



Education Through Sports

ACNRS Visit

Tie with Israeli Partners

**Partnership with the St Andrews
Established**

Petit Theatre: We Are Explorers

GLOBAL OUTLOOK

Strengthening Ties with Israeli Partners



FEATURES



Education through Sports: A Must and a Plus

Many college freshmen might wonder why they are required to take Physical Fitness classes. Surely, when they think of other physical education classes, such as baseball or volleyball, which are packed with excitement, passion, and drama, or sports-fencing and martial arts, basic physical fitness training pales in comparison. However, Professor Yu-Hui Lien, the Director of the Department of Athletics, sees things differently. He offers that the Physical Fitness course...

[... more](#)

HONOR



Distinguished Professor Chung-Wen Lan Wins PVSEC Award

At the 8th World Conference on Photovoltaic Energy Conversion (WCPEC-8) and The International Photovoltaic Science and Engineering Conference (PVSEC-32) in Milan, Italy, it was announced that Dr. Chung-Wen Lan, Distinguished Professor of NTU's Department of Chemical Engineering, and Prof. Armin Aberle, CEO of the Solar Research Institute of...

[... more](#)

GLOBAL OUTLOOK



Strengthening Ties with Academic and Industry Partners in Israel

NTU President Chung-Ming Kuan led a delegation of senior administrative heads, including Executive Vice President Chiapei Chou, Vice President for International Affairs Hsiao-Wei Yuan, Vice President for Academic Affairs Shih-Torng Ding, Vice...

[... more](#)

Becoming Partners with University of St Andrews

Prof. Chiapei Chou, Executive Vice President of NTU, led a delegation to the UK to work out an academic exchange agreement in early October. The trip bore fruit, resulting in a partnership...

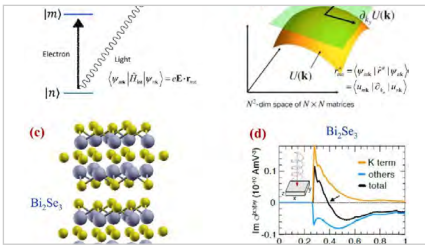
[... more](#)

Further Collaboration Opportunities Consolidated during CNRS Visit

Accompanied by the members from Bureau Français de Taipei (BFT), Prof. Antoine Petit and Mr. Edouard Besserve, Deputy Director for...

[... more](#)

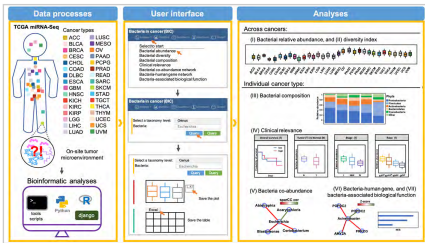
ACHIEVEMENTS



A Riemannian Geometry Theory of Nonlinear Optical Properties of Materials

Bulk photovoltaic effect (BPVE) is a second-order nonlinear optical effect that generates dc photocurrents in a noncentrosymmetric solid under light irradiation. Topological semimetals emerge as efficient infrared and terahertz photodetectors due to this promising mechanism. Recently, Professor Guo of NTU's Department of Physics, together with researchers...

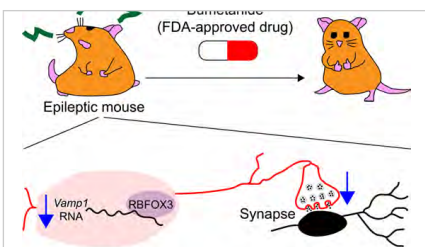
... more



Mining Big Data to Reveal the Transcriptional Landscape of Bacteria in Cancer

In the past, internal organs other than the human gut were thought to be sterile. In particular, bacteria detected in tumor tissue were often considered contaminants introduced during sampling. Recently, however, increasing evidence has shown that various microorganisms are present in cancer tissues. Based on the concept of "making the best use of everything,"...

... more



Novel Pathogenic Mechanisms of Epilepsy Revealed

Epilepsy is a common brain disorder. However, its pathogenic mechanisms have been a mystery. Mutations and deletions of *RBFOX3* were noted in persons with epilepsy but the mechanism of seizure mediation by *RBFOX3* remained unknown. Now, in a recent article, Dr. Hsien-Sung Huang and his team at the Graduate Institute of Brain and Mind Sciences have revealed important clues for understanding the pathogenesis of *RBFOX3*-linked epilepsy (*PNAS*, August 11, 2022).

... more

TEACHING & LEARNING



Innovation in Education: Charting Your Academic Journey

The mission of the NTU Office of Academic Affairs (OAA) is to lead innovative pedagogy and equip students with the knowledge and skills they will need to solve the world's most pressing and complex needs. To fulfill this mission, OAA has...

... more



Global Health Program Welcomes Incoming Students

This year marks the fourth year of the Global Health Program (GHP) offered by the College of Public Health. A welcome party was held on October 13, 2022 for its ten new master...

... more



Efforts to Solve Unmet Medical Needs

The development of new medical devices is an integral part of medical care, yet biomedicine companies often face difficulty finding the appropriate healthcare experts or institutions...

... more

PEOPLE



Anniversary Celebration—Pioneering the Future

NTU celebrated its 94th anniversary on November 15 with a grand ceremony presided over by President Chung-Ming Kuan. On this special occasion, Mr. Chun-Ming Huang and Mr. Jonney Shih were awarded honorary doctorates in recognition of their outstanding achievements and contributions. In his opening remarks, President Kuan asserted that for over nine decades NTU had been successfully cultivating many...

... more



Successful Fundraising to Prepare for NTU Centennial

As part of NTU's Centennial Celebration and an effort to strengthen ties among alumni, enhance solidarity, and replenish the endowment fund, the Office of Financial...

[... more](#)



Petit Theatre: We are not Teachers but Explorers

Fully immersed in her performance, Jasmine sits upright, her legs crossed, and calmly gives orders, perfectly capturing the essence of her character. "You were portraying everything so..."

[... more](#)

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw



**National
Taiwan
University**
國立臺灣大學

FEATURES

Education through Sports: A Must and a Plus

Many college freshmen might wonder why they are required to take Physical Fitness classes. Surely, when they think of other physical education classes, such as baseball or volleyball, which are packed with excitement, passion, and drama, or sports-fencing and martial arts, basic physical fitness training pales in comparison. However, Professor Yu-Hui Lien, the Director of the Department of Athletics, sees things differently. He offers that the Physical Fitness course requirement in fact creates a collective experience for students. "This is the best way for students to find a common topic to share with each other."

Professor Lien is a former professional tennis player who represented the Chinese Taipei National Tennis Team at the Atlanta Olympics in 1996. No one knows the importance of foundational training better than he does. He insists that the foundational training provided by the Physical Fitness classes is a necessary stepping stone for students to take up specific sports later. Still, it is no surprise that the students are eager to "be done with" the entry-level training course and "get on with" sampling the menu of superb sports courses at NTU.

There are 210 to 220 different physical education courses offered on campus each semester. To meet student demand, the University is hard-pressed to coordinate venues for each class as well as scout for instructors who are specialized in different types of sports. Such duties are shouldered by the Department of Athletics staff, who have many other responsibilities, such as scheduling on-campus sports competitions, arranging varsity practice sessions, and managing sports venues and equipment.

Creating Spaces that Build Positive Interpersonal Networks

A well-designed space breeds positive social interaction. Hence, the Department of Athletics aims to provide better stadiums and fields. As long as people feel safe and secure when they utilize these spaces, they will extend that sense of trust and confidence to the University as a whole. Recently, numerous sports facilities have been renovated, such as upgraded tennis courts and running tracks. Generous alumni donations are the catalyst driving these upgrades. At the same time, the Department of Athletics draws inspiration from campus planning at other universities around the world. They envision providing every student and faculty member with a more comfortable sports environment on campus. Excellent quality venues are crucial to the peak performance of varsity athletes, beckoning them to showcase their peak performances without holding back.

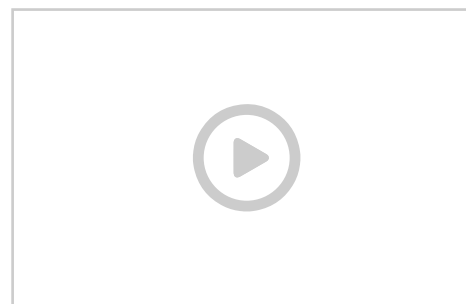
Nurturing and Developing Wide-Ranging Talents

NTU's varsity teams are composed of students from a wide range of academic disciplines, whose home departments are scattered across the vast campus. It is indisputable that these students are intellectually outstanding when they join the sports teams. Additionally, however, by receiving sports training and practice, they cultivate perseverance, self-discipline, respect, and good sportsmanship, which are laudable qualities of accomplished athletes. By developing these traits and participating in competitive team sports, young athletes acquire unique advantages, which benefit them along their career paths.

Professor Lien believes that the diversity of sports talents nurtured and developed by NTU will become boosters for the national sports community. An exemplary model is Wan-Ching Cho, a graduate of the Department of Foreign Languages and Literatures and a former member of the varsity basketball team, who later became a senior manager of the International Basketball



Prof. Yu-Hui Lien, Former player of the Chinese Taipei National Tennis Team, National Level Tennis Coach, and Director of the Department of Athletics at NTU.



Intro Video of Prof. Yu-Hui Lien, Director of the Department of Athletics.



Despite being the Director, Prof. Lien makes sure he inspects facilities on campus routinely in person, and he would warmly greet the faculties and workers on the way.

Federation (FIBA). Her success demonstrates the career potential and prospects for athletic talents in society and shows ways to make significant contributions to the field of sports.

Professor Lien sees tremendous potential in the sports industry today. He hopes that students will regard sports not just as a pastime or side hustle but rather as a profession worthy of their investments of brilliance, time, and energy. In response, the Department of Athletics plans to launch the Bachelor Program of International Sports Affairs to nurture talents for the professional sports industry. Through this program, NTU aspires to groom skilled professionals, increase the visibility of Taiwan in the international arena, and make tangible, positive impacts on the welfare of professional athletes.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan
ntuhighlights.ntu.edu.tw



| HONOR

Distinguished Professor Chung-Wen Lan Wins PVSEC Award

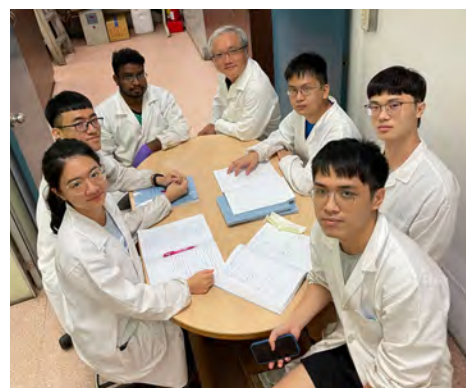


| Distinguished Professor Chung-Wen Lan of NTU's Department of Chemical Engineering.

At the 8th World Conference on Photovoltaic Energy Conversion (WCPEC-8) and The International Photovoltaic Science and Engineering Conference (PVSEC-32) in Milan, Italy, it was announced that Dr. Chung-Wen Lan, Distinguished Professor of NTU's Department of Chemical Engineering, and Prof. Armin Aberle, CEO of the Solar Research Institute of Singapore (SERIS) at the National University of Singapore (NUS) jointly won the PVSEC Award in recognition of their long-term efforts and contributions in the field of photovoltaics.

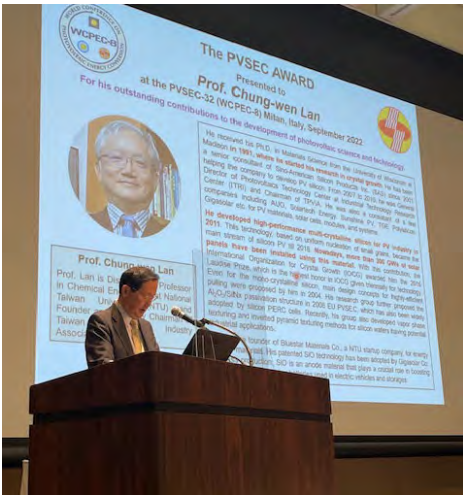
Launched in 1984, PVSEC is one of the three major international conferences in the field of photovoltaics. The PVSEC Award is a significant award of the conference. The winner of PVSEC-31 is the renowned father of solar energy, Prof. Martin Green. Prof. Lan also hosted PVSEC-23 in Taipei in 2013.

Prof. Lan established the Taiwan Photovoltaic Industry Association and became the Director of the Photovoltaics Technology Center of the Industrial Technology Research Institute (ITRI) in 2007. During his tenure as the Director of this Photovoltaics Technology Center, he worked tirelessly to promote the domestic solar photovoltaic industry. The high-performance multi-crystalline silicon (HP mc-Si), a technology based on small grains he developed with the team at Sino-American Silicon Products Inc. has made a vital impact on the global photovoltaic industry, winning him the Laudise Prize, the highest triennial honor of the International Organization of Crystal Growth (IOCG) in 2016. The bilayer $\text{Al}_2\text{O}_3/\text{SiNx}$ passivated PERC silicon cell technology proposed by his team is also one of the most widely used structures today.



| Prof. Lan and his team.

In 2021, the Semiconductor Equipment and Materials Institute (SEMI) recognized Prof. Lan's contribution to Solar Optoelectronics in Taiwan by awarding him the first PV Taiwan Award. Prof. Lan recently shifted his research focus to energy storage materials by founding Blue Star Advanced Materials Co., Ltd., an NTU startup. In the meantime, he transferred the technology of 200 kilo SiO production technology to GIGA Solar Materials Corp., turning a new page for silicon-based anode materials in the lithium battery industry in Taiwan. Additionally, Prof. Lan assisted Taiwan Specialty Chemicals Corporation to transform a company that produces special gases since 2010, starting with the first production of disilane (Si_2H_6). With Prof. Lan's assistance, Taiwan Specialty Chemicals Corporation was named an excellent supplier of TSMC in 2019.



| PVSEC Award Ceremony.

National Taiwan University
+886-2-3366-2577
No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan
ntuhighlights.ntu.edu.tw



| GLOBAL OUTLOOK

Strengthening Ties with Academic and Industry Partners in Israel



| Group photo of Prof. Jiun-Haw Lee (last row, third from left), Associate Vice President for International Affairs, and the delegation of NTU deans and professors at IN-VENTech.

NTU President Chung-Ming Kuan led a delegation of senior administrative heads, including Executive Vice President Chiapei Chou, Vice President for International Affairs Hsiao-Wei Yuan, Vice President for Academic Affairs Shih-Torng Ding, Vice President for Research and Development Pai-Chi Li and the Deans and faculty members of the fourteen NTU Colleges on a visit to Israel. Accompanied by Ya-Ping Lee, Representative of the Taipei Economic and Cultural Office in Tel Aviv, and Jeffrey D. Schwartz, Founder of Jeffrey D. Schwartz and NaTang Jewish Taiwan Cultural Association, the NTU delegation visited Israel's major academic and industry institutions, strengthening bilateral collaborations and exchanges.

During the visit, NTU established meaningful partnerships with several renowned universities in Israel through formal arrangements and collaborative agreements. Major achievements included the signing of university-level agreement and partner university student exchange agreement with both President Asher Cohen of the Hebrew University of Jerusalem and President Uri Sivan of Technion – Israel Institute of Technology—formally continuing the partnerships between NTU and these two universities. President Kuan also signed a Partnership Collaboration Award Memorandum of Understanding with President Ariel Porat of Tel Aviv University, with both parties agreeing to further promote the international cooperation and exchange between their professors and researchers.

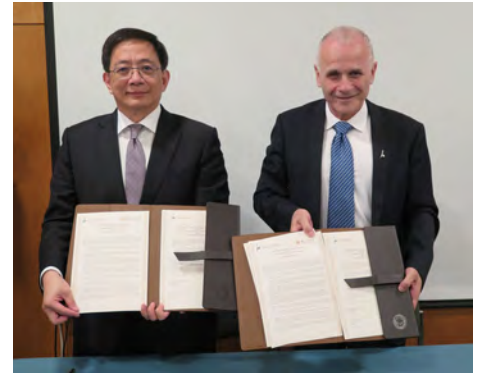
Israel is well-known for its technological innovations and thriving startups, thus the delegation also seized the chance to learn from Israeli style industry-academia collaboration to sustain our



| President Kuan with President Uri Sivan of Technion – Israel Institute of Technology after signing a university-level agreement and a partner university student exchange agreement.

country's technological advantage. They visited major industry-academia collaboration platforms, such as YISSUM, a technology transfer company of the Hebrew University of Jerusalem. To date, YISSUM has spun off over 200 companies, registered over 10,000 patents, and licensed over 3,000 technologies. Another company incubated by the Hebrew University of Jerusalem, MobilEye, was acquired by Intel and went public this year. The delegation also visited Seatback, a spin-off company of IN-VENTech, a startup program backed by Haifa Municipality, and Ramot, a technology transfer company established by Tel Aviv University.

The visit to Israel not only strengthened the existing ties between NTU and its partner universities there but also offered the delegation insights on how to create an innovation ecosystem. In the near future, NTU students who pass the selection procedures of NTU's Office of International Affairs will have the chance to intern at prominent Israeli startups.



President Kuan with President Asher Cohen of Hebrew University of Jerusalem after signing a university-level agreement and a partner university student exchange agreement.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw



| GLOBAL OUTLOOK

Becoming Partners with University of St Andrews



| NTU and the University of St Andrews became partner universities. Group photo of the delegations from both universities.

Prof. Chiapei Chou, Executive Vice President of NTU, led a delegation to the UK to work out an academic exchange agreement in early October. The trip bore fruit, resulting in a partnership agreement with the University of St Andrews.

Prof. Chiapei Chou completed the signing of a partner university and academic cooperation agreement with her counterpart at the University of St Andrews in Scotland on October 5. A total of 3 agreements were signed at the time, including a university-level Memorandum of Understanding, a university-level student exchange agreement, and an agreement promoting the Taiwan Huayu BEST Program. Unlike NTU's general student exchange program, which normally allows 2 to 5 students as the annual quota, the agreement between NTU and the University of St Andrews is open to 10 students per year, demonstrating the enthusiasm and high expectations on both sides for further cooperation.

The University of St Andrews is NTU's 22nd partner university located in the United Kingdom, and the 637th worldwide. The university is a prestigious institution of higher education, with a history of 610 years. It is the alma mater of William, Prince of Wales, and Catherine, Princess of Wales.

An important element of the visit was the planning and implementation of the Huayu BEST Program, which was discussed at length with the key players of the program at the University of St Andrews, including Prof. Gregory Lee, Founding Professor of Chinese Studies, and Prof. Nicki Hitchcott, Head of the School of Modern Languages. The signing ceremony was attended by the Master of the United College and Deputy Principal, Prof. Lorna Milne, as the representative of the University of St Andrews.

After the signing of the agreements, the NTU delegation discovered during their conversation with Prof. Milne that both universities were interested in such matters as dual degree programs, triple degree programs, seed grants to faculty, exchange internship programs for graduate students working in laboratories, as well as possible collaborations for teacher training. The University of St Andrews promised to form a delegation to visit NTU to discuss possible future collaborations in these areas.



Executive Vice President Chou and the Master of the United College and Deputy Principal Prof. Lorna Milne at the agreement signing ceremony.

| GLOBAL OUTLOOK

Further Collaboration Opportunities Consolidated during CNRS Visit



| Prof. Ching-Hua Lo, Executive Vice President of NTU (right) and Antoine Petit, Chairman and CEO of CNRS (left).

Accompanied by the members from Bureau Français de Taipei (BFT), Prof. Antoine Petit and Mr. Edouard Besserve, Deputy Director for Asia, Oceania, Eastern Europe and Russia, Centre national de la recherche scientifique (CNRS), met with representatives from NTU in October to discuss and boost further bilateral international collaborations between CNRS and NTU.

The representatives from NTU included Prof. Ching-Hua Lo, Executive Vice President, Prof. Wen-Chang Chen, Dean of the College of Engineering and Prof. Jiun-Haw Lee, Associate Vice President for International Affairs. The meeting was also attended by Prof. Chen's long-term research partner from France, Prof. Redouane Borsali.

Prof. Borsali is not only a scholar from CNRS but also a Professor at University Grenoble Alpes, one of NTU's strategic partners in France. The two professors' international collaboration started in 2012. In 2021, they jointly participated in the CNRS/NTU - International Research Project: France-Taiwan Project, a five-year project on the study of Green Material. At the meeting, Prof. Chen and Prof. Borsali shared their experience to help facilitate the formation of more connections between NTU and CNRS.



Besides the existing fields, future bilateral collaborations between NTU and CNRS will include the new fields of artificial intelligence, sustainability, and science. Scholars and symposiums will also be matched to expand the quality and quantity of international collaborations.

NTU is one of the CNRS' main partner institutions in higher education in Taiwan. According to the SciVal database, scholars from NTU and CNRS published over 1,100 co-authored publications in the last five years. The two delegations had fruitful discussions and reviews of current collaborations. They agreed to facilitate further bilateral collaboration via online forums, research symposiums, and so on in the fields of Science, Artificial Intelligence, and Sustainability.



Click or Scan the QR code
to learn more about the
Green Material Institute.



Prof. Wen-Chang Chen, Dean of the College of Engineering (right) has long been dedicated to international research collaborations. He attended the meeting to share his experience as Head of the Green Material Institute, a CNRS project in Taiwan, with Prof. Redouane Borsali, his research partner in France.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw



**National
Taiwan
University**
國立臺灣大學

ACHIEVEMENTS

A Riemannian Geometry Theory of Nonlinear Optical Properties of Materials

Bulk photovoltaic effect (BPVE) is a second-order nonlinear optical effect that generates dc photocurrents in a noncentrosymmetric solid under light irradiation. Topological semimetals emerge as efficient infrared and terahertz photodetectors due to this promising mechanism. Recently, Professor Guo of NTU's Department of Physics, together with researchers from RIKEN and the University of Tokyo, Japan as well as Harvard University, USA, investigated the second-order optical conductivity in topological semimetals described by Dirac and Weyl models.⁽¹⁾ Through symmetry and power counting analysis, they showed that Dirac and Weyl points with tilted cones exhibit the leading low-frequency divergence. They also uncovered the complete quantum geometric meaning of the low-frequency BPVE (TABLE I). For example, they found that the injection current is controlled by the quantum metric and Berry curvature, whereas the shift current is governed by Christoffel symbols. They also performed material specific first-principles calculations, and discovered that gigantic photoconductivity at low frequencies is due to the divergent behavior of the geometric quantities near the Dirac and Weyl points. This work⁽¹⁾ brings new insights into the BPVE as well as the design of semimetal-based terahertz photodetectors.

The geometry of quantum states is a powerful concept for understanding the responses of electronic systems to static electromagnetic fields, as exemplified by the quantum Hall effect. However, it has been challenging to relate quantum geometry with optical responses. The main obstacle is that optical transitions are properties of a pair of states, while existing geometrical properties are defined for a single state. Professor Guo and his collaborators recently constructed a Riemannian geometry theory for all-order optical processes by identifying transition dipole moment matrix elements as tangent vectors (FIG. 1). They showed that optical responses can be generally thought of as manifestations of the Riemannian geometry of quantum states. They also applied their theory that third-order photovoltaic Hall effects are related to the Riemann curvature tensor, and demonstrated an experimentally accessible regime where they dominate the response (FIG. 1). Their intriguing discovery was recently published in the leading physics journal *Nature Physics*.⁽²⁾

	Linear injection	Circular injection	Linear shift	Circular shift
T symmetric	✗	✓	✓	✗
PT symmetric	✓	✗	✗	✓
Broken T	✓	✓	✓	✓
Geometric quantities	Quantum metric (g_{ab})	Berry curvature (F_{ab})	Symplectic Christoffel symbols ($\tilde{\Gamma}_{acb}$)	Christoffel symbols of the first kind (Γ_{acb})
	Quantum geometric tensor ($Q_{ab} = g_{ab} - iF_{ab}/2$)		Quantum geometric connection ($C_{acb} = \Gamma_{acb} + i\tilde{\Gamma}_{acb}$)	
Divergence	$\mathcal{O}(\tau \omega^{d-3})$		$\mathcal{O}(\omega^{d-4})$	

TABLE I: Low-frequency properties of dc photovoltaic responses: linear and circular injection currents as well as linear and circular shift currents, together with the corresponding quantum geometric quantities and leading divergence. T denotes time-reversal, ω is photon frequency, d denotes spatial dimensions, τ denotes photoelectron relaxation time.

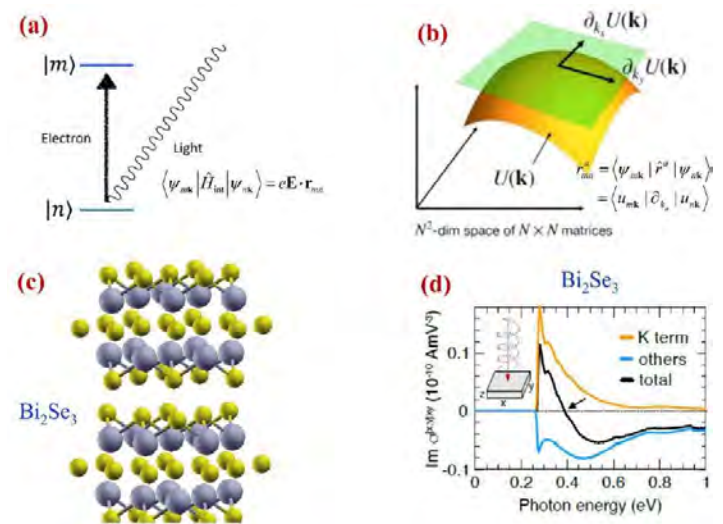


FIG. 1: (a) Optical transition and (b) geometry of the Bloch state: optical transition matrix elements as tangent basis vectors. (c) Structure of massive Dirac material Bi_2Se_3 , and (d) calculated third-order circular photovoltaic Hall conductivity for Bi_2Se_3 . As the theory predicts, the Hermitian curvature (K term) dominates the response near the band edge.



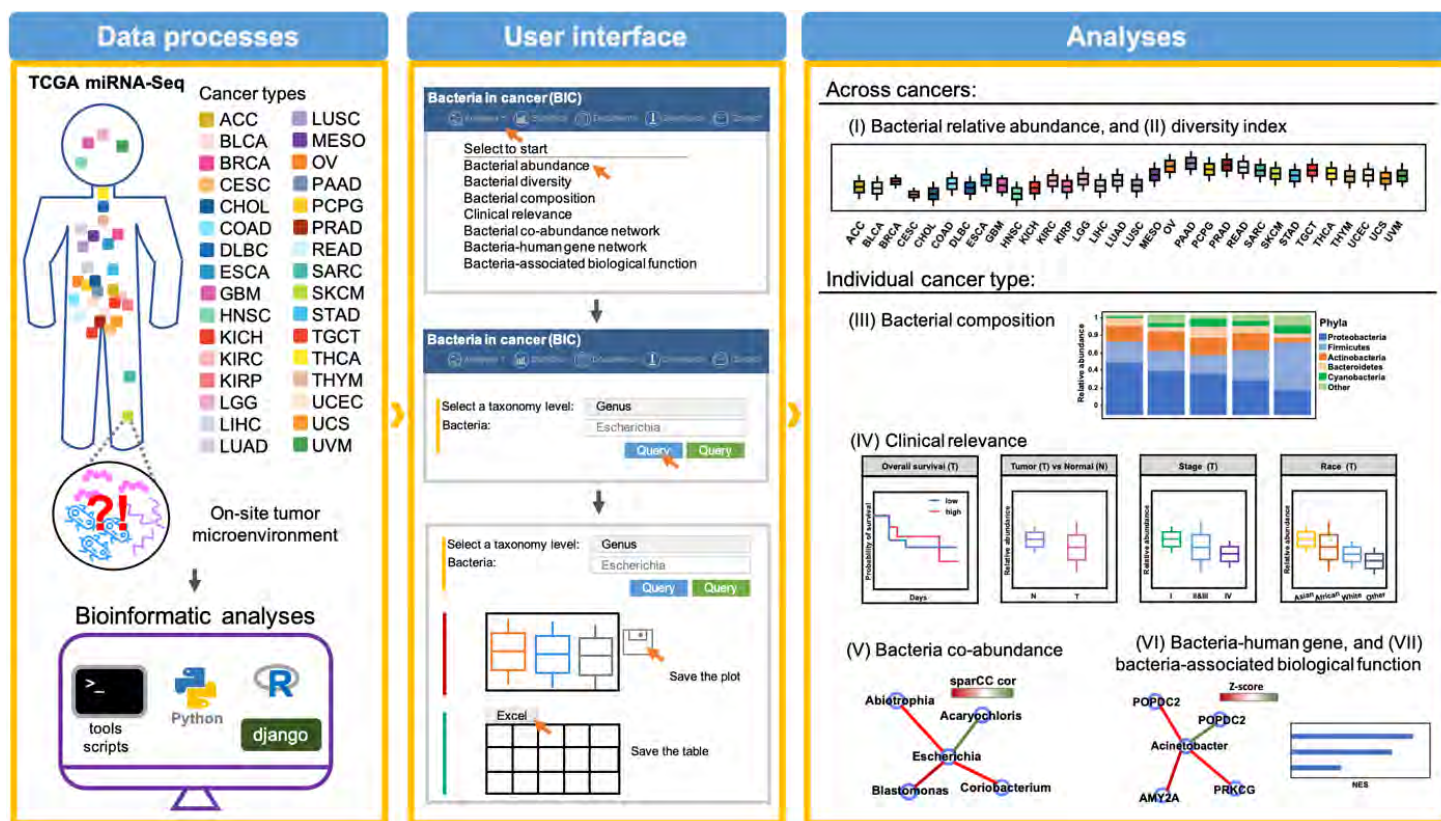
⁽¹⁾ Click or Scan the QR Code to read the journal article in *Physical Review X*.



⁽²⁾ Click or Scan the QR Code to read the journal article in *Nature Physics*.

ACHIEVEMENTS

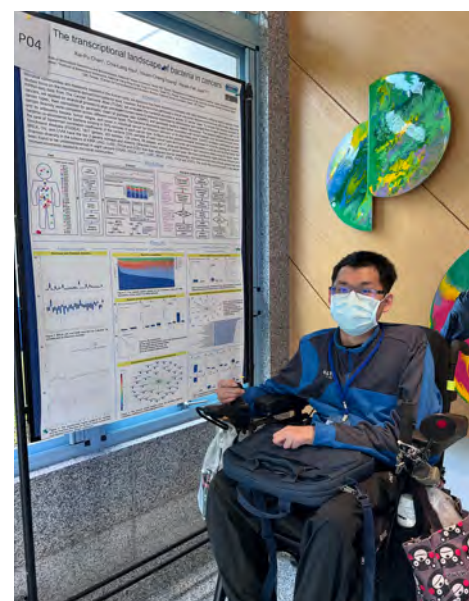
Mining Big Data to Reveal the Transcriptional Landscape of Bacteria in Cancer



Analyzing the microRNA sequence data of 32 human cancer tissues, mining the implied bacterial transcriptional landscape, and constructing the "BIC" database can provide cancer microenvironment information related to microbial communities.

In the past, internal organs other than the human gut were thought to be sterile. In particular, bacteria detected in tumor tissue were often considered contaminants introduced during sampling. Recently, however, increasing evidence has shown that various microorganisms are present in cancer tissues. Based on the concept of "making the best use of everything," this study carried out big data analysis of human cancer microRNA sequence data from The Cancer Genome Atlas (TCGA). By reusing the sequences that should have been discarded because they did not correspond to human genes, and performing sequence alignment with bacterial gene sequence data, the information, such as bacterial species and expression quantities present in cancer tissues, were obtained and "BIC" database, which provides biological information about the cancer microenvironment in relation to the microbial community, was then developed. The research results were published in *Nucleic Acids Research*, the top-ranking journal in biochemical research.

By mining the sequence data from 10,362 patient tissue samples in 32 cancer types and using multiple bioinformatic analyses, the results of cancer-associated bacterial information, including the relative abundance of bacteria, bacterial diversity, associations with clinical relevance, the co-expression network of bacteria and human genes, and their associated biological functions, were acquired. BIC database provides an online interface for query and visualization so that users can quickly and effectively use and download this information. BIC



First author Kai-Pu Chen attended the ISEGB 2022 conference.

is a public database that users can access freely, and all the developed source codes are available on GitHub. Researchers and enthusiasts in the bioinformatics-related community are also welcome to develop other applications accordingly.

The first author, Kai-Pu Chen, is a Ph.D. student of the Graduate Institute of Biomedical Electronics and Bioinformatics. Chen is diagnosed with the rare disease Spinal Muscular Atrophy (SMA). The research was completed thanks to NTU and the Department of Life Sciences for providing accessible spaces on campus for students such as Chen, so they can do their best work without worry.

This study was jointly conducted by Dr. Hsueh-Fen Juan, Distinguished Professor of the Department of Life Sciences and Graduate Institute of Biomedical Electronics and Bioinformatics and Director of the Center for Computational and Systems Biology, and Dr. Hsuan-Cheng Huang, Professor of the Institute of Biomedical Informatics at National Yang Ming Chiao Tung University. This work was supported by the Ministry of Science and Technology, Taiwan, the Ministry of Education, and the National Center for High-performance Computing (NCHC), which provided computational and storage resources. The research members include Dr. Chia-Lang Hsu, Associate Research Fellow of the Department of Medical Research of National Taiwan University Hospital, and Dr. Yen-Jen Oyang, Professor of the Graduate Institute of Biomedical Electronics and Bioinformatics.



Click or Scan the QR code
to read the journal article
in *Nucleic Acids Research*.

|

National Taiwan University
+886-2-3366-2577
No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan
ntuhighlights.ntu.edu.tw



ACHIEVEMENTS

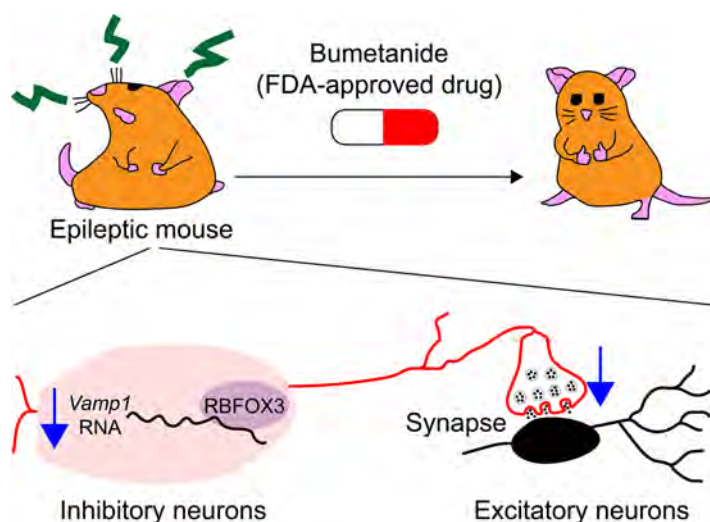
Novel Pathogenic Mechanisms of Epilepsy Revealed

Epilepsy is a common brain disorder. However, its pathogenic mechanisms have been a mystery. Mutations and deletions of *RBFOX3* were noted in persons with epilepsy but the mechanism of seizure mediation by *RBFOX3* remained unknown. Now, in a recent article, Dr. Hsien-Sung Huang and his team at the Graduate Institute of Brain and Mind Sciences have revealed important clues for understanding the pathogenesis of *RBFOX3*-linked epilepsy (*PNAS*, August 11, 2022).

Seeking to identify the underlying mechanisms that drive *RBFOX3*-linked epilepsy, De-Fong Huang, NTU MS, led a series of experiments in Huang's lab that produced three main findings. First, *RBFOX3* mediates the expression of *VAMP1*, an inhibitory neuron-specific protein that weakens the inhibitory strength of inhibitory neurons and increases the excitability of excitatory neurons. Hence, imbalances of excitation and inhibition contribute to seizure activities. Second, given the heterogeneity of inhibitory neurons in the brain, it is crucial to clarify which subtype of inhibitory neurons plays the key role in *RBFOX3*-linked epilepsy. By using cell-type-specific conditional knockout mice and other behavioral, electrophysiologic, cellular, and molecular approaches, neuropeptide Y (NPY)-expressing inhibitory neurons were found to be the key player. Third, notably, an FDA-approved drug, bumetanide, can recover seizure phenotypes due to *Rbfox3* deletion. Owing to the importance of these findings, the study was featured by *PNAS* Showcase.

Huang's research team is now studying the roles of NPY-expressing inhibitory neurons in the pathogenesis of epilepsy. Hopefully, they will reveal further insights into this disorder that will lead to new therapeutic strategies.

This study was supported by the National Science and Technology Council and NTU as a collaboration with Drs. Susan Shur-Fen Gau and Hsiang-Po Huang, NTU; Dr. Cheng-Chang Lien, National Yang Ming Chiao Tung University; as well as Dr. Yi-Shuan Huang, Academia Sinica.



Bumetanide rescues seizure phenotypes from *Rbfox3* knockout mice. Mechanistically speaking, *RBFOX3* mediates seizures via regulating *Vamp1* expression in inhibitory neurons, excitability of excitatory neurons and inhibitory synaptic transmission.



Click or Scan the QR code to read the journal article in *PNAS*.



Click or Scan the QR code to visit Dr. Hsien-Sung Huang's lab webpage.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw



National
Taiwan
University
國立臺灣大學

| TEACHING & LEARNING

Efforts to Solve Unmet Medical Needs

The development of new medical devices is an integral part of medical care, yet biomedicine companies often face difficulty finding the appropriate healthcare experts or institutions with whom to collaborate. To facilitate the innovation of new medical devices and build clinical research momentum in Taiwan, NTU has established the Research and Development Center for Medical Devices to bridge the gap between academia and industry.

Every year the Center hosts seminars with the theme “Unmet need for innovative medical devices: Perspective from clinicians,” inviting healthcare practitioners to share the latest trends in medical devices. These seminars not only help companies gain insight into new medical devices and approaches but also help biomedicine companies which are interested in developing medical technology assess whether their manufacturing capabilities can meet current clinical needs.

This year’s seminar focused on “The Clinical Application of Robotic Surgery,” inviting doctors from the NTU Hospital (NTUH), a leading medical institution in implementing robotic surgery systems. The invited lecturers included Dr. Sho-Mon Wang, NTUH Department of Urology, Dr. Tsung-Lin Yang, NTUH Department of Otolaryngology, and Dr. Shun-Mao Yang, Division of Thoracic Surgery at NTUH Hsin-Chu Branch.

All three doctors generously shared their extensive experience of applying robotic surgery tools with the audience. Dr. Wang focused on his observations and experience in the research and development of robotic-assisted urology surgery procedures while Dr. Tsung-Lin Yang delivered a presentation titled “Innovation and invention in the robotic surgery of otolaryngology and head and neck.” For his part, Dr. Shun-Mao Yang explained the significance and practice of robotic surgery in thoracic surgery. Through such sharing of expert knowledge and focused discussion, it is hoped that interested companies will be encouraged to apply for Center’s industry-academia cooperation projects and join NTU in fulfilling the unmet needs of patients.

Besides hosting regular seminars, the Research and Development Center for Medical Devices now participates in the National Science and Technology Council’s “Innovative Medical Devices and Precision Diagnosis and Treatment Project.” Using an organizational donation of TWD 1.5 million, the Center is working on a new research project to find out how to create value and develop suitable business models with medical devices for an aging population.



Dr. Tsung-Lin Yang sharing insights into robotic surgery.



Dr. Shun-Mao Yang discussing the significance and practice of robotic surgery in thoracic surgery.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw



National
Taiwan
University
國立臺灣大學

| TEACHING & LEARNING

Global Health Program Welcomes Incoming Students



| Students and faculty attending the 2022 GHP welcome party.

This year marks the fourth year of the Global Health Program (GHP) offered by the College of Public Health. A welcome party was held on October 13, 2022 for its ten new master students. Program faculty, students, and alumni also attended, providing the new students with an occasion to get acquainted with them.

GHP invited alumni to share their experiences of the program and offer advice, such as on how to find the ideal research supervisor or choose a viable thesis topic. Through the gems shared by the alumni, the newcomers not only got insight in their own academic journey at GHP but also became better acquainted with the GHP community.

Other special guests were invited to the event, including two incoming graduate students in Public Health and Dr. Po-Han Lee and Dr. Jhu-Cin (Rita) Jhang, who work towards inclusivity, diversity, and equality at NTU. The two international graduate students were invited to mix with international students in other departments and institutes of the College of Public Health. During the event, Dr. Lee and Dr. Jhang introduced NTU's "Inclusion Diversity Equality Initiative Project" to raise awareness of the importance of building an inclusive and diverse environment on campus. It is hoped that students will join the cause and actively participate in future events related to this project.

The highlight of the party was a guided tour of the NTU Medical Library. The newly renovated Medical Library boasts a rich collection of medical journals, textbooks, and resources. During the tour, GHP faculty members and students alike marveled at the abundance of academic resources as well as the diverse and ingenious design of the library's facilities and spaces. The tour was rated so highly by the students that GHP decided to host the tour regularly so every new student in the program will experience this introduction to NTU's medical research resources.

NTU's Global Health Program targets international students, with the goal of providing students the necessary research skills to work toward solving the world's most pressing public health issues.



| Students and professors visiting NTU Medical Library.



| GHP alumnus sharing his experience with the new graduate students.

| TEACHING & LEARNING

Innovation in Education: Charting Your Academic Journey



| NTU officials and faculty members at the inauguration ceremony of the Academic Advising Office.

The mission of the NTU Office of Academic Affairs (OAA) is to lead innovative pedagogy and equip students with the knowledge and skills they will need to solve the world's most pressing and complex needs. To fulfill this mission, OAA has developed an innovative learning system, providing a diversity of learning options: Specialization Program, University-Wide Interdisciplinary Bachelor's Program, and Undergraduate Honors Program.

These programs are designed to help students quickly grasp the core competencies of a single field of study, allowing them to strengthen their field-specific knowledge or learn across other areas of disciplines. NTU has launched the Specialization Program since the 2021-22 academic year. 56 academic units are offering 230 specializations. By stepping out of established disciplinary silos, students can make connections across diverse arrays of knowledge and learn how to apply knowledge in real-world settings.

To support students pursuing a unique academic and career path, OAA launched the University-Wide Interdisciplinary Bachelor's Program and the Undergraduate Honors Programs. The University-Wide Interdisciplinary Bachelor's Program offers an opportunity for students to select interdisciplinary courses and make new discoveries through interdisciplinary studies. The Undergraduate Honors Programs guide students to take more advanced courses that empower them to carve out a research niche that matches their passions and strengths. To date, OAA has implemented 17 Undergraduate Honors Programs, matching students with suitable fields of study and helping them explore and expand their research potential.

OAA also established the Academic Advising Office to help students identify their interests and design an academic portfolio tailored to chart their learning journey. In the future, with the assistance of the Academic Advising Office, OAA will continue to promote cross-departmental collaboration and launch courses, seminars, project-based courses, thesis writing workshops, internship programs, and industry talks. These activities can help students not only embark on a path with greater career opportunities but also become innovative leaders in academia or industry capable of changing the world.



| The Heart's Cafe meeting room at the Academic Advising Office, a space for students to contemplate or just relax.



| Inspirational quotes and note cards inside the Café meeting room. Students can write their feelings on the cards and post them in the Inspiration Room.

PEOPLE

Anniversary Celebration—Pioneering the Future



President Kuan addressing the ceremony. He affirmed that NTU had published the first Social Responsibility and Sustainability Report in 2020, with the goal of carbon neutrality on campus, aiming at 50% of carbon neutrality by 2028, the year of the University's centennial.

NTU celebrated its 94th anniversary on November 15 with a grand ceremony presided over by President Chung-Ming Kuan. On this special occasion, Mr. Chun-Ming Huang and Mr. Jonney Shih were awarded honorary doctorates in recognition of their outstanding achievements and contributions. In his opening remarks, President Kuan asserted that for over nine decades NTU had been successfully cultivating many exceptional students who have gone on to foster progress in economy, society, and scientific research, making great contributions to both the University and Taiwan. Now, NTU is faced with keen competition in higher education across Asia as well as rapid social changes. In an effort to tackle these challenges, NTU has designed and implemented innovative learning programs to attract and retain talents, connect with the wider world, as well as stir discussions on Future University. President Kuan encouraged NTU students to "pioneer the future," expecting more of them to break through current limitations, innovate, and face setbacks and failures without fear.

This year's honorary doctor, Mr. Chun-Ming Huang, is a giant of Taiwan's local literature, many of whose novels have been made into popular movies. His works show his affection for the land and reflect Taiwan's path to development from an agricultural society to the industrial and commercial era. His efforts at serving society and caring for the disadvantaged provide an ideal model for current students.



Honorary doctor Chun-Ming Huang addressing the ceremony.

He remarked that while reaching the age of 88 felt like being "withered wood" and "decayed wood," receiving an honorary doctorate felt like a spring breeze that opened his eyes to see the world anew.

The honorary doctor, Mr. Jonney Shih, is the Chairman of ASUS. Under his leadership, ASUS has been firmly established as the world's largest brand for motherboards and one of the top three international brands of consumer laptops. He has long dedicated himself to innovative research and development. While leading technological innovation, he also adopts measures for social responsibility as an entrepreneur, in particular by sparing no effort in developing green products and promoting digital inclusion, humanistic environmental education, and climate issues.

In addition, 10 alumni with exceptional achievements in the arts and humanities, academics, business, social services, and miscellanea were honored in recognition of their outstanding contributions to NTU and society. A winner in the academics category, Dr. Chi-Huey Wong, a graduate of the Institute of Biochemical Sciences and winner of the 2021 Welch Award in Chemistry, addressed the ceremony. He stated with pride that NTU was the first university in Taiwan and the top-ranking comprehensive university, with a distinctive free and open style of education that has always won a lot of praise. Looking back at his student life on NTU campus, he acknowledged NTU's long-lasting impact on his life. "If I have a little achievement today, the foundation was established during my time at NTU." He hopes that all NTU students can become the best version of themselves and find their place in the world.

The "Social Devotion Special Award" was presented during the ceremony to students in the International Degree Program in Climate Change and Sustainable Development, the Department of Social Work, and NTU Pinglin Sprout, in recognition of their love for society and spirit of altruism with excellent results. The ceremony concluded successfully with NTU Chorus leading the University Song.



Click or Scan the QR code
to find out more about Love Binti.



Click or Scan the QR code
to access the Facebook fan page of
NTU Pinglin Sprout to learn more
about what they are doing.



Honorary doctor Jonney Shih encouraging young students to hold on to their dream and enthusiasm after they graduate from NTU.

He expressed the hope that students will bravely "embrace reality" during every minute of their struggle, especially when faced with adversity.



Speaking on behalf of the outstanding alumni, Dr. Chi-Huey Wong remarking that he was pleasantly surprised about winning the prize, as recognition is what motivates people to advance.



Representing the winners of the Social Devotion Special Award, Yi-Ting Yang shared the story of her time in East Africa. She also started the Love Binti organization with the hopes of encouraging more people to help out the world's poor.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw

**National
Taiwan
University**
國立臺灣大學

PEOPLE

Successful Fundraising to Prepare for NTU Centennial



The Centennial Celebration Sorghum Liquor Fundraising Project Appreciation Gala was met with great enthusiasm from the guests.

As part of NTU's Centennial Celebration and an effort to strengthen ties among alumni, enhance solidarity, and replenish the endowment fund, the Office of Financial Affairs launched the "Centennial Celebration Sorghum Liquor Fundraising Project" in April. The funds raised were earmarked to help secure production of the centennial celebration liquor. Thanks to the promotion efforts of President Chung-Ming Kuan, Executive Vice President Chiapei Chou, the leaders of the administrative team, and the deans of every college, TWD 19.71 million was raised, surpassing the target.

The Office of Financial Affairs held an appreciation gala, inviting 100 guests including donors and the administrative leaders. On behalf of the University, President Kuan presented each of the donors with a certificate of appreciation. Executive Vice President Chou explained the significance of NTU's production of the centennial celebration liquor and the process of having it custom brewed. The appreciation gala was also a meaningful opportunity to maintain warm ties with the donors, with hopes of working towards the vision and realization of NTU's centennial celebration.

Fully supporting this meaningful project, our partner supplier, Kinmen Kaoliang Liquor Inc., will provide a precious, rare base liquor from their cellar. Aged for ten years, the Kaoliang is 100% raw liquor and of top-shelf quality. The celebration liquor will come in a beautifully designed custom-made bottle and box. Offered in one and two-liter bottles, the liquor will be ready in time for the NTU Centennial Celebration in 2028. Besides being presented as a gift to donors of this project, the rest will be offered as gifts to donors of the "Centennial Memory and Campus Construction Fund." It is the University's fondest hope that the fund-raising target of NT\$300 million can be reached to help NTU commence its next centenary in all its glory.



Executive Vice President Chiapei Chou presented a certificate of appreciation to President Chung-Ming Kuan on behalf of the University.



Executive Vice President Chiapei Chou (right) and Executive Vice President Shan-Chwen Chang (left) after signing a pottery urn containing the Centennial Celebration Liquor distilled exclusively for NTU, on behalf of the University.

PEOPLE

Petit Theatre: We are not Teachers but Explorers



Members form a "moving castle" to explore their body movements. The three-person castle grows bigger as more people join. This activity trains students to find conceivable ways to move their bodies through space.

Fully immersed in her performance, Jasmine sits upright, her legs crossed, and calmly gives orders, perfectly capturing the essence of her character. "You were portraying everything so well that you became the character! It was as if you have been a CEO before!" After Jasmine finished her performance, she was showered with praises and compliments by her instructors Hsi-Han Chen, Tzu-Yao Lin, and Chia-Ling Chien. Chen, Lin, and Chien are three of the five founding members of Petit Theatre, a theatre workshop that hosts creative drama courses at NTU.

Feeling lost? Join NTU's first drama-based communication course

Chen remarked, "Compared to the rigid routine in high school, we enjoy a lot more freedom in college. Yet after entering NTU, I was mostly overwhelmed by a feeling of loss and confusion." She soon discovered that she was not the only one who felt this way and that many students on campus shared the same struggle. Although students are given many options upon entering college, most of them do not know how to choose or make decisions. "That strong feeling of being lost, unsure, and confused is what eventually evolved into Petit Theatre."

In 2020, COVID-19 engulfed the world, and the chaos and impact of the outbreak led to unprecedented fear among people. At the same time, this fear drove people to press the pause button in their lives and take time to understand themselves better. It was during this time that Chen and Lin established Petit Theatre, with the mission to help people to explore their hidden talents and traits and thus discover their position and value in society.

Petit Theatre came into existence with perfect timing, offering people a chance to reflect on themselves during the COVID restrictions. However, it was not smooth sailing at first. The first two years were incredibly challenging for the team due to the high member turnover rate. Watching members come and go was not easy, but Chen and Lin dealt with such tensions and



The moving castle formed by the three students exploring the space in front of a bigger castle formed by a larger group.



Participant Hung-Chun Lai learns how to better use her body language to express herself in a group.

frustrations with what they knew best—creative drama. They developed a creative facilitation activity within their team, leading members in exercises that helped guide their emotions and feelings safely and responsively. Through such activities, members explored their inner thoughts and reflections while also practicing listening to each other's voices and body movements. The experiment of communicating and exploring through drama began with the core members of Petit Theatre, and this tradition continues. All the instructors working at the Theatre just lead and inspire students through their own personal experience of the activities.

In November 2022, with the support of NTU D-school and the NTU Leadership Program, Petit Theatre expanded its secret teambuilding activity into a three-week teambuilding creative workshop open to all NTU students. By sharing their communication experience, members hope to benefit people who wish to build team consensus and cultivate successful teamwork.

“Show, don't tell” is the key to building common good

The course covers seven themes, including mood, spatial relations, imagination, observation, understanding and cooperation, impromptu, and drama creation. Through the different activities and games performed under the guidance of the instructors, students explore themselves and their relationships within the team and society and connect their understanding with lived experience.

“I tend to be quiet in a group, and rarely speak,” said Yun-Ci You, one of the students who attended the course. “However, the improvisation exercises we did in class truly helped me to react intuitively, and I learned things about myself that I was never aware of before,” she added. As she recalled her time with Petit Theatre she smiled and asserted, “I’m amazed by how good the instructors are at leading and guiding us in thinking. I was able to associate these activities to real life and my interpersonal skills are now greatly improved.”

The three-week journey is a meaningful time for both students and instructors at Petit Theatre. Students enjoy learning surprising elements of themselves in a fun and creative manner that differs dramatically from traditional pedagogy. “We think of ourselves not as instructors, but as explorers helping one another on this journey of self-discovery,” declared one member of Petit Theatre.



Students posting their feedback on a mirror to exchange ideas.



Tzu-Yao Lin (middle) and Chia-Ling Chien (second from the left) sit in groups with the students to discuss their performance.

National Taiwan University

+886-2-3366-2577

No.1, Sec. 4, Roosevelt Road Taipei, 10617 Taiwan

ntuhighlights.ntu.edu.tw

 **National
Taiwan
University**
國立臺灣大學