



中国科学院大学
University of Chinese Academy of Sciences



ICTP-AP
International Centre
for Theoretical Physics Asia-Pacific
国际理论物理中心-亚太地区

ICTP-AP

Progress Report
2019-2020



INTRODUCTION & BACKGROUND

International Centre for Theoretical Physics Asia-Pacific (ICTP-AP) operates in affiliation to the University of Chinese Academy of Sciences (UCAS) and under the auspices of UNESCO. ICTP-AP is in cooperation with the Chinese Academy of Sciences (CAS), the National Science Foundation China (NSFC), and the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste). Its establishment was approved by the 38th session of the UNESCO General Conference in 2015. An agreement for the establishment of ICTP-AP was signed in May 2017 and its formal operation began in May 2019 following the finalization of all internal administrative steps in China.

As China's first UNESCO category 2 centre in the area of basic science, ICTP-AP is a non-profit organization and will carry out high-level scientific research, education and training in basic science such as frontiers of theoretical physics and the relevant interdisciplinary areas.

CONTENTS

01 Summary of Activities

Frontiers of Fundamental Physics Conference	03
First UCAS Gravitational Wave Summer School	05
Taiji Consortium Annual Meeting	06
Conference on the Development of School of Fundamental Physics and Mathematical Sciences	07
Winter School on Frontier and Interdisciplinary Sciences of the Oversea Students	09
Second UCAS Gravitational Wave Summer School	10

02 Scientific Research

Taiji Programme	13
Report of Taiji-1 Project	13
Core Publications (2019-2020.8)	15

03 International Co-operation

Xiangshan Science Conference	17
Round Table Meeting Between Institutions	18
Experiential Communication with ICTP	19

04 International Talents and Students

International Talents	21
Cultivation of International Students	21

05 Financial Report

24

06 Biennial Plan

Develop Outreach Activities and Strengthen International Collaboration	27
Develop Research Centre	27
Scientific Plan	29

07 Mid-term Strategy

Introduction And Background	31
Vision	31
Mission	31
Context Within Which We Operate And Our Resources	31
Our Values	31
What Success Will Look Like	32
Our Overall Objective	32
Our Specific Strategic Objectives	32
Collaboration	33
Risks & Steps For Their Mitigation	33
Performance Indicators 2019-2023	34

Summary of Activities

01

- 03 — Frontiers of Fundamental Physics Conference
- 05 — First UCAS Gravitational Wave Summer School
- 06 — Taiji Consortium Annual Meeting
- 07 — Conference on the Development of School of Fundamental Physics and Mathematical Sciences
- 09 — Winter School on Frontier and Interdisciplinary Sciences of the Oversea Students
- 10 — Second UCAS Gravitational Wave Summer School

ICTP-AP organized a series of scientific activities to facilitate international academic collaboration and exchange of scholars, educate and cultivate young talents, offer distinguished lectures and activities accessible to the public. Having contributed to the promotion of scientific cooperation, talent cultivation and development of fundamental physics.

1.1

Frontiers of Fundamental Physics Conference

Organizing Committee

Bo Feng (Zhejiang Univ.)
Shou-Hua Zhu (Peking Univ.)
Cai-Dian Lv (IHEP-CAS)
Zong-Guo Si (Shandong Univ.)
Qing Wang (Tsinghua Univ.)
Yu-Feng Zhou (ITP-CAS)

International Committee

Rong-Gen Cai (ITP-CAS)
Quevedo Fernando (ICTP)
Andrew Strominger (Harvard Univ.)
Yue-Liang Wu (ICTP-AP, UCAS)



Invited Speakers

Rong-Gen Cai (ITP-CAS)
 Jin Chang (PMO)
 Poul H. Damgaard (NBIK)
 Fernando Quevedo (Univ. of Cambridge)
 Monica Guica (Saclay Univ.)
 Yuanning Gao (Peking Univ.)
 Kimyeong Lee (KIAS)
 Subir Sarkar (Oxford Univ.)
 Henry Tye (HKUST & Cornell Univ.)
 Spenta Wadia (ICTS)
 Yue-Liang Wu (ICTP-AP, UCAS)
 Chen-Ning Yang (Tsinghua Univ.)



Goal of the Conference

The conference consists of symposiums and meetings. It includes the main topics of quantum field theory and particle physics, cosmology and gravity, and mathematical physics. The goal of the conference is to enable scholars working in related areas to exchange new ideas. Moreover, students could take this opportunity to improve their professional knowledge and broaden their horizons.

Performance

More than one hundred and thirty experts from nine countries participated in the two-day conference in Beijing and twenty-seven excellent academic reports were organized. The conference gave participants more choices to join reports according to their own interests. Through Q & A, discussion and other forms, all participants were fully communicated. Young students were delighted to have face to face communication with well-known experts.



1.2 First UCAS Gravitational Wave Summer School

Organizing Committee

Confeng Qiao (UCAS)
Hongbo Jin (NAO, CAS)

Invited Speakers

Zhoujian Cao (AMSS, CAS)
Zhihui Du (Tsinghua University)
Wenbiao Han (SHAO, CAS)
Antoine Klein (University of Birmingham)
Yunyong Wang (IHEP, CAS)
Yueliang Wu (ICTP-AP, UCAS)
Peng Xu (Lanzhou University)

Activities

Professional Knowledge Learning

The summer school invited seven experienced scientists from the research group of LISA, LIGO and TAIJI Programme to give a series of lectures on gravitational wave related studies in a week. Topics of the lectures mainly focused on gravitational wave detection technology, gravitational wave source, and data analysis and processing.

Academic Salon

The academic salon was held in the evening on the third day of summer school. Students and teachers seated together to express their opinions about the detection of gravitational waves and discussed the latest cutting-edge academic topics in a relaxed and pleasant atmosphere.



Goal of the School

The purpose of this summer school was to provide opportunities for students in relevant research fields to understand frontiers of international disciplines. Meanwhile, the school played a positive role in promoting the cultivation of young talents. In the future, some of them might become members of “Taiji programme” and contribute to the detection and research of gravitational waves.

Performance

Thirty-seven outstanding students from fourteen universities and research institutes in China participated in this summer school. Students gained professional knowledge in the five-days-training. They enjoyed the salon in a relaxed and pleasant atmosphere. All the students showed great interest in this way of education through entertainment which created an active learning experience.

1.3 Taiji Consortium Annual Meeting

Organizing Committee

- Yan-Fen Wang (UCAS)
- Wen-Rui Hu (IM-CAS)
- Min Huang (BFSE)
- Xiao Long Dong (NSSC)
- Zi-Jie Li (BMR&DP)

Invited Speakers

- Yan-Fen Wang (UCAS)
- Yue-Liang Wu (ICTP-AP, UCAS)
- Jian-Yu Wang (Shanghai Branch, CAS)
- Rong-Gen Cai (ITP-CAS)
- Wei-Dou Ni (NAOC)

Activities

Taiji Consortium Annual Meeting for Space Gravitational Wave Detection held in Beijing. It was jointly organized by ICTP-AP and Taiji Consortium. The meeting was related to gravitational wave physics and gravitational wave detection technology. Thirty-two experts/scholars from twenty-one research institutions conducted academic reports on related research of the Taiji programme, such as observation methods, data processing, high-precision measurement, gravitational wave signal sources, laser interference systems, drag-free systems, and micro-propulsion systems.

Goal of the annual meeting

To unite the national scientific experts who are committed to the theory and experimental research of space gravitational wave.



To organize forces to solve the key technology problems, improve the strength of independent research and development.
To strengthen the exchanges and cooperation among the member units of the consortium.



Performance

More than 160 experts and scholars from 36 institutions attended the annual meeting to discuss the latest research results and future development of space gravitational wave detection. The meeting provided a platform for cooperation and face-to-face communication among members of Taiji consortium. It facilitated cross-disciplinary key technology

collaborative research, promoted the in-depth exploration of the scientific connotation and social influence of the Taiji Programme. Taking the gravitational wave science goal as the traction, the annual meeting promoted the deep integration of various disciplines and early realization of space gravitational wave detection target.

1.4

Conference on the Development of School of Fundamental Physics and Mathematical Sciences

Organizing Committee

Chaoqiang Geng (School of Fundamental Physics and Mathematical Sciences, HIAS)

Yueliang Wu (ICTP-AP, UCAS)

Activities

College Construction Meeting

Delegations from Hangzhou Institute for Advanced Study, UCAS introduced the current situation and development progress of the school of Fundamental

Physics and Mathematical Sciences which was mainly developed by ICTP-AP. Representatives from various scientific research institutions participated in the meeting discussed the mid-term strategy of the school, defined three-to-five years objectives and specified the work in 2020.

Field Visit to Transition Campus

Representatives inspected the construction of laboratories, office buildings, and accommodations in the new transition zone of Hangzhou Institute for Advanced Study, UCAS.

Symposiums

Session 1:
Second Symposium on the Space Propulsion and Gravitational Universe Research Center (SPaGU).

Session 2:
Symposium on Quantum Cosmic Physics.

Goal of the Activity

Hangzhou Institute for Advanced Study(HIAS), UCAS is a new education and scientific research institution in Hangzhou. The school of Fundamental Physics and Mathematical Sciences is one of the six schools of HIAS. It is mainly developed by ICTP-AP and the Institute of Theoretical Physics, CAS. Professor Yue-Liang Wu, the director of ICTP-AP, takes the chair of the school. The school will build to an international first-class scientific research centre and talent training base.

The goal of the conference is to further promote the development of the school. Inviting experts in basic science to gather wisdom, experience and suggestions to find a better way to build the school to a world-class scientific institution with Chinese characteristics, and integration of science and education. Furthermore, the conference will strengthen the cooperation between institutions and attract more talents and scientific resources to join the school.



Performance

Seventy-two experts from thirty-five scientific institutions participated in the conference. This conference put forward good suggestions for the development of the school of Fundamental Physics and Mathematical Sciences, and further promoted the scientific cooperation

between scientific research institutions and the school. Participants praised current work and expressed their willingness to build long term cooperation and provide support to the development of the school.



1.5

Winter School on Frontier and Interdisciplinary Sciences of the Oversea Students

Organizing committee

Yong-Guan Zhu(IUE-CAS)
Feng-Chen(UCAS)

Activities

Professional Knowledge Learning

The winter school was held in Xiamen province. It was jointly held by UCAS and Urban Environment Institute, with the theme of environmental science and engineering, ecology and chemistry. The winter school invited nine scholars from CAS and well-

known universities to teach environmental science, environmental engineering, ecology and geography, materials science, chemistry, and other frontier topics and research methods to students.

Culture Exchange

During the winter school, experts invited students to visit some historical sites and characteristic learning spots in Xiamen. Let students to "go out", to feel the charm of Chinese traditional culture, and understand the historical development and customs of Xiamen. This activity gave international



students an opportunity to know more about Chinese culture and promoted multi-cultural exchanges.

Goal of the winter school

The winter school aimed to provide international students with cutting-edge and cross-scientific knowledge; create an academic exchange and cooperation platform; cultivate talents with global perspectives and cross-cultural communication capabilities.

Performance

The winter school was an extension of international education courses. It was an innovative training project which opens to all the students at UCAS. Forty-eight international students from twenty developing countries participated in this winter school. They all gave positive comments to this innovative form of training. The winter school not only improved their professional knowledge and broaden their horizons, but also let them know more about Chinese culture which promoted multi-cultural exchanges.

1.6

Second UCAS Gravitational Wave Summer School

Invited Speakers

Wenrui Hu (IMECH, CAS)
 Yueliang Wu (ICTP-AP, UCAS)
 Yunyong Wang (IHEP, CAS)

Yuanzhong Zhang (ITP, CAS)
 Ziren Luo (IMECH, CAS)
 Heshan liu (IMECH, CAS)
 Jianwu He (IMECH, CAS)
 Chu Zhang (IMECH, CAS)

Zhoujian Cao (AMSS, CAS)
Peng Xu (Lanzhou University)
Xiaoshan Ma (NSSC, CAS)
Lie Qiang (NSSC, CAS)
Wenbiao Han (SHAO, CAS)
Hongbo Jin (NAO, CAS)

Activities

The summer school invited fourteen experienced scientists from Taiji Consortium to give a series of online lectures on gravitational wave related studies. Topics of the lectures mainly focused on gravitational wave detection technology, gravitational wave source, and data analysis and processing.

Performance

Due to the influence of coronavirus pandemic, the summer school was carried out online, which gave more people opportunities to get access to fundamental science. Nearly 900 participants gathered online to explore the mysteries of gravitational waves and enjoy the charm of science. After the expert group assessment, five students were selected as outstanding student. They will have opportunities to be admitted to ICTP-AP without examination.



Scientific Research



02

- 13 — Taiji Programme
- 13 — Report of Taiji-1 Project
- 15 — Core Publications (2019-2020.8)

2.1 Taiji Programme

Discovery of gravitational waves (GWs) by the LIGO collaboration in 2016 has provided a direct test on the prediction made by Albert Einstein a century ago based on his general theory of relativity. GWs are expected to provide a new window to explore the evolution of early universe and the nature of gravity.

Taiji Programme in Space is proposed to detect GWs with frequencies covering the range of 0.1mHz to 1.0Hz with higher sensitivity around 0.01–1Hz than eLISA. The programme proposes to use a triangle of three space crafts in orbit around the Sun. Laser beams are sent both ways between each pair of spacecraft, and the differences in

the phase changes between the transmitted and received laser beams at each spacecraft are measured. The preliminary design for the Taiji mission is based on 3-million-kilometer separations between the spacecraft, and the expected launch date is about 2033.

The purpose of Taiji programme is to study the most challenging issues concerning massive black holes, such as how the intermediate mass seed black holes were formed in the early universe, whether the dark matter could form a black hole, how seed black hole grows into a large or extremely large black hole and what is the nature of gravity.

2.2 Report of Taiji-1 Project

Taiji-1 is the first experimental satellite of Taiji Programme. It marks the first under the Phase-II of the Strategic Priority Programme on Space Science (SPPSS-II) sponsored by the Chinese Academy of

Sciences (CAS). As professor Yueliang Wu, director of ICTP-AP, is the chief scientist of Taiji programme, ICTP-AP is responsible for the implementation, scientific research and management work.



ICTP-AP was responsible for the overall planning and coordination of the Taiji-1 project. Moreover, ICTP-AP undertook the construction and development of the scientific application system which was one of the six systems of Taiji-1 project. Furthermore, ICTP-AP joined the research of the hall-effect microthruster system.

On August 31st, 2019, Taiji-1 launched successfully from Jiuquan Satellite Launching Centre in northwestern China. By the end of 2019, the in-orbit tests were successfully completed, the functions and performance indexes of the satellite met the general requirements, and the results exceed expectations.

The in-orbit tests showed that :

- The accuracy of displacement measurement of the laser interferometer on Taiji-1 could reach a 100-picometer order of magnitude.
- The accuracy of the gravitational reference

sensor on the satellite reached ten billionths of the magnitude of the earth's gravitational acceleration.

- The thrust resolution of the micro-thruster on the satellite reached submicron-Newton scale.

Taiji-1 achieved China's highest accuracy of spatial laser interferometry; successfully conducted China's first on-orbit drag free control technology test; firstly and internationally on-orbit verification of micro-newton level radio frequency ion propulsion technology and dual mode hall-effect micro thruster technology.

Taiji-1 project was selected as one of China's top ten scientific and technological progress news. The experimental results verified the correctness and feasibility of the technical route and scheme of 'Taiji Programme'. It took the first step and laid solid foundation for the first breakthrough in space gravitational wave detection in China.



2.3 Core Publications (2019-2020.8)

Z. Fang, Y. L. Wu, and L. Zhang, 2019. Chiral phase transition and QCD phase diagram from AdS/QCD[J]. Physical Review D, 99(3).

Z. Fang, Y. L. Wu, and L. Zhang, 2019. Octet meson spectra and chiral phase diagram in the improved soft-wall AdS/QCD model[J]. Physical Review D, 100(5).

C. Csáki, C.S. Guan, T. Ma, and J. Shu, 2020. Generating a Higgs Potential Quartic Term[J]. Physical Review Letters, 124(25).

Y. Tang and Y. L. Wu, 2020. Weyl symmetry inspired inflation and dark matter[J]. Physics Letters B, 803, p.135320.

Z. Fang and Y. L. Wu, 2020. Equation of state and chiral transition in soft-wall AdS/QCD with a more realistic gravitational background[J]. Chinese Physics C, 44(10), p.103101.

W.H. Ruan, C. Liu, Z.K. Guo, Y.L. Wu, R.G. Cai, 2020. The LISA-Taiji network: precision localization of massive black hole binaries[J]. Nature Astronomy, 4, p.108-109.

Y. Tang and Y. L. Wu, 2020. Conformal α -attractor inflation with Weyl gauge field[J]. Journal of Cosmology and Astroparticle Physics, 3, p.067-067.

C.Q. Geng, C. W. Liu, and T. H. Tsai, 2020. Mixing effects of $\Sigma^0 - \Lambda^0$ in Λ_c^+ decays[J]. Physical Review D, 101, p.054005.

C.Q. Geng, C.C. Lih, C. W. Liu, and T. H.

Tsai, 2020. Semileptonic decays of Λ_c^+ in dynamical approaches[J]. Physical Review D, 101, p.094017.

R. S. Sufian, T. Liu, and et.al, 2020. Constraints on charm-anticharm asymmetry in the nucleon from lattice QCD[J]. Physics Letters B, 808, p.135633. C.Q. Geng and N.

N. John, 2020. Consequences of neutrinoless double decays dominated by short ranged interactions[J]. Physical Review D, 102, p.013004.

C.Q. Geng, H.J. Kuan and L.W. Luo, 2020. Viable constraint on scalar field in scalar-tensor theory[J]. Classical and Quantum Gravity, 37(11).

C.Q. Geng, H.J. Kuan and L.W. Luo, 2020. Inverse-chirp imprint of gravitational wave signals in scalar tensor theory[J]. Eur. Phys. J. C, 80, 780.

Y. Tang and Y. L. Wu, 2020. Weyl scaling invariant Λ_c^+ gravity for inflation and dark matter[J]. Physics Letters B, 809, p.135716.

B. Fornal, P. Sandick, J. Shu, and et.al, 2020. Boosted Dark Matter Interpretation of the XENON1T Excess. Physical Review Letters, 125, p.161804.

Q.S. Chen, H.F. Fu, Y.L. Ma, and Q. Wang, 2020. Chiral effective Lagrangian for heavy-light mesons from QCD[J]. Physical Review D, 102.034034.

International Co-operation



03

- 17 — Xiangshan Science Conference
- 18 — Round Table Meeting Between Institutions
- 19 — Experiential Communication with ICTP

3.1 Xiangshan Science Conference

ICTP-AP organized the 649th session of Xiangshan Science Conference on Chinese Space Gravitational Wave Detection Mission and International Alliance for Collaboration in Beijing, China. The main purpose of this conference was to promote scientific exchange and international cooperation in the exploration of gravitational waves. Junior scientists from 'LISA' programme of

European Space Agency (ESA) and 'Taiji' programme shared their latest research results and discussed topics related to space gravitational wave detection. The conference helped the two sides exchange experiences, scientific opinions and latest findings. Experts participated agreed that they would like to jointly promote the development of research on space gravitational waves and create more cooperation opportunities in the future.



3.2 Round Table Meeting Between Institutions

The round table meeting was held as one of the ICTP-AP kick-off activities. The round table meeting aimed to build long-term mechanisms and strengthen diversified cooperation with fundamental science research institutions in the future. Leaders of well-known scientific research institutions from national and abroad participated in this meeting. Delegates introduced the history, mission and vision, organization, latest research directions and achievements of their institutions. This meeting reached consensuses that institutions should

provide excellent learning and research environment, more academic exchange activities to young talents, and make scientific research becoming the choice of more teenagers. As a category 2 centre of UNESCO, ICTP-AP would make continuous efforts to strengthen collaboration between institutions and enhance talent cultivation.



3.3 Experiential Communication with ICTP

Members of ICTP-AP office visited the International Centre for Theoretical Physics (ICTP) in Italy. The goal of this visit was to learn from their advanced scientific research management concepts. Office members of ICTP-AP met with representatives from multiple departments of ICTP to exchange operation mechanisms and laboratory constructions. In combination with its own situation, ICTP-AP further developed an administrative management and operation mechanism, and determined relevant implementation

plan. The visit was fruitful and played an important role in the improvement of operation and administrative management of ICTP-AP.



International Talents and Students

—
—
—
—
—
—
—
—
—
—
—
—
—
—
—
04

21 — International Talents

21 — Cultivation of International Students

4.1 International Talents

We have started global recruitment from 2019. We have received 70 resumes from all over the world apply for the position at ICTP-AP. After strict screening and interviews, the selection committee finally decided to enroll Xiaoyong Chu and Nian Jun as tenure track position of ICTP-AP. Moreover, we have appointed a new associate director Song He to provide intellectual and organizational leadership and strategic guidance to the Centre. All of them have rich working experience of international cooperation. They will support the development of education and

scientific research at ICTP-AP.

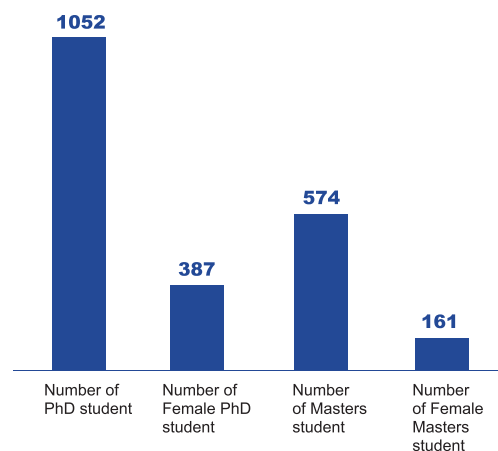
We have conducted global recruitment of the postdoctoral position in the area of: quantum cosmophysics, gravitational waves and detection, plasma physics, space propulsion and drag free technologies, advanced space materials and laser interference ranging systems. Currently, there are ten postdocs from three countries and regions have joined the research team of ICTP-AP.

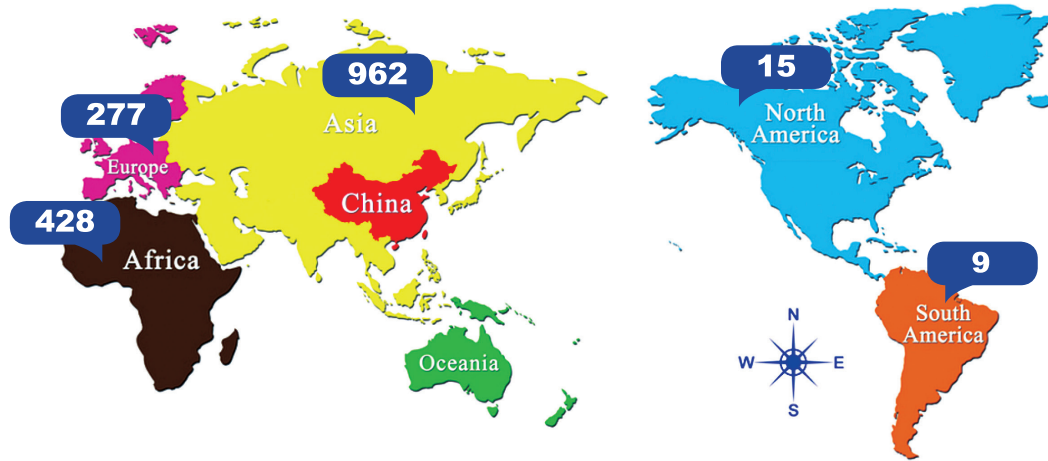
4.2 Cultivation of International Students

As a UNESCO category2 centre, ICTP-AP serves the overall goal of global sustainable development and serves UNESCO. It is our obligation to provide opportunities for advanced education, training and research in basic science such as frontiers of theoretical physics and the relevant interdisciplinary areas for scientists from Asia-Pacific region and other countries.

ICTP-AP is jointly cultivating international students with the International College of UCAS to provide frontier education for students from all over the world. In 2019, 1626 international students studied

at UCAS, and one third of the total students are female.





The students are mainly coming from five continents, 85% of them are from developing countries. In order to provide equal access to advanced education for students from all over the world, there are several scholarships to sponsor young talents from abroad who have financial difficulties:

- 1) ANSO Scholarship: Master awardees will receive a monthly stipend of RMB 3000, while PhD awardees will receive a monthly stipend of RMB 6000 or RMB 7000 depending on whether he/she has passed the qualification test arranged by USTC/UCAS for all doctoral candidates after admission.
- 2) The “Belt and Road” Master Fellowship

Programme: Monthly stipend to cover accommodation, local transportation expenses, health insurance, and other basic living expenses (Reference: RMB 4000 per month, within which RMB 1000 is provided by UCAS faculty/CAS institute).

3) UCAS Scholarship: The total amounts of monthly stipend will be no less than RMB 3500 for PhD students, senior visiting students and students on joint programs . RMB 3000 for Master students and regular visiting students.

On average, 65% of international students could win the scholarships, which provided financial support for their study and daily life.



In order to promote innovative research in basic science and promote the dissemination and exchange of knowledge. ICTP-AP plans to hold short-term schools with various themes during students' vacation. The schools aim to serve the overall goal of global sustainable development and member states of UNESCO. Students from China and abroad have equal access to apply for the short-term schools.

Cultural Exchanges

Apart from daily study and academic activities, international students have lots of opportunities to participate in Chinese traditional cultural activities.



Traditional Chinese Costumes Festival



International students are making moon cake for the Mid-autumn Festival which is one of a traditional festival in China.



International students made beautiful Lantern with Chinese students

Financial Report

—
—
—
—
—
—
—
—
—
—

05

The funding of ICTP-AP is mainly supported by CAS and UCAS. The CAS Bureau of International Cooperation allocated 1 million RMB for the daily operation of ICTP-AP. By the end of the year, the implementation rate of the fund reached a hundred percent. The total scientific research funding of the centre was 219.03 million RMB. Leaders of scientific projects were responsible to apply the funds. The implementation period of funds was generally 1-3 years.

Financial expenditure are reported in the table below. Salaries expenses of all ICTP-AP employees and expenses on students' training are mainly undertaken by UCAS. It is included in the overall payroll budget of UCAS. Thus, this table does not specify the details.

SUBJECT	APPROVED BUDGET (RMB)	IMPLEMENTATION RATE
1. Annual Salary	Undertake by UCAS	
2. Scientific Projects	219.03 million	98.8%
Supported by the Strategic Priority Research Program of Chinese Academy of Sciences (B): Pre-study of Taiji Programme	17.03 million	85.3%
Supported by the Strategic Priority Research Program of Chinese Academy of Sciences(A): Taiji-1 Satellite Project	200 million	100%
Science Application System	2 million	93.2%
3. Operation · Administration · Events · Equipment Procurement	1 million	100%
4. Students Education	Undertake by UCAS	



Biennial Plan

—
—
—
—
—
—
—
—
—
—
06

- 27 — Develop Outreach Activities and Strengthen International Collaboration
- 27 — Develop Research Centre
- 29 — Scientific Plan

Based on the Mid-Term Strategic Plan for 2019-2023, which defines the vision, mission, value and objectives of the work for ICTP-AP. This biennial work plan outlines the actions that will be implemented by ICTP-AP during 2020-2021, so as to ensure satisfactory progress in meeting the targets set by the Mid-Term Strategic Plan. The biennial plan provides the work plan for the next stage, including activities and schools, scientific research projects, talents introduction and budget plan.

6.1 Develop Outreach Activities and Strengthen International Collaboration

Due to the influence of coronavirus pandemic, ICTP-AP could not hold international conferences or people gathering public activities in the first half of 2020. Therefore, lots of activities planned were canceled or delayed. However, after the pandemic, ICTP-AP will start to develop outreach activities in cooperation with national and international institutions. ICTP-AP plans to hold international forums that will enhance international collaborative networks among scientists. Moreover, the meeting of Taiji consortium

is planned to hold annually. Scientists from domestic scientific research institutions will participate in this meeting to report the progress of Taiji programme and exchange their latest scientific research results. All the activities are opened to students without any restrictions. They could not only get access to the top scientists and research results but also enrich their knowledge and cultivate their interest in physics learning.

6.2 Develop Research Centre

To achieve the goal of becoming a world-class research center, training base for talents with global eye sights and international academic exchange centre, ICTP-AP will build professional academic environment and upgrade research facilities. ICTP-AP participated in the construction and

management of Hangzhou Institute for Advanced Study, UCAS (HIAS). In order to improve the scientific research and training level, ICTP-AP started global recruitment from 2019 to attract talents who could compete to cultivate students with strong comprehensive ability and international vision.

Building New Type of Education and Research Institution

Construction of Hangzhou Institute for Advanced Study, UCAS

HIAS was founded in 2019, jointly established by the Hangzhou Municipal People's Government and the University of Chinese Academy of Sciences. Facing the development of frontier science and technology in the world and centering on the major needs of China and the needs of regional economic and social development, it implements a new type of teaching and scientific research institution that integrates science and education. Its management of affiliated colleges adopts the chief professor studio system. Combining with the basis of economic and social development of Hangzhou, HIAS have set up seven colleges and two key laboratories.

The school of Fundamental Physics and Mathematical Sciences is jointly constructed by ICTP-AP and the Institute of Theoretical Physics, CAS (ITP). The school is seeking major breakthroughs in the field of quantum cosmic physics, space propulsion, key technology of drag-free system. Focusing on five breeding directions: applied mathematics and mathematical physics,

fundamental mathematics, quantum phase physics and applied fundamental physics, quantum biophysics and the origin of life, and computational physics and data science. HIAS has established cooperation with leading universities and research institutions from domestic and abroad. It is determined to build itself into an international first-class scientific research centre, an international talent training base and an open international academic exchange platform.

Talent Building

In order to develop and coordinate research-education-oriented advanced studies in theoretical physics and related interdisciplinary areas, ICTP-AP is doing global recruiting to engage about 56 excellent scientific researchers undertaking scientific research and teaching tasks in Beijing and Hangzhou respectively. The improvement of facilities and human resources will promote integration of advanced scientific research and education, especially in the Asia-Pacific region within the concept of "science for development".

School of Fundamental Physics and Mathematical Sciences, HIAS have appointed two tenured professors and eighteen bilateral contractual researchers with institutions from CAS.



6.3 Scientific Plan

Construction of Taiji Laboratory

The full name of Taiji Lab is "Taiji laboratory for Gravitational Wave Universe". To improve the scientific research performance of Taiji Programme, ICTP-AP is responsible to build Taiji laboratories in Beijing and Hangzhou. Taiji Lab is mainly focusing on the research of cosmology, especially in the area of gravitational wave detection.

Roadmap:

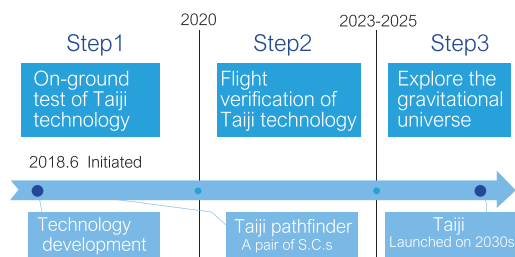


Fig1: Roadmap of Taiji Programme

The Taiji Lab serves the "three-step" development roadmap of Taiji Programme. It could be used for satellite data reception, storage, and processing to support the final detection of gravitational waves.

First stage of Taiji Lab:

Based on the existing scientific application system, improve and iterate a new generation of data receiving and processing system. Serving Taiji-2: To obtain more reliable technical identification data.

Second stage of Taiji Lab:

Serving Taiji-3: Achieving the detection of gravitational waves. Pushing the level of Chinese space gravitational wave detection to the forefront of the world.

Scientific Goals

Taiji Lab aims to build a world-class research team which focuses on the field of gravitational wave detection and explore the inner laws of extremely small particles and the giant universe.



TAIJI LABORATORY
FOR GRAVITATIONAL WAVE UNIVERSE

Taiji Lab will integrate China's superior strength in related theories and technology conducts to solve major scientific problems and drive major technological progress. After five to ten years of operation in the future, the research team will achieve groundbreaking results in related fields, led the research and development direction in related fields, and build an international first-class gravitational wave experimental platform.

Tasks

Construction of scientific application system;
Research and development of payload equipment;
Advanced research and achievement promotion;
Data management and argument assessment
International cooperation;
Science popularization education.

With the progress of Taiji programme, Taiji Lab will provide support to scientific research, technical verification and project management. In Taiji-1 project, the scientific application system of Taiji Lab plays an important role in data management. It receives and processes satellite data, and verifies the correctness of the satellite data in a timely manner. It could make immediate feedback and perform data monitoring.

Taiji-2

According to the "three-step" development roadmap of Taiji Programme, Taiji-2 will launch two experimental satellites for further space technical identification. Taiji-2 project has officially launched in September, 2020. It is in the process of tackling problems and making breakthroughs in key technology.

Mid-term Strategy

07

- 31 — Introduction And Background
- 31 — Vision
- 31 — Mission
- 31 — Context Within Which We Operate And Our Resources
- 31 — Our Values
- 32 — What Success Will Look Like
- 32 — Our Overall Objective
- 32 — Our Specific Strategic Objectives
- 33 — Collaboration
- 33 — Risks & Steps For Their Mitigation
- 34 — Performance Indicators 2019-2023

ICTP-AP MID-TERM STRATEGIC PLAN 2019 – 2023 (Draft)

Introduction And Background

The International Centre for Theoretical Physics Asia-Pacific under the auspices of UNESCO (hereafter abbreviated as ICTP-AP) is China's first UNESCO Category 2 basic science center. Its establishment was approved by the 38th session of the UNESCO General Conference in 2015. An agreement for the establishment of ICTP-AP was signed in May 2017 and its formal operations began in November 2018 following the finalization of all internal administrative steps in China.

This Mid-Term Strategic Plan (MTSP) for 2019-2022 is an outcome of discussions between members of the Governing Board of ICTP-AP and ICTP-AP Office. This MTSP guides the directions for the development of annual plan for the 5-year period from 2019-2023.

Vision

ICTP-AP's vision is to bring its unique blend of high-quality physics and mathematics education and high-level science meetings closer to scientists everywhere.

Mission

ICTP-AP's mission is to develop outreach activities in cooperation with national and international institutions, providing

an international forum and enhancing collaborative networks among scientists from different countries in and out of the region.

Context Within Which We Operate And Our Resources

ICTP-AP was established in Beijing, China, as a category 2 Centre under the auspices of UNESCO in cooperation with the Chinese Academy of Sciences, the National Science Foundation China (NSFC) and the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste). ICTP-AP is hosted by University of Chinese Academy of Sciences (UCAS), in cooperation with the Chinese Academy of Sciences, the National Science Foundation China (NSFC) and the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste). ICTP-AP operates in affiliation to the University of Chinese Academy of Sciences (UCAS) and is an ICTP partner Institute.

Our Values

ICTP-AP will adhere to values of mutual respect, non-interference in the internal affairs of cooperating countries, as well as abiding by laws, regulations and legislative and administrative procedures of cooperating countries and organizations. ICTP-AP will ensure its dedication to facilitating development and skills and capacities in less developed nations of the world.

What Success Will Look Like

By 2023, ICTP-AP will be recognized by UNESCO and its Member States for its contributions to basic science development. ICTP-AP will have completed three to five projects, and trained 100 people as part of its capacity building activities.

Our Overall Objective

ICTP-AP IS TO

- ① Provide opportunities for advanced education, training and research in basic science such as frontiers of theoretical physics and the relevant interdisciplinary areas for scientists from Asia-Pacific region and other countries;
- ② Develop outreach activities in cooperation with national and international institutions, providing an international forum and enhancing collaborative networks among scientists from different countries in and out of the region;
- ③ Develop and coordinate research-education-oriented advanced studies in theoretical physics and related interdisciplinary areas;
- ④ Develop to be a world-class research center, training base for talents with global eye sights and international academic exchange center.

Our Specific Strategic Objectives

Assembling and communicating information and knowledge with UNESCO affiliates and building the bridge of cooperation and communication

Develop high-level scientific programmes keeping in mind the needs of developing countries, and provide an international forum of scientific contact for scientists from all countries.

Conduct research at the highest international standards and maintain a conducive environment of scientific inquiry for the entire UNESCO community.

Research Project: Taiji Program in Space for Gravitational Physics

Research Project: NSFC Dark Matter Major Program

Collaboration

Strategic collaboration will be sought where it enhances the effectiveness of ICTP-AP. Key collaborators include:

In China:

- ① Chinese Academy of Sciences (CAS) and University of Chinese Academy of Sciences (UCAS) which host and support the Secretariat and operations of ICTP-AP.
- ② National Commission of China for UNESCO which is representing China on all matters pertaining to education, science and culture.
- ③ Ministry of Science and Technology which is the leading agency of China in science and technology policies.
- ④ Other collaborators include universities and research institutions.

Internationally:

- ① ICTP;
- ② UNESCO partners who are willing to cooperate with ICTP-AP;
- ③ Organizations and Conventions addressing relevant themes and issues;
- ④ NGOs, civil society and private sector organizations interested in collaborating with ICTP-AP.

Risks & Steps For Their Mitigation

The following describes the key risks to implementation of the MTSP (2018-2023); for each of the key risk explanations on how the potential negative effects could be mitigated and minimized are also provided.

- ① Institutional and financial back-up from CAS, UCAS and other Chinese parental bodies falls short of expectations
The excellent and high level of moral and logistic support from CAS and UCAS so far clearly demonstrates that this is a minimal risk-factor. But the institutional and financial back-up for ICTP-AP's activities in the other member states of UNESCO is still not enough. To have increasing budget from CAS and UCAS requires that the significance and work of ICTP-AP as an important international centre should be continuously demonstrated in a competitive organizational environment. ICTP-AP will also strive to attract project-based financial and in-kind support from other Chinese Government Ministries and Departments in order to avoid excessive dependence on CAS and UCAS.
- ② ICTP-AP work and potential are not adequately known or recognized by UNESCO Member States and other inter-governmental partners of UNESCO.

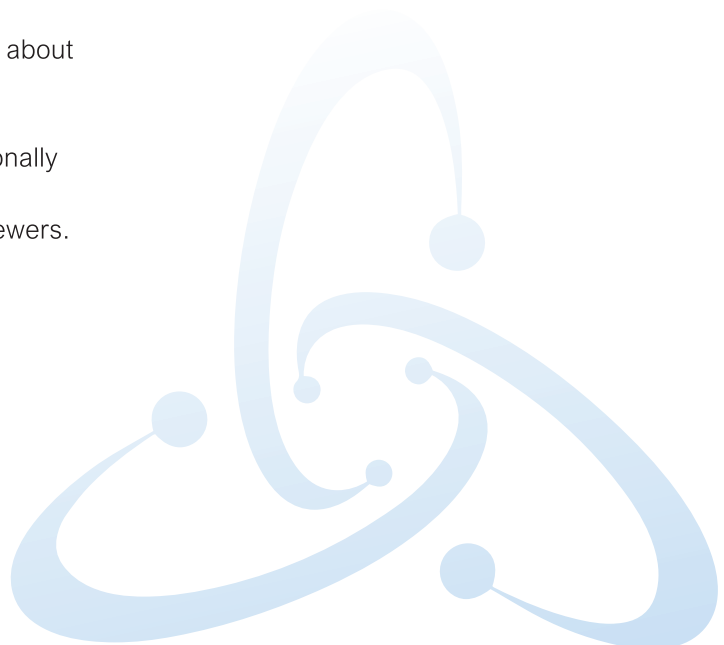
Regular information sharing via respective UNESCO websites as well as participation of ICTP-AP and UCAS representatives in sessions of the relevant intergovernmental committees of conventions and programs will minimize this risk. UNESCO's information dissemination on ICTP-AP must avoid presenting it as "donor" to

whom interested Member States can write directly for financial assistance. Instead ICTP-AP must be presented as a partner interested in developing specific activities in accordance with the objectives of this MTSP through consultations, negotiations and mutual understanding. ICTP-AP will also try to organize special or side events in collaboration with appropriate UNESCO Offices, Units and partners at international events to showcase its work, networks and partnerships. ICAP-AP also intends to develop and manage its English language web-content at a level and quality that will help it meet its mission, goals and objectives and international ambitions and aspirations.

Performance Indicators 2019-2023

- ① Completion of 3 research projects.
- ② Completion of a demonstration platform for UNESCO designated sites which can showcase all the achievements that ICTP-AP has made in collaboration with its international and domestic partners.
- ③ Coordination of 3-5 workshops training about 100 people.
- ④ ICTP-AP is widely recognized internationally as a valuable centre as judged by an independent international panel of reviewers.

<https://ictp-ap.org>



Multiple Tenure-track & Tenured Faculty Positions of Theoretical Physics

Fields:

Theoretical physics and related fields
Special consideration will be given to theoretical high-energy physics, cosmology, gravity and mathematical physics.

Job Description:

Successful candidates will not only be part of ICTP-AP but will also have joint tenure track or faculty positions at UCAS. Teaching loads are light, salaries are negotiable, and there is a good housing benefit and an excellent start-up grant.

Successful candidates will automatically be ICTP (Trieste) Associates with the ability to spend extended periods at the ICTP.

Requirements:

Candidates for the positions are required to have a postdoc, Ph.D. or equivalent degree and have a demonstrated ability to conduct outstanding research.

Candidates are expected to carry out excellent research, mentor Ph.D. students and promote the mission of the ICTP-AP in the region and beyond.

Application Materials:

- ① CV, scans of qualification certificates, incl. degree, employment and award documents;
- ② Track record statements including the list of patents granted & published theses;
- ③ Five representative publications which can reflect the applicant's academic level;
- ④ Proposal for future research and related demand;
- ⑤ Four reference letters from famous experts in the relevant fields

Contact Information:

Please email the softcopy of all application materials together to the following contact and specify your name, the position you are applying.

Phone: 10-82648142

E-mail: ictp-ap@ucas.ac.cn

Call for 2021 Doctoral Programs for International Students

Introduction:

The University of Chinese Academy of Sciences (UCAS) accepts international students through over 20 UCAS faculties and over 100 institutes of Chinese Academy of Sciences (CAS).

Doctoral programs commonly last for 3-4 years. Certificates of graduation and degrees will be awarded to those who have met the requirements of graduation and degree conferment.

General Conditions for Applicants

- ① Non-Chinese citizens.
- ② Be in good health, of good character, and willing to abide by China's laws and decrees, as well as UCAS's rules and regulations.
- ③ Holding a Master's degree or its equivalent.
- ④ English proficiency is required.

Application Time

- ① Program for 2021 fall semester: Please submit online application during December 1st, 2020–May 31st, 2021. For those who apply to UCAS for scholarship, please submit the above admission application documents along with scholarship application form before March 31st, 2021.
- ② Program for 2022 spring semester: Please submit online application during June 1st, 2021–November 30th, 2021.

See More Details

<http://englishucas.ac.cn/index.php>



ICTP-AP
International Centre
for Theoretical Physics Asia-Pacific
国际理论物理中心-亚太地区

Address: No.55, Zhongguancun East St., Haidian Dist., Beijing, China.

Post Code: 100190

Tel: 010-82648142

Web: <https://ictp-ap.org>