INTRODUCTION

The year 2020 marks the 25th anniversary of the formal inauguration of the Institute of Atomic and Molecular Sciences (IAMS) and the 38th anniversary of its inception. IAMS has grown from a young institute to a mature one with multiple research areas, including chemical dynamics and spectroscopy, atomic physics and optical science, advanced materials and surface science, and biophysics and bioanalytical technology. Annually, we have senior colleagues accomplishing their mission and retiring as many new, energetic, and brilliant young scientists join the institute. A newsletter to share with the community about happenings in IAMS is a natural means of covering our achievements, new members, retirements, awards, students, and activities. Through this newsletter, we hope to provide more understanding of IAMS and attract new members among the faculty, staff, and students.

Kuei-Hsien Chen, Director

Kuei-Hsien Chen, Director

[Photo of Kuei-Hsien Chen]
We had a dream when we established IAMS that by 2000, at the turn of the century, IAMS, Academia Sinica would become one of the most well-known institutes in the world. Therefore, young people would not have to go abroad and can stay here to get good education and do good research work. We started with chemical dynamics, spectroscopy, and surface chemistry. To a certain extent, we accomplished that dream by the turn of the century.

With time, we have continued to recruit excellent candidates in the fields of physics, chemistry, and microscopy. In recent years, more young scientists have been working in the fields of cold atoms and molecules and in bioimaging, which are very exciting nowadays.

During the years since I was elected as President of the International Council of Science Union (ICSU), I’ve been working together with many idealistic scientists trying to strengthen international science for the benefit of society. I hope that my efforts for the sustainable development of human society will continue as part of the goals of IAMS.

Yuan-Tseh Lee, President Emeritus, Academia Sinica ——

(Excerpt from interview, 2015)

**Dr. Chi-Kung Ni, Research Fellow and Deputy Director**

Dr. Chi-Kung Ni and co-workers recently developed a new mass spectrometry method for carbohydrate structural identification which they named “logically derived sequence (LODES) tandem mass spectrometry.” By applying theory and techniques frequently used in gas-phase chemical kinetics, Dr. Ni and colleagues found that the mass spectra of carbohydrates can be explained using a few simple rules. By using these rules, they successfully identified the complete structure of numerous oligosaccharides.

Nucleic acids, proteins, lipids, and carbohydrates are the four categories of molecules in creating life. Although the structural determination of nucleic acids, proteins, and lipids have been well established, the development of a simple and robust method for carbohydrate structural determination remains a conundrum in the field. A main obstacle hindering such a development is the numerous carbohydrate isomers. For example, even though they are constructed using only three common hexoses (i.e., glucose, galactose, and mannose) small oligosaccharides such as pentasaccharide and hexasaccharide have more than $10^6$ and $10^7$ isomers, respectively.

Mass spectrometry is highly sensitive and widely applied in determination of molecular structure. In structural analysis through mass spectrometry, molecules (precursor ions) are dissociated into fragments, and the mass spectra of these fragments are recorded. Because different molecular structures result in different fragmentations, the mass spectra of the fragments can be integrated to reveal the structures of parent ions. However, most mass spectrometry methods can only determine a portion of a carbohydrate's structure. The identification of a given carbohydrate from various isomers consequently remains difficult.
The novel mass spectrometry method Dr. Ni and co-workers developed involves successive collision-induced dissociation of underivatized oligosaccharides in a commercial ion-trap mass spectrometer. The key of LODES is the sequence in multistage tandem mass spectrometry, which is derived from the understanding of dissociation mechanisms using theory and techniques in gas-phase chemical kinetics. “This is an example to show that the tools developed in one field can be applied to solve problems in another field,” said Dr. Ni. “Changing the research field does not mean losing the advantage you once had, but an opportunity to explore the endless potential of your skill and knowledge.”

Dr. Ni has studied gas-phase kinetics for 25 years. His research topics include photodissociation of small organic molecules in molecular beams as well as molecular energy transfer in crossed molecular beams. He started considering carbohydrate structure determination in 2016. “If I had not studied gas-phase chemical kinetics in past years, I would not have come up with the idea to develop LODES,” said Dr. Ni. “The dissociation of carbohydrates in mass spectrometry is a standard problem in gas-phase chemical kinetics, though it is difficult and complicated. Most people who work on gas-
phase chemical kinetics focus on small molecules. They are either unaware of this problem or perhaps they think carbohydrates are too large to be understood in detail like the typical small molecules studied in gas phase. I am lucky to notice this problem, and I happen to know the tools to solve it,” he added.

Fig. 1. Flow chart of the program for automatic carbohydrate structural determination.
Dr. Lin’s group studies ultracold bosonic neutral atoms, which are dilute quantum gases in the degenerate regime. These ultracold gases are atoms present at microkelvin to nanokelvin temperature ranges; these systems are simple and can be well controlled because the effective interaction is short range and tunable, and the optical or magnetic trapping potentials are precise. Thus, quantum physics in our textbooks can be manifested in such systems. Dr. Lin uses them as a platform to study fundamental quantum physics, simulate complicated models in condensed matter physics, and create new types of coupling with designed properties that can lead to new systems with no counterparts in materials.

Dr. Lin’s research focuses on synthesizing a magnetic field $B^* = \nabla \times A^*$ for neutral atoms with a corresponding synthetic gauge potential $A^*$; this is equivalent to generating a Lorentz force for moving atoms, thus simulating charged particles in a real magnetic field $B$ (see Fig. 1). The motivation is that the charge neutrality of the atoms has limited physicists from simulating interesting phenomena where charged particles are under electromagnetic fields, such as those in quantum Hall physics and topological phases. Therefore, through the generation of synthetic $A^*$ and $B^*$, Dr. Lin expects to explore novel quantum phenomena resulting from gauge fields.

Dr. Lin’s group created an ultracold atomic gas, which is an $^{87}$Rb Bose–Einstein condensate (BEC) of $N=2\times10^5$ atoms with temperatures of a few $\times10$ nK. The BEC is produced after laser cooling and evaporative cooling, and the atoms are trapped by optical tweezer beams (see our setup in Fig. 2). A synthetic gauge potential $A^*$ is then created along the azimuthal direction $\phi$. This is achieved by using two Raman beams, one of which is a Laguerre–Gaussian beam carrying orbital angular momentum (OAM) of light. The two-photon Raman coupling from the two beams transfers OAM of $\hbar$ to the center-of-mass of the atoms as the atomic spin state changes, thus creating a spin-OAM coupling (SOAMC). That is, the cold atoms initially spin polarized with zero angular
momentum can be set into rotation by the OAM-carrying Raman beams, which couple the atoms into other spin states with nonzero angular momentum. To be precise yet technical, Fig. 3 displays the atoms in each spin state, \( m_F = -1, 0, 1 \) after the Raman coupling is turned on. The atoms are initially prepared in spin \( m_F = -1 \) state with zero OAM \( \ell = 0 \) before the Raman coupling is turned on. The Raman beams couple spin \( m_F \) with OAM \( \ell_m \) to spin \( m_F + 1 \) with OAM \( \ell_m + 1 = \ell_m + \hbar \), and thus we have \( m_F = -1, \ell = 0 \) state, \( m_F = 0, \ell = \hbar \), and \( m_F = 1, \ell = 2 \hbar \) states for each Raman detuning \( \delta \). Such a correlation between spin \( m_F \) and OAM \( \ell_m \) is the SO-AMC. We further employed the azimuthal gauge potential arising from the SOAMC as an effective rotation, and this can be used to study the rotational properties of superfluids under thermal equilibrium in a well-controlled manner.

References:

Fig. 1. Simulating the Lorentz force of neutral atoms.
Fig. 2 Experimental setup.

Fig. 3. Spin-orbital-angular-momentum coupling in the Raman-coupled spinor Bose–Einstein condensate.
A: What is chemical physics? What do you mean by “theoretical?”
Dr. Liang–Yan Hsu (LYH): Chemical physics is a branch of physics and chemistry that investigates chemical processes or the physical properties of materials from the point of view of physics. For instance, when we study molecular fluorescence and electron transfer, we start from a microscopic world based on the principles of quantum mechanics, statistical mechanics, and electrodynamics. As for “theoretical,” it means that we explore and analyze chemical processes by using mathematical equations and computers.

A: Why did you select these two topics? Could you talk more about them?
LYH: Resonance energy transfer and molecular fluorescence are fundamental photophysical processes, and there are a lot of applications based on the two processes. The pioneers have established a variety of useful theories about the two processes, but their theories cannot be adequately employed to describe molecules coupled to plasmon polariton or photons in an inhomogeneous cavity. To address this issue, we introduced a technique called “macroscopic quantum electrodynamics.” My recent works have received broad interest and a lot of attention. For example, “Plasmon-Coupled Resonance Energy Transfer” was selected as a feature article in The Journal of Physical Chemistry Letters and “Quantum Dynamics of a Molecular Emitter Strongly Coupled with Surface Plasmon Polaritons: A Macroscopic Quantum Electrodynamics Approach” was chosen as “Editor’s Pick” and “Editor’s Choice” in The Journal of...
**Chemical Physics.**

**A:** How about the other topic, “photoinduced electron transport through molecules?”

**LYH:** Photoelectric processes have many applications, such as solar cells. Chemists have investigated organic solar cells for a long time, but the photoelectric processes in molecules are still not very clear. By using advances in technology, currently, researchers can study the photoelectric process at a single-molecule level. As a result, it is a good opportunity to clarify the mechanism of photoelectric processes in organic molecules. If we can fully understand the mechanism, we may increase the efficiency of organic solar cells. If you are interested in this topic, you can read my recent work “Photoinduced Anomalous Coulomb Blockade and the Role of Triplet States in Electron Transport through an Irradiated Molecular Transistor” in *Nano Letters*.

**A:** Your research topics seem quite challenging. Do you have any group members or need financial support?

**LYH:** Yes, I have a fantastic team. I am very impressed by my students and my postdocs. The members of my group are enthusiastic about their research work, and truly love science. Finally, I would like to acknowledge the support from IAMS and Academia Sinica. In my early career, our director Prof. Kuei-Hsien Chen fully supports my research directions, and my mentors Prof. Ching-Ming Wei and Prof. Yuh-Lin Wang give useful advice. Without their support, I could not have started my research career in Taiwan. IAMS is a fantastic institute for basic science. I think that it is one of the best choices for young rising scientists.
A: What is a dual-comb spectrometer?

Dr. Pei-Ling Luo (PLL): A dual-comb spectrometer (DCS), a multiheterodyne Fourier transform spectrometer based on two frequency combs at slightly different repetition frequencies, enables the simultaneous achievement of broad bandwidth, rapid measurement, and high resolution. DCS is a promising successor to conventional Fourier-transform infrared spectroscopy (FTIR), but unlike FTIR, a DCS can offer sensitive spectral measurements with virtually no instrument line shape. Therefore, DCS can be a powerful tool for accurate quantitative spectroscopy.

A: What type of dual-comb spectrometer you are making?

PLL: Most of the DCSs are designed based on the mode-locked lasers; however, the optical resolution and spectral sampling speed of these DCSs lacks flexibility because of the narrow tuning range of the repetition rate of the mode-locked laser combs. In our lab, we set up a highly flexible DCS based on electro-optic frequency combs near 3 µm. Our DCS offers a tunable spectral range of >500 nm and adjustable comb mode spacing (optical resolutions) from a few hundred MHz to a few GHz. Both precision spectral metrology and fast molecular sampling could be implemented by employing our rapidly tunable DCS.

A: What specific topic are you working on using your dual-comb spectrometer?

PLL: We are interested in accurate quantitative spectral measurements of key atmospheric molecules and free radicals. By employing the DCS, we will take advantage of the rapid broadband spectral acquisition for systematic measurements in different conditions. In addition, our system could be implemented for studying chemical reactions with a distinguish-
ing probe of each species.

A: Why did you choose to use dual-comb for such problems? Could you talk more about it?

PLL: There are two conventional methods: one is Michelson interferometer-based FTIR and the other is a tunable CW laser-based spectrometer. FTIR has broad spectral measurement capability; however, it lacks sensitivity and typically requires several hours for recording a high-resolution spectrum. By contrast, by using a CW laser-based spectrometer, the sensitivity can be improved by combining it with the cavity-enhanced absorption system, but the spectral lines are measured one by one, taking a long time to record the entire spectrum. The DCS has the unique capability of recording a broadband spectrum in a short data acquisition time. By employing the DCS, we can monitor the signal variations of multiple species simultaneously in real time.

A: Your research topics seem quite challenging. Do you have any group members or support?

PLL: Although my lab currently only has a few people, our experimental system is very stable, and the proposed research projects are progressing step by step. In addition, I really appreciate the support from all of IAMS members, particularly from the groups of Prof. Chi-Kung Ni, Prof. Wen-Bih Tzeng, and Prof. Jr-Min Lin. They give me many useful bits of advice and helped in building my new lab. Finally, I would like to acknowledge our director Prof. Kuei-Hsien Chen, who fully supports my research projects. IAMS offers a very good research environment that can help people to overcome challenges and accomplish tasks.
Huan-Cheng Chang, Ph.D., IAMS Distinguished Research Fellow, won the 2018 Academia Sinica Investigator Award. The award is given to outstanding researchers at Academia Sinica to support them in pursuing innovative and long-term research goals with noteworthy effects.

Dr. Chang was one of the 13 researchers selected for the 2018 Academia Sinica Investigator Award and one of the 5 recipients in the fields of mathematics and physical sciences.

Quantum technology is a rapidly emerging field of science, and devices developed using the technology can actively create, manipulate, and read out quantum states of matter with unprecedented sensitivity, precision, and accuracy. Specifically, numerous new quantum technologies have recently been developed to investigate complex biological systems. The proposed study “Advancing life science research with quantum technologies” employs fluorescent nanodiamonds (FNDs) containing color centers as a new class of quantum sensors dedicated
to advancing life science research. Dr. Chang and his teams have pioneered the FND field since 2005, and Dr. Chang will focus his research activities on this topic for the next 5 years as the next frontier of exploration.

Dr. Chang is also the recipient of the Ho Chin Tui Award (2014), the Outstanding Research Award (2015), the FutureTech Demo and Breakthrough Award of the Ministry of Science and Technology, Taiwan (2017), and the France–Taiwan Scientific Foundation Prize (2019), and he was selected as the Far Eastern Y. Z. Hsu Chair Professor in 2017.

IAMS Assistant Researcher Receives 2019 Academia Sinica Junior Research Investigator Award

Chia-Lung Hsieh, Ph.D., IAMS Assistant Research Fellow, was the recipient of the 2019 Academia Sinica Junior Research Investigator Award. The Academia Sinica Junior Research Investigator Award, one of the highest recognitions of research excellence for researchers aged younger than 42 years, is designed to encourage junior researchers
in Taiwan to publish papers with major contribution to their research fields. This award is meant to enhance the research potential of young scholars within both Academia Sinica and other research institutions in Taiwan.

Hsieh was one of the only 10 researchers selected for the 2019 Junior Research Investigator Award and one of the four recipients working in mathematics and physical sciences. His research focuses on developing ultrahigh-speed optical microscopy techniques to investigate biophysics at nanometer-length scales.

Hsieh said that he wants to encourage junior researchers to study important topics that advance the frontiers of human knowledge and have a true impact on the community.

“Junior researchers have great creativity and the potential of conducting innovative research. It is a prime time to explore and enjoy science with the highest degree of freedom. I encourage the young scholars to be brave and ambitious to solve important problems and be proud of their research,” Hsieh said.

Team of IAMS Researchers Selected to Conduct Translational Medicine Research Initiative in National Biotechnology Research Park

A project led by Jung-Chi Liao, Ph.D., IAMS Research Fellow, was selected as one of the first groups of projects to conduct the Translational Medicine Research Initiative in the National Biotechnology Research Park, Taipei.

This project supports market-oriented innovation and multidisciplinary collaboration in translational medicine. The selected projects are expected to enhance our international competitiveness in new drug development as well as medical equipment industries and contribute to creating an international biotechnology industry cluster.
Dr. Liao’s project aims to create a novel microscopy system that can not only image proteins of interest but also label and then isolate proteins at user-defined subcellular regions under the microscope. This patented image-guided photoinduced labeling system will be used to study subcellular spatial proteomics. Cell biology researchers can apply the system widely to reveal new protein–protein interactions and thus expand druggable proteomes for pharmaceutical applications. Joining the National Biotechnology Research Park will benefit Liao’s team in accelerating the commercialization process. Several biologists have already expressed high interest in using such a system in studying their research questions.

Dr. Liao is one of the 10 researchers selected for the Translational Medicine Research Initiative, which provides funding support and laboratory space privileges in the National Biotechnology Research Park for 3 years.

Yi-Fan Huang (postdoctoral researcher in Kuei-Hsien Chen’s group) and Jake A. Tan (postdoctoral researcher in Jer-Lai Kuo’s Group) won the 2019 IAMS Junior Fellowship and were named among the Assistant Research Scholars and Independent Postdoctoral Research Scholars, respectively, by the Ministry of Science and Technology (MOST).

The IAMS Junior Fellow Program is funded by IAMS to provide prestigious re-
search opportunities for both domestic and international postdoctoral fellows to engage in frontier research at IAMS. Four awards are conferred each year to outstanding junior scholars with excellent track records and research potential.

As awardees of the IAMS Junior Fellowship, Yi-Fan and Jake were also named among the MOST Assistant Research Scholars and Independent Postdoctoral Research Scholars in 2019. These scholarships are awarded to junior researchers with outstanding research achievements in the early stage of their careers.

Yi-Fan currently studies two-dimensional metal sulfide materials and uses them as photocatalysts to convert carbon dioxide and water molecules into solar fuel. He thanks IAMS and Academia Sinica for their strong support of his research. “I would like to invite young researchers to join IAMS at Academia Sinica. IAMS is a place that hosts young researchers by providing the platform and resources for world-class research,” Yi-Fan said.

Jake was born in The Philippines and came to Taiwan as a Ph.D. fellowship recipient in the Taiwan International Graduate Program (TiGP) Molecular Science and Technology (MST) Program in cooperation with National Tsing Hua University. His work uses theoretical and computational chemistry to understand the vibrational structures of proton-bound dimers. “I would like to thank my academic supervisor, Prof. Jer-Lai Kuo, for giving me the opportunity and encouragement to compete for these fellowships,” Jake said.
Dr. Jon Torger Hougen passed away on January 28, 2019, in Taipei, Taiwan, where he was attending a meeting of the IAMS as a member of the institute’s Scientific Advisory Committee.

Dr. Hougen was born on October 23, 1936, in Sheboygan, Wisconsin as the oldest son of a doctor and a nurse, originally of Norwegian and Dutch ancestry. After completing his undergraduate in Oberlin College and the University of Wisconsin, he attended Harvard for his M.A. and Ph.D. In 1967, he was recruited by the National Bureau of Standards (NBS, now the National Institute of Standards and Technology), where he spent the rest of his career.

Dr. Hougen’s research interests were in quantum mechanical and group theoretical calculations of quantities of molecular spectroscopic interest for various cases of interaction between rotational, vibrational, and electronic motion, with particular emphasis on rotational energy levels and rotational line intensities. In addition, he was known among his colleagues worldwide for his encyclopedic knowledge of molecular spectroscopy.
theory, as someone always willing to help and advise, and as a lover of languages. He spoke French, German, Czech, Japanese, and Chinese in addition to English. He particularly enjoyed any opportunity to work with young chemists, and he privately helped numerous young people with academic promise but limited means to attend college. Moreover, he was a staunch defender of good science and a foe of racism and injustice, and in later years he actively supported numerous progressive causes, journalists, and candidates who fought for social justice. He also loved to dance, particularly the polka.

In the course of his career, Dr. Hougen received numerous awards and honors for his scientific achievements, including the Coblentz Award, the NBS Silver Medal, the NBS Gold Medal, the Plyler Prize from the American Physical Society, the Lippincott Award from the Optical Society of America, and the Marcus Marci Award from the Czech Spectroscopy Society. The Journal of Molecular Spectroscopy dedicated special issues to him in honor of his 68th birthday in 2004 and his 80th birthday in 2017. He was a fervent attendant and participant at various spectroscopy conferences in the United States and globally.

Dr. Hougen had served as member of the Scientific Advisory Board for IAMS since 1996 and never missed a single meeting in 23 years. He loved this task so much that he contributed his last mission in life to IAMS.

He will be deeply missed.
TiGP Background

TiGP is a graduate education platform established in 2002 by Academia Sinica in association with Taiwan’s key national research universities. With the support of research institutes in Academia Sinica, TiGP currently has 12 interdisciplinary Ph.D. programs offering postgraduate education as well as advanced scientific training. Since its launch, TiGP@Academia Sinica has expanded extensively and currently has approximately 600 TiGP students from 48 countries.

MST Program

The Molecular Science and Technology (MST) program was one of the first Ph.D. programs founded in 2002 under TiGP@Academia Sinica, and IAMS has been the main host institute for this program. Currently, we have 49 MST students from 12 countries. MST students can choose from a broad selection of research areas for their thesis work, including atomic physics and optics science, chemical reaction dynamics, advanced materials and surface science and biophysics and biotechnology.

Message From the MST Program Coordinator

Dear friends of the TiGP-MST program,

I am honored to introduce the column for the TiGP-MST program in the first issue of the IAMS Newsletter. Over the last two years, several exciting developments have occurred in the TiGP-MST program. In 2018, the Molecular Science and Technology Program of National Taiwan University (NTU-MST) joined the TiGP-MST family and will soon confer Ph.D. degrees in engineering. In the 2019 admissions period, we had the most applicants ever to TiGP and the MST program; of those, we admitted nine new students. The 2019 Student Poster Contest for the MST, Nano Science and Technology (NST), and Sustainable Chemical Science and Technology (SCST) programs was held at IAMS, and three MST students won the first and third prizes. MST Travel Awards were also given to three MST students.

To cultivate young talent and offer the best education and mentorship to our students,
we are also making new implementations to better serve students and the needs of the community. New merit-based scholarships—the Academia Sinica Research Award and the Presidential Award of Academia Sinica—will soon be introduced to recognize current TiGP students with excellent research performance while working toward graduation.

At MST, we feel that balancing work and life as well as social networking are essential. Cultural exchange among the international students is a natural means of networking, and the MST lunch parties to sample international foods have been organized by MST students. In the subsequent sections, you will read about their recent activities. You will also find more MST program highlights, including messages from MST students. For complete information, please visit our website at http://tigp.iams.sinica.edu.tw/#home

Sincerely,
Ming-Shien Chang
October 7, 2019

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**MST Overview**

The MST program currently has 49 students from 12 countries: Taiwan (17), India (10), The Philippines (5), Vietnam (5), Pakistan (4), Ethiopia (2), Indonesia (1), Malaysia (1), Nepal (1), Bangladesh (1), Germany (1), and Egypt (1).

The MST program has had 47 Ph.D. students graduate since 2007, and all our alumni have succeeded in establishing professional careers either in research institutes, universities, or industries related to microelectronics and photonic device fabrication, nanomaterials, biotechnology, and advanced instrumentation.

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**Student Activities**

At MST, we hold a poster presentation contest to help students practice presenting their research and learn about each other’s research. A poster contest was held on May 7, 2019 at IAMS, and the first student-organized MST oral presentation workshop will be held on Dec. 20, 2019.

In addition to presentations, we hold lunch parties to experience food from different countries. We had regional cuisines from India on October 24, 2018, and Vietnam on December 25, 2018. We are about to hold another Filipino-style lunch party on November 1, 2019. In addition, international students have experienced Taiwanese events, such as Dragon Boat Festival and Mid-Autumn Festival, so the students can also taste traditional Taiwanese food!
This fall, five students graduated from the MST program. Ms. Be-Ming Chang tells us about her experience in Prof. Huan-Cheng Chang’s lab as a TiGP-MST student: Looking back, the Ph.D. was a journey to empower my knowledge, practice thinking like a scientist, and learn to find solutions. TiGP-MST has created a multinational atmosphere for students to study their research topics and pursue their academic careers. The program also offers the greatest support from Academia Sinica. In such a cultivated academic arena, I was fortunate to learn from and work with people in different fields, such as physics, optics, and biology, during my Ph.D. life. With interdisciplinary connections, my chemistry background allows me to develop and create multifunctional nanomaterials for practical applications, such as a bioimaging agent for protein targeting and labeling, a dual-modality agent for MRI and histological studies, a bactericidal agent for clinical and public health, and a nanodiamond-incorporated thin film polymer sensor for both optical and electrical systems. In return, during constructive discussions between chemistry and other fields, I understand how powerful thinking beyond the boundaries can be.

Of course, pursuing a Ph.D. can be tough; you may face struggles, frustrations, critics, and fears. Doing research means that sometimes things do not occur according to

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**Graduated Students**

Left: Students discussing in front of their poster. Right: Students learning to make Indian dishes.
This year we admitted nine new students, with five from Taiwan, two from The Philippines, one from Indonesia, and one from India. The following is a photo from the welcome party:

From left to right: Dr. Ming-Shien Chang (Coordinator of MST Program), Ms. Jenny Lin (Secretary@NTU-MST), Chieh-I Chen, Muhammad Yusuf Fakhri, Armida Villas Gilado, Rona Felisilda Barbarona, Tulsiram Moodala Beed Prasannakumar (1st year MST students), Rapti Ghosh (2nd year MST student & MST Representative), Ms. Bonnie Lin (Secretary@TiGP-MST), and Dr. Jer-Lai Juo (Graduate Dean of TiGP)
Congratulations to Ms. Monika Kataria, who won first prize in the 2019 TiGP Student Poster Contest!

I, Monika Kataria (MST-TiGP Ph.D. student), had the opportunity to participate in the 2019 MST/NST/SCST Joint Poster Contest held at IAMS, Academia Sinica on the afternoon of May 7, 2019. I was fortunate enough to have received the first prize in the poster contest. I was delighted and surprised to have convinced the jury of the day to adjudge me worthy of the award. The title of my poster presentation was “Visible Blind, Wearable, and Omnidirectional Near-Infrared Photodetector: A Filterless Approach.” Concerning the preparation process for the poster, I made sure that my work touches the lives of people. Thus, finding instances from the situations and problems around us and providing solutions to them through my work attracted audiences more toward understanding the importance of my work. I want to acknowledge Dr. Wei-Hua Wang and Dr. Yang-Fang Chen, without whose guidance and support this presentation would not have been possible. I owe my success in this contest to them and feel blessed to have them as my mentors. Finally, I would like to express my heartfelt gratitude to my TiGP-MST family for having me and providing me with a platform I always aspired for in my ongoing Ph.D. journey. The MST program has always been flexible and student friendly. The best part about the MST program is that it helped me hone my skills of presentation and public speaking. The MST program allows its student members to organize and host MST events every year. This helped me in building confidence and learning the art of expressing in larger gatherings. Overall, winning the first prize in the poster contest was not a one-day event. It was the efforts, guidance, and support of each member of the MST family who has played their role in my improvisation every passing day of my Ph.D. journey in Taiwan. I hope to receive more accolades for the MST-TiGP program and IAMS, Academia Sinica, in the near future and continue to learn and grow.
Other TiGP Programs

In addition to MST, many IAMS faculty members are affiliated with the SCST, NST, and Chemical Biology and Molecular Biophysics programs under TiGP@Academia Sinica.

Information for Perspective Students

TiGP offers admissions for the fall semester only. Detailed admission requirements and application materials are available on the TiGP@AS website (http://tigp.sinica.edu.tw).

TiGP-MST will ally with the TiGP-NST and TiGP-SCST programs to conduct joint admissions in 2020, and the application for TiGP 2020 admissions will open on November 1, 2019 and close on February 1, 2020. This schedule is shifted forward compared with those of previous years to attract and offer early admissions to outstanding applicants.
13th New Diamond and Nano Carbons Conference

Date: May 12-17, 2019
Organizer(s): IAMS, Academia Sinica; National Cheng Kung University; National Dong Hwa University; National Taiwan University

The 13th New Diamond and Nano Carbons Conference (NDNC 2019) was held on the scenic east coast of Taiwan. The conference presented recent breakthroughs in the synthesis, physics, and application of diamonds and other carbon nanostructures, such as graphene and nanotubes. The program featured 4 plenary talks, 25 invited talks, oral contributions, and 2 poster sessions. The conference venue was the five-star Farglory Resort in Hualien at the entrance of the majestic Taroko Gorge National Park.
Symposium on Chemical Reaction Dynamics (Honoring the marvelous career of Dr. Kopin Liu)

Date: January 28, 2019
Organizer(s): IAMS, Academia Sinica

This symposium was hosted by IAMS to discuss the latest developments in chemical dynamics and spectroscopy, as well as to honor the marvelous career of Dr. Kopin Liu (IAMS).
Date: December 16-20, 2018
Organizer(s): IAMS, Academia Sinica; National Taiwan University; National Chiao Tung University; National Tsing Hua University; Institute of Chemistry, Academia Sinica

The conference was jointly hosted by Academia Sinica and National Taiwan University. Topics included but were not limited to photophysics and photochemistry, photobiology and photosynthesis, spectroscopy and dynamics, plasmonics and nanophotonics, solar energy materials and photocatalysis, photoluminescent and photochromic materials, bioimaging, biosensing, and phototherapy. In addition, the conference incorporated The Fourth International Symposium on Frontiers in Bioimaging, which showcased novel imaging techniques in biology and medical sciences.

The year 2018 was special for Academia Sinica and National Taiwan University because both marked their 90th anniversaries. To celebrate this occasion, a series of events including conferences, seminars, and heritage exhibitions was held throughout the year. The Asian Photochemistry Conference was part of this celebration to present top research from Academia Sinica.
JOBS_Faculty Position

The IAMS in Academia Sinica, one of the most eminent research institutes in Taiwan, invites applications for multiple tenure-track or tenured faculty positions in the following areas:

1. **The Chemical Dynamics and Spectroscopy** group is searching for new members specializing in studying chemical reactions in gas, condensed phases, and/or on interfaces utilizing experimental or computational techniques. Applicants who are interested in atmospheric chemistry and/or the chemistry of unstable species are particularly welcome. We are also open to accepting candidates from interdisciplinary fields. This group is rooted in gas-phase reaction dynamics and spectroscopy; its research have been extended to other applications (e.g. structure determination of carbohydrates).

2. **The Atomic Physics and Optical Science** group invites individuals with expertise in atomic physics, optical science, and quantum science and technology—either theoretical or practical. Higher priority will be given to theoretical quantum many-body physics with ultracold quantum gases and theoretical quantum optics. This group has existing strengths in the experiments of quantum gases, cold-atom based quantum and nonlinear optics, as well as ultrafast and ultraintense lasers.

3. **The Biophysics and Bioanalytical Technology** group invites individuals interested in technology development for addressing unique biological questions, including but not limited to computational biophysics, single-cell technology, advanced microscopy, nanotechnology, bio-instrumentation, and biosensors.

4. **The Advanced Materials and Surface Science** group is searching for a new faculty member specializing in the synthesis, characterization, simulation, and application of advanced materials. Applicants interested in fundamental physics and chemistry of materials, surfaces, and nanostructures are particularly welcome.

Candidates at the assistant, associate, and full research fellow (equivalent to assistant, associate, and full professor) levels will be considered. Candidates must have a Ph.D. degree and will be expected to develop an internationally recognized research program. Adequate start-up packages will be provided. Application packages containing a cover letter, a full CV with a complete publication record, a research proposal, and a minimum of three referees may be sent to facultysearch@pub.iams.sinica.edu.tw. Letters of recommendation can also be sent to the same address. Please address all other correspondence to

**Dr. Tsyr-Yan Dharma Yu**  
*Faculty Search Committee, Institute of Atomic and Molecular Sciences  
Academia Sinica, Room 222, P.O. Box 23-166, Taipei, 10617, Taiwan.*