations, which can be used to study large

bound nuclei, nuclear fission, neutron stars, trapped ultracold atomic gases (Phys. Rev. C 90, 024317

and has not been applied to nuclear physics before. This work has a good innovation, and the paper was highlighted and selected as an Editors' Suggestion in Physical Review C.

PRC

07 Department of Astronomy

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Department of Astronomy of PKU was founded in 2000, based on the Astronomy Division in the Department of Geophysics established in 1960. It became a family member of the School of Physics when the later was created in 2001. The Department of Astronomy have 14 full faculty members consisting of 8 professors, 4 associate professors and 2 secretaries, 19 joint faculty members, 7 post-doctors, 50 post-graduate students, and 118

Interstellar Medium, Stellar and Planet System, and Astroparticle Physics, involving astronomical phenomena and astrophysical processes at all scales and various astrophysical environments.



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Liu, F. K.; Li, Shuo; Komossa, 1 S., " A Milliparsec Supermassive Black Hole Binary Candidate in the Galaxy SDSS J120136.02+300305.5", 2014, ApJ, 786, 103



(ESA, C. Carreau)

With my students and colleagues, we recently discovered a pair of supermassive black holes in orbit

have been found in an ordinary galaxy. We discovered them because they ripped apart and accreted a star when the European Space Agency's space observatory XMM-Newton happened to be looking in their direction. The finding also validates our predictions from 2009 of the tidal disruption by supermassive binary black holes. Our results were published in the 10 May 2014 issue of The Astrophysical Journal (Reference 1)

Most massive galaxies in the Universe are thought to harbor one supermassive black hole at their center. Two supermassive black holes are the smoking gun that the galaxy has merged with another and the strong gravitational wave radiation sources are present in

holes can tell astronomers about how galaxies evolved into their present-day shapes and sizes.

On 10 June 2010, a tidal disruption event was spotted by XMM–Newton in the galaxy SDSS J120136.02+300305.5, approximately 2 billion light years away. Follow-up observations just days later were carried out with XMM–Newton and NASA's Swift satellite. The galaxy was still spilling X-rays into space. It looked exactly like a tidal disruption event caused by a supermassive black hole, but as they tracked the slowly fading emission day after day, something strange happened. The X-rays fell below detectable levels between days 27 and 48 after the discovery. Then they reappeared and continued to follow a more expected fading rate, as if nothing had happened.

Our recent work showed that this "strange" behavior is exactly what we predicated in 2009. My group had been working on models of black hole binary systems that predicted a sudden plunge to darkness, followed by a recovery because the gravity of one of the black holes disrupted the flow of gas

configurations could reproduce the observations of

10 million solar masses and was orbited by a black hole of about a million solar masses in an elliptical orbit. In the second solution, the primary black hole was about a million solar masses in a circular orbit. In both cases, the separation between the black holes

year. This is about the width of our Solar System. Being this close, they will radiate their orbital energy away through gravitational waves, gradually spiralling together, until in about two million years time they will merge into a single black hole.

$\displaystyle 08$ The Department of Atmospheric and Oceanic Sciences



The Department of Atmospheric and Oceanic Sciences at PKU celebrates a long and prestigious heritage. Our Atmospheric Science Program traces its root back to the Meteorology Program originally founded in 1929 at Tsinghua University. After the period of the utmost fortitude at the National Southwest Associated University during World War II (1938-1945), the Department of Meteorology was established at Tsinghua University in 1946. In 1952, the faculty and students of the Department of Meteorology were all moved from Tsinghua University to the Department of Physics of Peking University, as part of the nation-wide restructuring of higher education. In 1958, Peking University established the Department of Geophysics, under which the Program of

combined to form the Program of Atmospheric Sciences in 1998. In 2001, Peking University established the School of Physics, into which the Program of Atmospheric Sciences was incorporated to become the Department of Atmospheric Sciences. Most recently, Peking University founded the Program of Physical Oceanography under the newly renamed Department of Atmospheric and Oceanic Sciences in 2010.

The Department of Atmospheric and Oceanic Sciences has a strong faculty team. There are currently 31 faculty "Bairen"

also 5 adjunct professors. More and more outstanding and internationally-trained young scientists are joining the Department in the past few years, invigorating our faculty team. In recent few years, we have received more than 16 million RMB per annum in research funding and have published approximately 60-70 SCI journal papers

physics and atmospheric chemistry; atmospheric boundary layer and environment; numerical weather prediction and simulation; atmospheric dynamics and non-linear dynamics; climate dynamics and modeling; physical oceanography, air-sea interaction and climate change, planetary atmospheres and climate, etc.

80%

°C

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early/2013/12/26/1315215111.full.pdf+html

(left) and surface temperature (right). Upper maps are for the case of a slab ocean, and the lower maps are for a dynamic ocean. For left-hand maps, blue indicates open ocean, and gray denotes ice. For the right-hand maps, the unit of temperature color bars is ° C.

PNAS

Are we alone in the Universe? Are there any other extra-solar planets (exoplanets) which can harbor Earth-life-like life? These have lone been intriguing questios that human wish to answer. So far, the most critically necessary condition for life is liquid water. Thus, the criterion for judging whether an exoplanet is habitable is whether its surface temperature allows the existence of liquid water, that is, whether its surface temperature is in the range of 0 - 70 °C. If it is below 0 °C, all water is frozen. If it is higher than 70 °C, the exoplanet would run into runaway climate state, and all water is evaporated and photo-dissociated.

Professor Yongyun Hu and his former PhD student, Jun Yang (currently a postdoctoral research scientist at the University of Chicago), from the Department of Atmospheric and Oceanic Sciences, School of Physics, Peking University, has recently studied the problems and made outstanding contribution to this subject. In this work, they have demonstrated the importance of exo-oceanography in determining climate states, habitability and the width of the Habitable Zone around M-Dwarf stars.

M-dwarf stars are the most common type of stars in the Universe. It is thus very likely that habitable exoplanets are first discovered around M Dwarfs in future. Climate patterns caused by ocean circulations, as shown in this study, may have observational consequences in both the infrared and visible phase curves of the system, which could be visible (irc)0.0dves of 0S-es w-58 Tc 0.083 Tw 0 -1.6 Tdelobservation missatis. T thhabita

of emissions. Also, the amount of emissions from

between countries, due to differences in economic structure, energy structure and emission control levels. This might greatly change the total amount of global emissions. Changes in both magnitude and spatial distribution of emissions will lead to substantial changes in regional air pollution and global transport, due to the relatively short lifetimes of air pollutants (from several hours to several months). Through these mechanisms, international trade has a profound impact on the global atmospheric environment. However, research has rarely been done in this regard.

Professor Jintai Lin and undergraduate Da Pan led an international collaborative study to analyze the impacts of China' s international trade on the global atmospheric pollution and transport (China's international trade and air pollution in the United

Instead of adopting the traditional production-based pollution analysis, the team examined the trade influences from the consumption perspective. The team calculated the emissions between 2000 and 2009 related to China's exports and imports through an economic input-output analysis and emission statistics. The study revealed that, for 2006 alone, as much as 36% of sulfur dioxide, 27% of nitrogen oxides, 22% of carbon monoxide and 17% of black carbon in Chinese anthropogenic emissions were related to production of goods for export. For each pollutant, 21% of the export-related emissions were tied to China-to-U.S. export. The total amounts of export-related Chinese emissions were larger than emissions in foreign countries related to China' s imports by a factor of 4-6. Using a global atmospheric chemical transport model called GEOS-Chem, the team further revealed that in

2006, 23-34% of sulfate particulate concentrations in the surface atmosphere of East China were caused by export-related emissions (Fig. 1a). The fractions were about 10-23% for black carbon and 12-23% for carbon monoxide (Fig. 1c,d).

The study further showed the impacts of China's export-related pollution on the global atmospheric environment, with a particular focus on air quality in the United States. The study showed that in 2006, about 3-10% of sulfate and 0.5-1.5% of ozone in the surface atmosphere of the western United States were tied to China's export-related emissions (Fig. 1a,b). The U.S. outsourcing manufacturing to China reduced emissions produced in the United States with

and thus an increase in pollution transported from China. The two factors compensated for each other, resulting in an improvement in sulfate air quality over the eastern United States with reductions in China and the western United States (Fig. 2a). The changes in

States due to the much denser population in the east. Enhancing China' s energy efficiency and emission control technologies to the U.S. level (e.g., through enhanced technology exchange) would not only reduce Chinese air pollution but also improve air quality in the United States.

The study concluded that analysis of the trade impacts on the global atmospheric environment with a consumption-based accounting would facilitate discussions of international collaboration in reducing global air pollution and transboundary transport. The paper has been awarded the 2014 PNAS Cozzarelli Prize. The annual prize is given to six papers " of ", out

of a total of ~ 3500 PNAS papers.



ENSO

Z Liu, Z Lu, X Wen, et al. Evolution and forcing mechanisms of El Niño over the past 21,000 years.

n7528/full/nature13963.html

Figure 1 TRACE simulation and observation during the last 21,000 years. a, Grey, amplitude of annual cycle of insolation (DJF–JJA) at 30S; black, meltwater

black and grey, 231Pa/230Th ratio in Bermuda. c,

SST; black, reconstruction. d, Red, Nino3.4 annual SST; black, Nino3.4 CO2 reconstruction. e, Red, ENSO amplitude in 100-year windows; black, lake sediment records in the eastern Pacific; grey, lake sediment records on the South American coast. f, Amplitude of Nino3 SST total variability in 100-year windows. The black bars show the reconstruction of total SST variance derived from sediment cores in the

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El Niño, a climatic anomalous phenomenon occurring over the eastern equatorial Pacific Ocean every 2-7 years with 1-year warmed water at sea surface, play the key role in modulating Earth' s climate on the inter-annual timescale. El Niño cause wide and unusual climatic disasters near South America, Australia, and even the coasts surrounding the entire Pacific. However, one still do not understand why El Niño behaves like this especially as the responses to key external forcing including orbital parameters,

Dr. Zhengyu Liu and his team at Peking University investigated the relationship between modeled El Niño and the observational records during the last 21,000 years. Liu and his collaborators performed a set of long-term transient climate simulations covering the last 21,000 years using coupled climate model, and compared the model results with various proxy data. It is indicated that both the orbital parameters, particularly the procession, and melting water flux dominate El Niño' s responses. On the low-varying orbital timescale, El Niño was controlled by orbital forcing through complex tropical air-sea feedbacks, which is especially evident during the Holocene, when most of the observations can be explained (Fig 1). On the fast-varying millennial timescale, however, the

El Niño' s variability in the deglaciation mainly by tuning the meridional overturning circulation of North Atlantic and the annual cycle pattern over the

The present study provides the climate community a wide view of showing how El Niño will behave as the responses to key climatic forcing, and exhibits meaningful thoughts for future climate projection under the context of global warming. In the meanwhile, one good model in paleoclimate studies was set up in terms of performing long-term transient simulations and model-data comparison especially in the paleo-ENSO community.

09 Teaching Center of General Physics

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The Teaching Center for General Physics is a branch of School of Physics at Peking University. Previously, it was

called the Teaching and Research Section of the Physics Department. The main task of the Center is to supervise all the teaching programs of general physics courses, such as mechanics, electrodynamics, thermodynamics and optics, for the sciences major undergraduate students of Peking University. It is also responsible for organizing seminars and arranging foreign exchange activities, which are closely related to teaching and learning. All the members of the Teaching Center have full teaching load each semester. They are heavily involved in making and managing the entire teaching schedule at School of Physics, too. The Teaching Center has one laboratory for

subject. Their duties cover the whole Physics 01-05 series. Each year, more than 2,000 undergraduate students take these courses. It is equivalent to a working load of 222,000 teaching units (number of students times class hours) per year.

teaching excellence, as the Teaching and Research Section of the Physics Department did traditionally in the old days. As far as the teaching faculties are concerned, except several full-time members, many professors from other departments of School of Physics participate also in teaching general physics. Since these lecturers are experienced researchers, they make their classes more interesting and illuminating to the students. On the other hand, the Center invites also some retired teachers to be senior advisors. Therefore, each teaching group has an ideal structure with respect to the distributions of faculty ages, specialties, professional ranks and teaching experiences. These teams perform at very high professional levels which are compatible with the academic stature of School of Physics at Peking University. The Teaching Center for General Physics is dedicated to sustain such high teaching standards in future.

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13 coursera

In the year of 2013, two courses of the Teaching Center for General Physics, Electromagnetism and Optics were approved by the Chinese Education Ministry for the ZGDXZYGX (The Chinese University Open On-line Excellent Courses) program. In the past two years, the faculty members at the Teaching Center for General Physics made great

by exploiting opportunities provided by Internet. Several years ago these courses were recommended as GJJPK courses (The National Excellent Courses) by the Education Ministry. This time, we made first both the courses video-taped. Then, after carefully editing and revising, we up-loaded these tapes with supplementary materials, such as the power-point files and additional explanatory documents onto the

cn/mooc/. Personally, Professor Wang Jia-Jun was in charge of upgrading the course Electromagnetism. She was aided by Professors Chen Xiao-Lin, Shen Bo, Wang Fu-Ren and Mu Liang-Zhu. Professor Zhong Xi-Hua was in charge of upgrading the course Optics. He was aided by Professors Wang Ruo-Peng, Chen Zhi-Jian, Li Yan, Wang Shu-Feng and Qu Bo.

In the meantime, Professor Wang Jia-Jun opened an online course Electromagnetism to high school students, too. At the beginning of 2013, in response to the appeals of some high school principals, the authority of Peking University decided to provide the Chinese Advanced Placement Courses to the students of these high schools. The main purpose of this program is to help some advanced students on studying mathematics and physics by themselves. Electromagnetism is one

to now, it has held three examinations. About 1,000 students took these examinations and five percent of them obtained score A. Furthermore, Professor Wang made also this course into a MOOC (Massive Open On-line Courses). Recently, COURSERA and EDX, the two major MOOC platforms based in USA have made agreements with Peking University, respectively. With their help, the University has opened 35

course of Electromagnetism. In the fall semester of academic year 2014-15, 3,600 students all over the world enrolled in this course of 13 weeks. During the teaching period, Professor Wang was aided by Dr. Mu Liang-Zhu in making quiz problems and by Mr. An Wei in uploading course materials and communicating with students. This course will be taught again each semester. We hope that it will eventually play a complementary role to the conventional classroom teaching of Electromagnetism.

10 The Teaching Center for Experimental Physics

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The Teaching Center for Experimental Physics at Peking University is a national demonstration center of experiment teaching. It is mainly engaged in teaching of "General Physics Experiment" and "Modern Physics Experiment", which are of high-quality nationwide and belong to "National Outstanding Courses". Besides, the center gives a research course called "Comprehensive Physics Experiment" to students who are willing to investigate some experimental problems. Now there are 15 faculty members in the center, in which are 2 professors, 5 associate professors, 2 lecturers, 1senior engineer, 5 engineers

2014 11 " NTCPI—



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In November of 2014, the Measuring Instrument of Nonlinear Thermal Convective Patterns NTCPI—

made teaching experiment instrument selection activities from the national wide colleges and universities, jointly organaized by the Chinese Higher Education Association Secretariat, the Guidance Committee of Ministry of Education of Laboratory Construction in higher school, the Guidance Committee of Ministry of Education of college experiment teaching, the Association of National Experimental Teaching Demonstration Center, and the Laboratory Management Branch of Chinese Institute of Higher Education. About 260 sets of instument attended this selection acvitivities from about 100 colleges and universities in Chengdu new exihibition hall. Our intrument impressed experts a lot by the clear images showed on the scene of pattern formations from disorder to order.

The Measuring Instrument of Nonlinear Thermal

Zhou Luqun, Jia Chunyan, Ran Shuneng and Liu Guochao in Teaching Center of Physics Experiment, sponsored by reform funds of the Department of laboratory and equipment management in Peking University. The Measuring Instrument is loved deeply by stutends due to the simple operation, rich phenomena, through observation and strong comprehensive, combined with the theory of dissipative structure, which won the 1977 Nobel prize in Chemistry, in order to teach the basic knowledges in nonlinear dynamics of disciplines. The instruction handouts were edited into the textbook of the course. and the instrument was used in the Modern Physics Experiments Course. Under the support of the Ministry of science and technology development, we signed signed a patent license into the agreement with the Beijing Xinglin Real-light Limited Company, trying to spread nation wide.

11 Peking University Electron Microscopy Laboratory





Quantum Chromodynamics (QCD) is believed to be the fundamental theory for the strong interaction, one of the four fundamental interactions in Nature. Unlike the mediating particle in Quantum Electrodynamics (QED)--the photons, its counterpart in QCD--the gluons, can have direct interaction among themselves. It is therefore in principle possible to form bound states of gluons which are called glueballs. Glueballs are exotic hadronic states that differ in many ways compared with ordinary hadrons and its search has always been a hot topic in the field. However, due to its non-perturbative nature and also its mixing with the ordinary hadrons, theoretical understanding and the experimental evidence are still scarce. Theoretically, one needs a non-perturbative approach. Experimentally, the world largest charmonium sample, e.g. J/Psi, being collected at BEPCII/BESIII provides a unique opportunity for a comprehensive experimental study of this long-standing problem.

Recently, important progress has been made by the

China Lattice QCD Collaboration (CLQCD) which was initiated by Prof. Chuan Liu et al in 2005. The collaboration now consists of Y. Chen (IHEP), C. Liu (PKU), Y.B. Liu (NKU), J.P. Ma (ITP), J.B. Zhang (ZJU) and their postdocs and PhD students. Lattice QCD method (a genuine non-perturbative method) is utilized to study the production of glueballs in charmonium radiative decays. The branching ratios for J/Psi decay to scalar and tensor glueballs is estimated to be 3.8(9)x10-3 and 1.1(2)x10-2 respectively. These

110, 021601 (2013) and Phys. Rev. Lett. 111 091601 (2013)). These results, when combined with relevant experimental measurements, favors the candidate f0(1710) as the scalar glueball over the other two candidates f0(1500) and f0(1370). As for the tensor glueballs, the results also suggest a comprehensive experimental study in relevant channels. All these have shed some light on the experimental search of glueballs.

13 International Center for Quantum Materials







by Peking University, aiming to create a platform of world-class excellence for physics research and education. ICQM has since been committed to building interdisciplinary research programs that span a wide spectrum of topics in condensed-matter and materials physics, to be based concretely on an intellectual environment that

collaboration and exploration at the leading edges.

ICQM is dedicated to bringing in both internationally-renowned scientists and excellent young researchers and enabling them to work together productively in a dynamical culture. Located in Beijing and amid the fast socioeconomical transformation of China, ICQM endeavors to implement new academic systems that include

As of December 2014, ICQM has on its faculty 8 Chair Professors, 3 tenured Professors, 1 tenured Associated Professor, 16 tenure-track faculty members. Among the senior researchers are 1 Nobel Laureate, 1 Member of Chinese Academy of Sciences and 7 Fellows of American Physical Society. At full strength, ICQM will have research personnel consisting of 40 permanent members and over 200 Ph.D. students and postdoctoral fellows. ICQM also provides first-rate research opportunities and solid training to younger scientist, including postdoctoral researchers and graduate students from both domestic and foreign institutions. In the past few years, ICQM has hosted 15 postdocs, several of whom have made important progresses in their research. The graduate students of ICQM are typically graduates from top Chinese universities, with exceptional academic performances. In addition to research, young researchers at ICQM are also profusely exposed to a wide-range of frontier topics research through a rich array of academic activities, such as seminars, lectures and summer schools.

Low temperature and quantum transport experiments;

Spintronics and low-dimensional magnetism experiments;

Spectroscopy and high-resolution detection experiments;

Theoretical condensed matter physics;

Computational physics.

Topics and systems of current interest include quantum transport, strongly-correlated electron systems, lowdimensional quantal systems, topological effects in condensed matter physics, mesoscopic superconducting systems, spintronics, advanced scanning tunneling microscopy, ultra-fast spectroscopy, neutron spectroscopy, ultra-cold atoms, computational simulations for quantum materials, surface dynamics, water behaviors under

In order to promote academic exchanges and collaborations on the interanational arena, collaboration agreements have been reached between ICQM and world-renowned institutions, such as Rice University, the University of Texas at Austin, Pennsylvania State University. Incoming graduate students may take advantage of the collaboration programs, such as Dual Degree Ph.D. program in Physics. In addition, ICQM has been visited by more than 100 scientists annually through various capacities.

Behavior



of the Widom line in critical phenomenon.Phys. Rev. Lett. 112,135701 (2014))



(a), negatively (b) and zero-sloped (c) coexistence line. The critical point can be traced as the terminal point of response function maxima from the supercritical region in all circumstances by choosing proper response functions.

Substance undergoes phase transitions when external fields vary. It has been know that thermodynamic properties are discontinuous along the two-phase coexistence line while they become continuous at the critical point where the difference between two

response functions beyond the critical point in the supercritical region remain unclear even for the simple gas-liquid phase transition.

Recent studies by Xu et al showed that there exists supercritical phenomenon beyond the critical point. That is, the response functions have maxima. The loci of response functions maxiam in the vicinity of the critical point is termed as the Widom line along which the magnitude of response function maxima become larger till it diverges as the critical point is approached from the supercritical region. This phenomenon has been employed to experimentally detect the critical point as the terminal point of response maxima from supercritical region in practical systems. The study also revealed that for different systems (e.g., the slope of the system is positive, negative, or almost horizontal), different response function should be employed in tracing the critical point. For instance, when the slope of the coexistence line is almost zero, the line of specific heat maxima does not follow the



" Crossover from 3D to 2D Quantum Transport in Bi2Se3/In2Se3 Superlattices" (Nano Letters 14, 5244 (2014))

(Bi2Se3)12/(In2Se3)6 (Bi2Se3)6/(In2Se3)6

SLs and (Bi2Se3)6/(In2Se3)6 SLs

Prof. Jian Wang's group, in collaboration with Prof. Xin-Cheng Xie, Prof. Maohai Xie and Prof. Yong Wang et al., firstly and systematically studied the

They investigated the quantum transport of SL heterostructure consisted of different thickness of TI layers and found that tuning the thickness of TI Bi2Se3 layers may completely change the transport dimensionality from 3D to 2D in Bi2Se3/In2Se3

SLs. The discovery demonstrated the feasibility of modulation of topological material property by using TI/NI SLs. This work may stimulate the research on exploring exotic quantum state and potential magneto-conductance, thermoelectric and spintronics applications in TI/NI SLs. The results were published in Nano Letters (Nano Letters 14, 5244 (2014)) with a title of " Crossover from 3D to 2D Quantum Transport in Bi2Se3/In2Se3 Superlattices".

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spin excitations and magnetic anisotropy in antiferromagnetically ordered BaFe2As2, Phys. Rev. X 3, 041036 (2013)

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X Longitudinal



 $M_{\rm b}, M_{\rm c}$ M_a

_b, M_c)

and longitudinal (M_a) spin excitations, along with momentum transfer direction in the scattering process relative to the antiferromagnetic spin arrangement. Right panel shows the experimental results, which

Iron pnictides, a class of high-temperature superconductors discovered only in 2008, have presented many fundamental puzzles for physicists working on superconductors. One of the puzzles is the proximity of an antiferromagnetic phase to the superconducting phase in these materials, raising the tantalizing possibility of a fundamental connection between magnetism and superconductivity. What is the microscopic origin of the magnetism, then? Existing

either arises from spin moments of electrons localized on the iron nuclei, or results from the collective ordering of spins of itinerant electrons. However, no " smoking gun" evidence has been found for either of these possibilities.

uncover an unequivocal signature of longitudinal spin excitations in the experimental spectrum. This result can be regarded as the first smoking-gun evidence for a sizable contribution of itinerant electrons to the antiferromagnetism, and it puts the plausible connection between magnetism and superconductivity on a firmer footing. The work was published in Phys. Rev. X 3, 041036 (2013), "Longitudinal spin excitations and magnetic anisotropy in antiferromagnetically ordered BaFe2As2". The first author of the paper is Chong Wang, a Ph.D. student at the ICQM, Peking University. This work was supported by MOST and NSFC.

14 The Kavli Institute for Astronomy and Astrophysics (KIAA)

		Kavli	2006	6	2007
			Kavli		
4)	1)		2)		; 3)
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				24	15

The Kavli Institute for Astronomy and Astrophysics (KIAA) is jointly supported by Peking University and an endowment made possible by a generous gift from the Kavli Foundation, USA. KIAA was established in June, 2006 and started operation in 2007. KIAA's mission is to establish an international center of excellence in astronomy and astrophysics that promotes the development of basic astrophysical research. Its primary goal is to foster frontier research in a vibrant intellectual environment. With English as its working language, KIAA is engaged in theoretical and observational initiatives, development and utilization of astronomical facilities, and training of undergraduate and graduate students and postdoctoral fellows. KIAA regularly sponsors thematic workshops, conferences, and a range of other academic activities to facilitate scientific exchange with the domestic and international astronomy community. It is establishing exchange and visiting programs with other

Kavli institutes and a network of universities and astronomy centers worldwide.

and evolution; 2) star formation, stellar and planetary systems; 3) gravitational physics and high-energy phenomena; and 4) computational astrophysics.

The Institute is under the leadership of its Director Luis C. Ho, Associate Director X.-B. Wu, and coordinator J. S. Chen. An international Science Advisory Committee provides guidance concerning proposed academic activities, assistance on major projects to set research directions, and review of new faculty appointments. KIAA works closely with the Department of Astronomy, via coordination of research activities, sharing of research facilities and resources, and training and supervising of students. Together with several joint appointments with the Department of Astronomy and other institutions, KIAA currently has 24 professors, approximately 15 postdoctoral fellows, and a number of visiting scholars.

Boroson &

Green 1992, ApJS, 80, 109

2014 9 11



The distribution of about 20,000 luminous Sloan Digital Sky Survey quasars in the two-dimensional space of broad line width versus FeII strength, colorcoded by the strength of the narrow [OIII] line emission. The strong horizontal trend is the main sequence of quasars driven by the efficiency of the black hole accretion, while the vertical spread of broad line width is largely due to our viewing angle to the inner region of the quasar.

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Quasars are accreting supermassive black holes (SMBHs) at the center of distant galaxies, with a black hole mass several million to several billion times the mass of the Sun. Due to the intensive radiation from BH accretion, gas near the hole will be ionized and

Quasar phenomenology is a subject to reveal the physical nature of BH accretion by studying the observed properties of the emission spectrum as well as the strengths and kinematic properties of the emission lines.

During the past several decades, astronomers have known that the multi-wavelength properties of quasar spectra display a strong diversity, reflecting the differences among different systems. On the other hand, this diversity appears to be organized, i.e., most of the quasar properties seem to vary along a main sequence defined by the strength of the optical iron emission (Boroson & Green 1992, ApJS, 80, 109). This main sequence is called Eigenvector 1 (EV1), and has been one of the most important tools to study quasars. But it remains unclear what is the a quantity called the Eddington ratio. Understanding the nature of the quasar main sequence is critical to understanding BH accretion.

Using the massive data set on quasars from the Sloan Digital Sky Survey, Yue Shen and Luis Ho revisited this important EV1 problem. Large statistical samples of observational data provide a new path to understand the nature of the quasar main sequence. Shen and Ho' s work took advantage of several novel statistical tools that were made possible in the large-scale survey era. By studying the change in the quasar clustering properties along the EV1, Shen and Ho for the first

of EV1. In addition, by studying the kinematics of the broad emission lines in quasar spectra, Shen and Ho pointed out that the broad-line region gas is distributed in a flattened disk geometry, and the observed line

and the normal of the disk. This additional discovery has important implications for estimating quasar BH mass using the kinematics of the broad emission lines, and offers a new way to improve quasar BH



NGC1651



As compact aggregates containing up to millions of stars each, the evolution of star clusters was

Until about a decade ago, such massive star clusters were thought to have formed all of their member stars at approximately the same time from the same gas cloud, so that their ongoing evolution could be understood rather easily. In the mean time, this concept has changed dramatically. Massive star clusters, and in particular the old, so-called 'globular' clusters that formed at the time of galaxy formation, are no longer considered 'simple' single-generation stellar populations. Instead, they are usually thought to contain stars that formed over extended periods. However, based on Hubble Space Telescope images of the star cluster NGC 1651 in the Large Magellanic Cloud, a satellite galaxy of the Milky Way, researchers at the Kavli Institute for Astronomy and Astrophysics (KIAA) at Peking University and the National Astronomical Observatories (Chinese Academy of Sciences) in Beijing found that middle-aged massive star clusters may be 'simple' after all.

Stars spend most of their lifetimes converting hydrogen into helium in their cores on the so-called 'main sequence' in the diagnostic Hertzsprung–Russell diagram, which relates the stellar surface temperatures to their brightnesses. When the core hydrogen supply has been exhausted, stars leave the main sequence and evolve onto the 'subgiant branch.' For a single-age population of stars, one expects to see a narrow, well-

observations of clusters with masses greater than about 50,000 times the mass of our Sun, and ages between

extended main-sequence turn-off regions. These are commonly interpreted as evidence of age spreads of more than 300 million years.

" This has long been a surprising inference, because youngervations re thought to quickly lose any

years of their lifetimes," said Chengyuan Li, PhD student at Peking University and lead author of the new study.

The researchons found that although the rvations

extended main-sequence turn-off region is welldescribed by adoption of an age dispersion of approximately 450 million years, the rvation's very tight subgiant branch places the strongest constraints yet on the maximum likely age range in the rvation. To their surprise, the team found that the narrow width of the cvatier's subgiani branch can only be reconciled with a spread in tiollar ages of less than 80 mivlion years.

"We concluded that NGC 1651 is the best example found to date of a truly single-age tiollar population," explained Richard de Grijs, faculty member at the KIAA and Chengyuan Li's PhD supervison. "We have now identified a handful of otherervations that appear to show similar features."

The team's most plausible explanation of this surprising paradigm reversal is the presence of a population of stars in the rvation that rotate around their axes at different rates. Licai Deng, principal scieniist at the National Astronomical Observatories, commented that "these latest results resolve nearly a decade of debate among scientists; as such, the results were deemed 'solid and welcome' by the peerreviewers."

The resulting article was published in the journal

Li C., de Grijs R., Deng L., 2014, Nature, 516, 367

Students

2013 10 19

On October 19 2013, the school held the celebration conference to commemorate the 100th anniversary of physics education at Peking University. The '12 undergraduate class performed the original chorus "Centennial Physics" at the conference. The school's New Media Center students also filmed the micro film "The Transformation of Qun Li."



The Centennial Physics Cultural Season 2013 invited Prof. Kaihua Zhao, renowned physics educationist and Prof. Wei Guo, the "PKU best teacher of the year 2011" to exchange with PKU students. The Centennial Physics Cultural Season 2014 invited the academicians Profs. Qihuang Gong and Qi Ouyang to share their school and career development experiences.

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2013 3

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In March 2013, the "physics showplace" experiment demonstrations activity was held at PKU campus. The activity was aimed to present to students a wonderful physics world through miraculous experiment demonstrations.

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2013 4

2014 9

In April 2013, the 1st National Students Microscopic Photo Filming Contest was held by our school. Students from over 10 universities from China attended this contest. In September 2014, the school held the Books Relay activity, which calls on students to reclaim books from close-to-graduation students and give them out to freshmen students.




2013	8		,	2013			2013
2014		2014		10	"	"	

The university held the student military trainings in every August. The school's swimming team which was built in 2013 won the 1st place from two consecutive years. In October 2014, the astronomy freshmen class ranked 1st in the PKU "Freshmen Cup" Basketball Competition.



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In July 2013, the school's summer vacation social practice team visited the National Bureau of Oceanography and took a photo with China Coast Guard 169. The team also visited the Meteorological Bureau of Guangdong Province.





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2013

The 5th National College Student Physics Academic Competition was held in 2014. The school's representative team won the 1st place in the competition. Student Zeyang Li from the '13 undergraduate class won the "best competitor" medal. The 11th and 12th awards ceremonies of Choong Shin-Piaw's Physics Educational Fund at PKU were held in May of 2013 and 2014.

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2013		1958	
	2014		
	2014	625	

In 2013, the school's opening ceremony took place at the Yingjie Exchange Center at PKU, during which the alumni representative Yuanguo Zhao from the '58 class delivered a welcoming speech. In 2014, a total of 625 representatives that consist of the school's managing team, representative professors, alumni, the 2014 graduation class and their parents took part in the ceremony.





On October 19 2013, the school held the grand conference to celebrate the 100th anniversary of the Physics Education at PKU.



100

The school also launched the evening program that invited the Oriental Song and Dance Company to deliver celebration performances.





| Alumni and Funds

10 18 77

On October 18, the school's Alumni Donation Ceremony was held at the Yingjie Exchange Center at PKU. More than 20 alumni representatives attended the ceremony.

2013 9



2014 1 "1898"



2014 5 3

116

On May 3 2014, over 100 alumni returned to campus celebrate the 116th anniversary of Peking University. The school set up the reception station to welcome and serve the school alumni.



| Alumni and Funds

5 " 54 " " 312 85

In July, the '80 physics class held the gathering party to celebrate the 30th anniversary of graduation and the establishment ceremony of the '80 physics class fund.



9 04

In September, the '04 undergraduate and graduate physics classes were invited back to talk to the '14 physics freshmen.

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Alumni and Funds

2014 11-12

In September and December 2014, the school held the 1st session of Alumni Badminton Contest at PKU. The purpose of the contest was to promote alumni closeness and inspire passion for body exercises.



2013	2,299,233.46			
473,620.86	1,048,366.94	2014		2,668,550.08
	1,931,158.14		1,425,435.71	2014
	13,300,000.00			

In 2013, the school alumni funds received 2,299,233.46 in donation, spent 473,620.86 in awarding scholarship, supporting student activities and student aid, applied for and were granted 1,048,366.94 in matching funds. In 2014, we received 2,668,550.08 in donation, spent 1,931,158.14, and received

1,425,435.71 in mating funds. Until the end of 2014, the school had accumulated about 13,300,000.00 in alumni funds.

The Alumni Funds	Time of Establishment
Qisun Ye Experimental Physics Fund	1987
Shechao Charles Feng Scholarship	1996
Xie Yibing Fund	1996
77 '77 Physics Class Fund	2002
Paul Shin-Piaw Choong Educational Fund for Physics	2002
80 '80 Ellen Yi Lan Woman Physicist Scholarship	2005
86 '86 Physics Class Fund	2005
88 '88 Physics Class Fund	2006
Kecheng Scholarship	2006
() Taconic Scholarship (University level)	2007
Di Guang Scholarship	2007
Huxiong Chen Educational Fund for Physics	2008
Shechao Charles Feng Special Scholarship	2008
Ning Hu Scholarship	2008
Kaihua Zhao Educational Fund for Physics	2010
Truth-seeking Scholarship	2011
Wenxin Zhang Educational Fund for Physics	2011
Ou Hai Scholarship	2011
91 '91 Physics Class Fund	2011
Keqi Shen Educational Fund for Physics	2011
PKU Physics Students Development Fund	2011
The Centennial Celebration Fund for Physics at PKU	2012
Institute of Modern Physics Fund	2012
85 '85 Physics Class Fund	2012
Emergency Aid for Physics at PKU	2013
PKU Physics Lecture Hall Chair Donation Fund	2013
79 '79 Class Fund for Garden Donation	2013
PKU Physics Video Meeting Room Fund	2013
Physics Building Front-garden Fund	2013
PKU Partnership Fund	2013

Alumni and Funds

" 7802 Meeting Room Fund	" PKU Physics 7802	2013
1978	'78 Nuclear Physics Class Fund	2013
	PKU Xingcheng Fund	2014
1980	'80 Physics Class Fund	2014
Room Fund	PKU Physics New Library Reading	2014
212 Building Chair Donation Fund	PKU Physics Room 212 Middle	2015

Cooperation

In 2013, the school held the 7th and 8th sessions of The Centennial Physics Lectures. The 7th lecture was titled —A Century of Discovery and Innovation" given by the "Paul Pigott Professor" Prof. Zhixun Shen in the physical sciences of Stanford University.



James G. Anderson

The 8th lecture was jointly given by Prof. Xiaowei Zhuang, Prof. Xiaoliang Xie and Prof. James G. Anderson with Harvard University.



2014 " "

Gerard 't Hooft

Joseph Incandela

In 2014, the school held the 9th to 12th sessions of The Centennial Physics Lectures. The 9th lecture invited the Nobel laureate in physics Prof. Gerard 't Hooft and winner of the Basic Physics Award Prof. Joseph Incandela.





Moses Chan

The 10th lecture was given by Prof. Moses Chan, fellow of the American Academy of Sciences with the State University of Pennsylvania.



François Baron Englert

Frank Wilczek

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The 11th and 12th lectures were included into the PKU Global Fellowship program. We invited the Nobel laureates in physics Profs. François Baron Englert and Frank Wilczek for lectures and workshops.



		1935	
1903	•	1903	1911

| Cooperation

In 2013, the school invited the famous French scholars Elena Lang's Joliot and Pierre Joliot to give lectures at PKU. Their parents are the 1935 Nobel laureates the Joliot Curie couple, and their grandparents are the 1903 and 1911 Nobel laureates Pierre Curie and Marie Curie.



2014

James G. Anderson

In 2014, the school invited Prof. James G. Anderson to give the PKU Global Fellowship lecture and exchange with PKU faculty and students. Prof. Anderson was awarded the appointment letter of "PKU Guest Professor."

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2013 1 27-30 1 28

The school sent its visiting delegation to the College of Sciences of Taiwan University and they jointly held the

| Cooperation



2013 1 Perrin Di Tarik Bourouina

Dominique Didier Degny



In January 2013, Prof. Dominique Perrin, President of University of East Paris led a delegation to our school.



2013 4 Martin Ward

Richard Myers

In April 2013, Prof. Martin Ward, Dean of Physics Department of Durham University visited our school and held a discussion on joint cultivation of undergraduate students.

2013 4 Ed Gerstner

208

In April 2013, Dr. Ed Gerstner, Chief Managing Editor in China of Nature Communications met with Prof. Xincheng Xie, Dean of the school.



In May 2013, the University of Texas at Austin and PKU jointly held a physics academic exchange workshop at the International Center of Quantum Materials.



In September 2013, Prof. Pierre Marage, Vice President of the Vrije Universiteit Brussel in Belgium visited our school.



2013 9

11

In September 2013, a delegation of the presidents of African American universities visited the Institute of Heavy Ion Physics of our school.

| Cooperation

2013 10

In October 2013, two vice presidents of the Superior National University of Arts and Technologies visited our school.



2013 11

The Australian National University

Monash

Queensland University

In November 2013, the school sent its visiting delegation of 9 to the Monash University, the Australian National University, and the Queensland University in Australia.



2014 10

In October 2014, Dr. Hongyi Qiu, retired scientist of National Aeronautics and Space Administration met with Prof. Xincheng Xie, Dean of the school, and visited the school labs.



60

In October 2014, a delegation of 60 from the science class of Taipei First Girls High School visited the school and exchanged with PKU students.



	Cooperation		
2013	5	"	"
			60

The Third International Workshop on Microcavities and Their Applications was held at PKU in May 2013. More than 60 representatives from China, US, Korea, Germany, France, Japan and Australia attended the conference.



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2013 6

The Majoranas in Solid State Workshop was held at PKU in June 2013.



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The 3rd International Symposium on Green Photonics, co-organized by PKU and Swinburne University of Technology, was held in Australia in January 2014.

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The 3rd Cross-Strait Symposium on Nano-Photonics was held in National Cheng Kung University in January 2014.





SPIN2014 2014

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2014 10 50 """ 20

The Kavli Institute of Astronomy and Astrophysics held the "Quarks and Compact Stars 2014" workshop in October 2014. The workshop attracted more than 50 participants, among them 20 are from Japan.

The 21st International Symposium on Spin Physics 2014 was held by PKU in October 2014.

Cooperation





2013

JUSTIPEN

FUSTIPEN

In 2013, the United States Department of Energy (DOE) granted the establishment of the China-U. S. Theory Institute from Physics with Exotic Nuclei (CUSTIPEN) to promote the cooperation between the China and U.S. nuclear physics communities on radioactive nuclear physics.



2011-2012

In 2013, the school issued *The Bi-annual Report 2011-2012* in the bilingual edition. The report covered the school's Personnel, Divisions, Research Highlights, Students, Alumni and Funds, Cooperation, Awards and Honors. The purpose of the report was to promote international exchange and cooperation of the school and elevate its academic status in the international physics community.

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Awards & Honors

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" The Collaborative Innovative Center of Quantum Matter"

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Qi Ouyang and Qihuang Gong were elected Academicians of the Chinese Academy of Sciences

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Qingfeng Sun was appointed the Yangtze River Scholar by the Ministry of Education

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Bin Chen and Junren Shi were awarded the National Funds for Distinguished Young Scientists

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Ji Feng, Xi Lin, Liangyou Peng, Zefeng Ren and Kebin Shi were awarded the National Funds for Excellent Young Scientists

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Xueqing Yan was included into the Young Leading Talents in the Innovative Talents Promotion Plan initiated by the Ministry of Science and Technology

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Jia'er Chen was awarded " the Cai Yuanpei Medal"

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Guogang Qin was awarded the Guohua Distinguished Scholar Medal

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Zhiyong Meng won the Chinese Young Woman Scientist Medal

Jie Meng's Group was awarded the first-class Natural Science Award of Higher Education Science Research Excellent Achievements

Yanqing Ma (Guangda Zhao as mentor) and Zheyu Fang (Xing Zhu as mentor) won the National Excellent Doctoral Dissertation Awards

Yanlin Ye was elected Chairman of the China Nuclear Physics Society

" Method of Mathematics and Physics," " Quantum Mechanics," " Mechanics," " General Physics Laboratory" and " Electromagnetism" were chosen as National Resource Sharing Courses

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2014

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Qihuang Gong and Yunfeng Xiao' Education in China

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2014

Academician Enge Wang was awarded the Chen Jiageng Mathematics and Physics Science Medal

23

Academician Yingchang Yang won the Distinguished Achievement Medal at the 23rd International Workshop on Rare Earth Permanent Magnets

Xinqiang Wang, Yunquan Liu and Biao Wu were appointed the Yangtze River Scholars by the Ministry of Education

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Zhiyong Meng was awarded the National Funds for Distinguished Young Scientists

Xinzheng Li, Jintai Lin, Guowei Lv and Zheyu Fang were awarded the National Funds for Excellent Young Scientists

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Yunquan Liu was included into the Young Leading Talents in the Innovative Talents Promotion Plan initiated by the Ministry of Science and Technology

• 2014

Yan Li's Group won the second-class Natural Science Award of Higher Education Science Research Excellent Achievements

• 2014

Guoyi Zhang's Group won the second-class Science and Technology Progress Award of Higher Education Science Research Excellent Achievements

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Qihuang Gong's Group was included into the Key Field Innovative Teams by the Ministry of Science and Tchnology

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Yan Li was entitled the " National Excellent Science and Technology Worker"

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