2021 International Symposium on 10/27 Advanced Science and Technology

Taichung, Taiwan

Conference Manual

Contents

The origin of the Symposium

The International Symposium on Advanced Science and Technology (ISAST) is held by the College of Science of National Chung Hsing University (NCHU). NCHU, located in Taichung city, is the most historic university in Taiwan and the most prestigious academic research center in central Taiwan. It was founded in 1919 in the Roosevelt Road Campus of National Taiwan University, and was then moved to its present location in 1943. With overall 17,000 students and nearly 800 faculties and is one of the 100 top universities in Asia. NCHU is famous of its excellent Agricultural Science, Veterinary, Life Science, Biotechnology and Fundamental Science. Focusing on the developing into a comprehensive research university, NCHU devoted to researches on cutting-edge science and technologies. The main campus contains eight colleges and one school including the College of Liberal Arts, the College of Agriculture and Natural Resources, the College of Science, the College of Engineering, the College of Life Sciences, the College of Veterinary Medicine, the College of Management, the College of Law and Politics, and the School of Innovation and Industry Liaison.

The purpose of ISAST is to promote the collaboration between College of Science of NCHU in Taiwan and research institutes of distinguished world leader in a diverse array of scientific disciplines including University of Chicago (USA), Kyoto University (Japan), Chonnam National University (Korea), Kurume University (Japan), Hitotsubashi University Business School (Japan), UC San Diego (USA), Idaho State University (USA), RIKEN Center for Emergent Matter Science (Japan), University of Electro-Communications (Japan), establishing close cooperation in the field of forward-looking research and strengthening students' international vision. The symposium will mainly cover three fields including physics, mathematics, and chemistry. The scholars of participating the meeting will give professional lectures and conduct academic exchanges with the teachers and students after the meeting. This symposium is conducted by the form of online meeting due to the pandemic of COVID-19. Hopefully, all attending researchers and students have a fantastic opportunity to discuss interdisciplinary research in the fields of science and technology. We expect that all participating institutes can continue to deepen mutual exchanges and cooperation and establish closer cooperative relations in the field of forward-looking research, improving the university's international research standards and at the same time applying the research results to next-generation industrial upgrading.

Date: Wednesday, October 27, 2021
Method: Webinar
Program

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09:00</td><td>09:30
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20:10</td><td colspan="2">Opening Ceremony</td></tr>
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21:00</td><td colspan="2">Keynote Speech</td></tr>
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23:30</td><td colspan="2">Chemistry</td></tr>
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S. Lee (CNU, KR)
J.L. Han(NCHU, TW)</td><td>Chair:
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Speakers:
C.M. Chou (NUK, TW)
H. Yorimitsu (Kyoto Univ., JP)</td></tr>
<tr><td colspan="2">Applied Mathematics</td></tr>
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<tr><td>Chair:
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S.C. Chen (ISU, US)</td><td>Chair:
C.Y. Lin (NCHU, TW)
Speakers:
T. Emura (Kurume Univ., JP)
M.M. WEN (HUB, JP)</td></tr>
<tr><td colspan="2">Physics</td></tr>
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<tr><td>Chair:
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Speakers:
Y. Mizugaki (UEC, JP)
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<tr><td>12:30
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14:00</td><td colspan="5">Lunch & Discussion</td></tr>
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Keynote Speech

Moderator

Ching-Ray Chang

Department of Physics, National Taiwan University
Distinguished Professor
APS Fellow, IEEE Fellow, RIEA member

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Brief biography

Prof. Ching-Ray Chang received the B. S. degree in Physics from National Taiwan University, Taipei, Taiwan, in 1979, then Ph.D. degree in Physics from University of California, San Diego, in 1988.

He was associated with magnetic group of Industrial Technology Research Institute at 1988. Since 1989, he has been with National Taiwan University, where he was Executive Vice President and also Interim President of University. Prof. Chang has worked in micromagnetic numerical modeling since 1980s. He not only carried out pioneering static studies of micromagnetic structures in the early 80s but also was one of the first to apply the Landau-Lifschitz equation to sub-nanosecond analysis in the 1990s. Prof. Chang has made very significant scientific contributions and had great impact on the understanding of nucleation, spin dynamics and thermal activation of magnetic materials, also recently spin transport in low dimensional materials. He was the president of Asia Union of Magnetic Societies (AUMS) and Director of the Center for Theoretical Physics in NTU. He also served as Presidents of both Taiwanese Physical Society and Taiwan Associations of Magnetic Technologies. He is both APS and IEEE Fellows. He has authored more than 280 papers published and held more than 28 magnetic related patents.

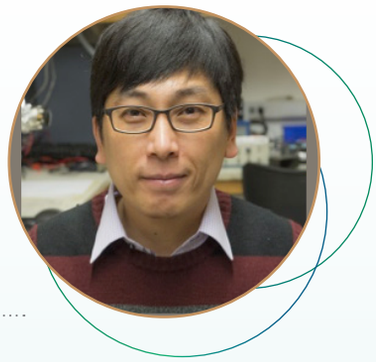
Currently he is director of NTU-IBM quantum computer hub and also the Chair of quantum computer promotion office, MOST. Prof. Chang also Founded the Taiwan Association of Quantum Computer and Information Technologies and he is the President.

Keynote Speech

Speaker

Cheng Chin

University of Chicago
Email: cchin@uchicago.edu



Presentation title

Technology, innovation, and scientific discovery in the quantum era

Brief biography

Professor of Physics, James Franck institute and Enrico Fermi institute, University of Chicago.

Education: B.Sc. Physics, National Taiwan University (1993) Ph.D. Physics, Stanford University (2001). Visiting Scientist/Professor: Innsbruck University (2003), ETH Zurich (2005, 2014), Rice University (2013), MIT (2013), Institute of Atomic and Molecular Science, Academic Sinica (2013), University of Ulm (2014), University of Munich (2014), Max-Planck institute for Quantum Optics (2014), JILA (2015), Tsinghua University (2018, 2019), National Sun Yat-sen University (2019-2021).

Honors: Lise-Meitner Research Fellow, Austrian Science Fund (2003); Outstanding Young Researcher Award, Oversea Chinese Physics Association (2006), Alfred P. Sloan Research Fellow (2006), David and Lucile Packard Fellow (2006), CAREER award, National Science Foundation (2008), Young Scientist Prize in Atomic, Molecular and Optical Physics, IUPAP (2008), I.I. Rabi Prize, American Physical Society (2011), Alexander von Humboldt Research Fellow (2014), American Physical Society Fellow (2014), Highly-Cited Researcher, Thomson Reuters (2014), Distinguished Alumni Award, Physics Department, National Taiwan University (2014), Bose-Einstein Condensation Award (2017).

Research interest: Atomic and molecular quantum gas, Feshbach resonance, Efimov physics, quantum simulation and quantum information control.

Abstract

Last year (2020), right before the pandemic, our group achieved Bose-Einstein condensation of molecules. This is a long-sought-after goal in the past 25 years, and it embarks a brand-new exploration into intriguing quantum phenomena at the interface of physics and chemistry --- also dubbed “quantum super-chemistry”.

Where do such ideas come from? Why it took so long to accomplish the goal? This work, among other examples, is an ideal case that exemplifies the synergistic interactions between technological advances, creative minds, and scientific discoveries in the brand new wonderland of quantum science.

Chemistry Session - Speaker

Sunwoo Lee
Chonnam National University
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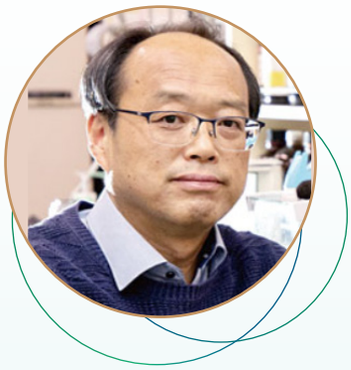

Presentation title

Development of Synthetic Methods using C-N Bond Activation

Brief biography

Sunwoo Lee was born in Busan, South Korea. After his B.S. in Chemistry Education at Pusan National University (1987-94, including military service), he obtained his M.S. (1996) and Ph. D. (1999) at POSTECH under the supervision of Professor Jaiwook Park. He did his post-doctoral studies in the Department of Chemistry at Yale University (1999-2001) with Professor John F. Hartwig. He worked at LG Chem as a senior researcher (2001-2004). In 2004, he began his current position as a Professor in the Department of Chemistry at Chonnam National University. The main focus of his work is the development of catalytic transformations including decarboxyaltive couplings and C-N bond activations and their applications.

Abstract

The amide functionality is one of the key structural motifs found in biological compounds such as peptides, proteins, and alkaloids. It is also widely used to prepare agrochemicals, pharmaceuticals, polymers, and materials. Therefore, a number of synthetic routes to amides have been reported. We developed the nickel-catalyzed transamidation of unactivated secondary amides and the Claisen condensation reaction between two different amides. It was found that nickel activated C-N bond of amides. In addition, the transamidation of primary amides at room temperature was developed by our group. We also reported the amide coupling reaction with carbon nucleophiles such as carbonyl compounds and aryl siloxanes to give the corresponding acylated products. In this seminar, the details about our recent findings of the C-N bond activations for the synthesis of different type of amides and ketones will be presented.

Chemistry Session- Speaker

Hideki Yorimitsu

Department of Chemistry, Kyoto University

Email: yori@kuchem.kyoto-u.ac.jp

Presentation title

Sulfonium-aided Organic Synthesis

Brief biography

Born in Kochi in 1975. PhD in 2002 from Kyoto U (Prof Koichiro Oshima). Postdoc at U Tokyo (Prof Eiichi Nakamura). Assistant Prof (2003) and Associate Prof (2008) in Dept Material Chemistry, Kyoto U. Associate Prof (2009) and Prof (2015) in Dept Chemistry, Kyoto U. Project Leaders of JST-ACT-C (2012-18) and of JST-CREST (2019-). Visiting Scholar, Institute for Molecular Science (2014-16); Honorary International Chair Prof, Nat'l Taipei U Tech (2018-20); Visiting Lecturer by CRPC, Taiwan (2019); Associate Editor, SYNTHESIS (2019-). CSJ Award for Young Chemists (2009); Young Scientists' Prize from MEXT (2011); Mukaiyama Award (2016); Negishi Award (2018); JSPS Prize (2020); Japan Academy Medal (2020).

Abstract

Organic halides represent a key class of molecules that form the basis of organic chemistry and organic synthesis. For the last 15 years, we have been interested in sulfur-based organic synthesis, which may complement the conventional halogen-based organic synthesis. In this talk, I will discuss the following topics, wherein positively charged sulfonium intermediates play important roles: (1) Discovery of the beautiful cascade of interrupted Pummerer reaction and sigmatropic rearrangement; (2) Annulation of phenols with vinyl sulfoxides to yield benzofurans; (3) Versatile catalytic transformations of organosulfur compounds, especially sulfonium salts; (4) Dehydrative synthesis of biaryls from phenols and aryl sulfoxides without recourse to transition metal catalysts.

Chemistry Session - Speaker

Chih-Ming Chou

Department of Applied Chemistry, National University of Kaohsiung

Email: cmchou@nuk.edu.tw

Presentation title

Palladium-Catalyzed Carboxylate-Directed C(alkenyl)-H Activations and Decarboxylative Couplings

Brief biography

Education

1997-2001 B.S. National Chiao Tung University

2001-2003 M.S. National Taiwan University

2003-2007 Ph.D. National Taiwan University

Academic Careers

2008-2009 Post Doctoral Fellow, National Taiwan University (Professor Tien-Yau Luh)

2009-2011 Alexander von Humboldt Post Doctoral Fellow, Münster University (Professor Armido Studer)

2011-2014 JSPS Post Doctoral Fellow, Nagoya University (Professor Shigehiro Yamaguchi)

2015-2018 Assistant Professor, Department of Applied Chemistry, National University of Kaohsiung

2018-present Associate Professor, Department of Applied Chemistry, National University of Kaohsiung

Abstract

Recently, we have established three synthetic protocols for the preparation of functionalized arenes from commercially available benzoic acids. The reactions involve dearomatization of benzoic acids by Birch reductive alkylation providing alkylated 2,5-cyclohexadiene carboxylic acid derivatives. The corresponding cyclohexadienyl acid derivatives can undergo Pd-catalyzed decarboxylative C-H olefination, or decarboxylative γ-olefination, or intramolecular decarboxylative allylic etherification, resulting in regioselective arene functionalizations. With these protocols, diverse value-added molecules can be prepared through alkylated 2,5-cyclohexadiene carboxylic acid derivatives.

Chemistry Session- Speaker

Jeng-Liang Han

Department of Chemistry
National Chung Hsing University

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Presentation title

Synthesis of Chiral Spirooxindole Lactones through Enantioselective Vinylogous Reactions of 3-Alkylidene Oxindoles

Brief biography

National Sun Yat-Sen University (Ph.D, 2005, Prof. Chi-Wi Ong); Academia Sinica (Postdoc, 2007-2010, 2012-2013, Prof. Chung-Yi Wu); Scripps Florida (Postdoc, 2010-2012, Prof. William Roush); Chung Yuan Christian University (Assistant & Associate Professor, 2013-2019). National Chung Hsing University (Associate Professor, 2019-) [Field of research] Asymmetric Organocatalysis

Abstract

Spirooxindole lactones are a key structure element found in a variety of natural products and biologically active molecules. This lecture will present our recent works on the enantioselective synthesis of spirooxindole lactones using vinylogous reactions of 3-alkylidene oxindoles catalyzed by cinchona alkaloid -derived bifunctional organocatalysts.

Applied Mathematics Session- Speaker

Chung-Kuan Cheng

University of California, San Diego

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Presentation title

Exploration of VLSI Layout Scaling

Brief biography

Chung-Kuan Cheng is with UC San Diego as a Distinguished Professor at CSE Department and an Adjunct Professor at ECE Department. He is a recipient of the best paper awards, IEEE Trans. on Computer-Aided Design in 1997, and in 2002, the NCR excellence in teaching award, School of Engineering, UCSD in 1991, IEEE Fellow in 2000, IBM Faculty Awards in 2004, 2006, and 2007, the Distinguished Faculty Certificate of Achievement, UJIMA Network, UCSD in 2013, and Cadence Academic Collaboration Award 2016. Currently, he is an associate editor of IEEE Trans. On Computer-Aided Design of Integrated Circuits and Systems. His research interests include design automation on microelectronic circuits, network optimization, and medical modeling and analysis.

Abstract

With the relentless scaling of Moore's law, VLSI designs encounter non-trivial challenges due to smaller numbers of routing tracks, higher pin density, and more complex design rules. First, securing design rule-correct routability has become a critical bottleneck for designs costing days of runtime, particularly, in the detailed routing stage. Second, the design and system technology co-optimization (DTCO/STCO) in the advanced nodes requires prompt development of massive standard cell libraries to explore the scaling effects of various cell architectures. Third, the validation in the block-level layout is laborious due to iterations of engineering change orders to produce satisfactory designs. In this talk, we will discuss the methodology, algorithms, and results of our exploration of the layout scaling via DTCO/STCO.

Applied Mathematics Session- Speaker

Shu-Chuan Chen

Idaho State University, U.S.

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Presentation title

Mixtures, Data Science and Bioinformatics

Brief biography

Dr. Chen received her Ph.D. in Statistics and Operations Research from Pennsylvania State University in the U.S. She then worked as an assistant professor at Arizona State University. Currently she is a tenured full professor at Department of Mathematics and Statistics, Idaho State University in the U.S. Dr. Chen's research mainly focuses on bioinformatics, especially in developing statistical methods and algorithms for functional genomic data. Her past publications involved with the development of mixture models for clustering high dimensional sequences, its related theoretical justifications and applications, especially in bioinformatics. The software, MixtureTree, developed by her research team, has been widely used in bioinformatics area.

Dr. Chen teaches and conducts funded research in the areas of bioinformatics, biology, and high performance computing. She has received over one million U.S. dollars research funds in the United States. In addition, Dr. Chen has served on National Science Foundation in the U.S. as a panelist. She also has served as a reviewer for several top tier journals including JASA, Bioinformatics, BMC Bioinformatics, etc.

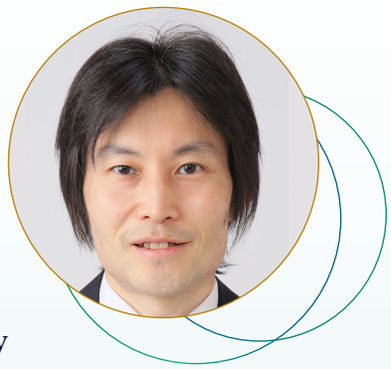
Abstract

Data science and bioinformatics are blooming areas nowadays. Methods for constructing a hierarchical tree given a set of the DNA sequences is always a popular topic in both biological and statistical research. Chen and Lindsay et. al. proposed the ancestral mixture models, a mixture likelihood algorithm, for hierarchical clustering of long biological sequence data. To promote the algorithm, MixtureTree, a Linux based program, implementing ancestral mixture models for reconstructing phylogeny has been developed. In addition to the mixture algorithm with three different optimization options, the MixtureTree program also implements a bootstrap procedure with majority-rule consensus.

In the talk, we will start with the history of data science and bioinformatics. We will then introduce mixture models which are often used for clustering data, and how to extend the methodology with particular focus on sequence data with long sequences. Improvements of optimization algorithms will then be presented. In order to compare these methods with other popular hierarchical clustering methods, we will use a data example from the international HapMap project for comparison.

Finally, to promote collaboration, limitations of these algorithms will be presented and open questions will also be discussed.

Applied Mathematics Session- Speaker



Takeshi Emura

Kurume University

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Presentation title

Change point estimation under a copula-based Markov chain model for binomial time series

Brief biography

Prof. Takeshi Emura obtained his Ph.D (in Science) from Institute of Statistics, National Chao Tung University, Taiwan. After having Ph.D, he taught more than 10 years in National Central University, and Chang Gung University. In Taiwan, he supervised 21 master students and 1 Ph.D student (in Science). Now he moved back to Japan, and is serving as Associate Professor in Biostatistics Center, Kurume University, Japan.

Prof. Emura has developed innovative statistical methods for survival data, time series data, and multivariate data. Prof. Emura has published more than 60 papers in statistical journals, including Statistical Methods in Medical Research, Computational Statistics & Data Analysis, and Journal of Multivariate Analysis. He also published 4 books from Springer. He is a leading scholar in Statistics, especially in the area of survival analysis and copula models.

Prof. Emura is currently serving as Associate Editor of two international journals. Computational Statistics & Data Analysis and Japanese Journal of Statistics & Data Science.

Abstract

Estimation of a change point is a classical statistical problem in sequential analysis and process control. For binomial time series, the existing maximum likelihood estimators (MLEs) for a change point are limited to independent observations. If the independence assumption is violated, the MLEs substantially lose their efficiency, and a likelihood function provides a poor fit to the data. We propose a novel change point estimator under a copula-based Markov chain model for serially dependent observations. The main novelty is the adaptation of a three-state copula model, consisting of the in-control state, out-of-control state, and transition state. Under this model, a MLE is proposed with the aid of profile likelihood. A parametric bootstrap method is adopted to compute a confidence set for the unknown change point. The simulation studies show that the proposed MLE is more efficient than the existing estimators when serial dependence in observations are specified by the model. The proposed method is illustrated by the jewelry manufacturing data, where the proposed model gives an improved fit.

KEYWORDS: binomial CUSUM; serial dependence; sequential analysis; statistical process control; time series

Applied Mathematics Session- Speaker

Min-Ming WEN

Hitotsubashi University Business School, Japan

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Presentation title

Cash Flow Risk Management in the Property/Liability Insurance Industry: A Dynamic Factor Modeling Approach

Brief biography

Dr. Min-Ming Wen is currently a Professor at Hitotsubashi University, Tokyo, Japan. Having received the trainings from Mathematics and Statistics, Dr. Wen pursued her Ph.D. study in Finance and specialized in Insurance Finance, Risk Management, and Corporate Finance. She has published papers in the following journals: “Journal of Corporate Finance”, "Financial Management", "Journal of Banking and Finance", "Journal of Risk and Insurance", "North American Actuarial Journal", "Journal of Insurance Regulation", and "Asia-Pacific Journal of Risk and Insurance.

Abstract

This study proposes and demonstrates a dynamic factor model that can be empirically carried out by the utilization of factor augmented autoregressive technique to explain and forecast the time-varying patterns of cash flows of insurance companies in the US. A principal component approach is employed in the Factor Augmented Autoregressive Model (FAARM) to capture the augmented factors that are to be utilized for forecasting. We describe the cash flow statistical model by a dimension-reduction technique that can depict the dynamic patterns of the cash flows of insurance firms and then measure the FAARM model. Results from the first step (principal component analysis) help capture the macroeconomic variables and the variables pertaining to insurance companies’ cash flows, namely, cash flows from investment, underwriting, and risk management activities. Results from the second step offer evidences supporting that the FAARM improves the out-of-sample forecasting accuracy assessed by forecasted root mean squared error (FRMSE). This paper presents a set of feasible FAAR models from which an insurance firm can choose one that can be a better fit to the firm corresponding to its specific firm characteristics, such as firm size. Consequently, the chosen FAARM(s) can improve the accuracy of cash flow forecasting and thus can help the insurers to manage risk via cash flow matching techniques.

Physics Session- Speaker

Minoru Kawamura

RIKEN Center for Emergent Matter Science

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Presentation title

Quantum transport phenomena in magnetic topological insulator thin films

Brief biography

April 2001 - March 2003: Postdoctoral fellow, NTT Basic Research Laboratories

April 2003 - March 2006: Postdoctoral fellow, RIKEN

April 2006 - September 2008: Research Associate, Institute of Industrial Science, University of Tokyo

October 2008 - March 2010: Research Scientist, RIKEN

April 2010 - present: Senior Research Scientist, RIKEN

July 2019 - September 2019: Visiting professor, National Chung Hshing University , Taiwan

Abstract

Topological quantum materials with the non-trivial topology of band structures have attracted great interest in contemporary condensed-matter physics. The quantum anomalous Hall effect is one of the hallmark phenomena observed in magnetically-doped topological insulator thin films [1]. When the film is magnetized, the Hall resistance is quantized to the quantum resistance h/e2 and the longitudinal resistance becomes zero. The quantum anomalous Hall effect possesses many similarities with the quantum Hall effect under a high magnetic field but it has a distinguished feature that it can appear even at zero magnetic field.

We have studied the quantum phase transition between a quantum anomalous Hall insulator phase and a trivial insulator phase in a thin film of a magnetic topological insulator Cr-doped (Bi,Sb)2Te3 [2]. The phase transition is driven by the magnetization tilt angle with respect to the film plane and is measured by monitoring the Hall and the longitudinal resistance. From the temperature and the current dependence of the transition, the critical exponents for the localization length and the coherence length are evaluated separately. The localization exponent is close to the values reported in quantum Hall plateau transitions.

[1] C. –Z. Chang et al., Science 340, 167 (2013).

[2] M. Kawamura et al., Phys. Rev. B 98, 140404 (2018) and 102, 041301 (2020).

Physics Session- Speaker

Yoshinao Mizugaki

The University of Electro-Communications

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Presentation title

Superconducting Josephson digital-to-analog converters for quantum voltage generation

Brief biography

Yoshinao Mizugaki received the Ph.D. degree from Tohoku University, Sendai, Japan, in 1995. In 1995, he was a Research Fellow at Nagoya University for six months. From 1995 to 2002, he was a Research Associate at Tohoku University, except for one year from 1999 to 2000, when he was a Visiting Researcher at Chalmers University of Technology, Gothenburg, Sweden. From 2002 to 2009, he was an Associate Professor at The University of Electro-Communications, Tokyo, Japan, where he has been a Professor since 2009. His current research interests are in Josephson devices, single-electron devices, and electronics using lipid bilayer membranes under water.

Abstract

Superconducting single-flux-quantum (SFQ) digital technologies have been developed mainly for low-power and high-speed signal processing. We apply SFQ digital technologies for precise voltage generation. Over a previous decade, we designed and tested several types of superconducting Josephson digital-to-analog converters (DACs). The AIST Nb/AlOx/Nb integration process was used for fabrication. We succeeded to operate a DAC of SFQ pulse-frequency modulation type that synthesized a 2.5-mVpp sinusoidal voltage waveform of 9-bit resolution. The key is the integer multiplication of SFQ pules passing through Josephson junctions.

Physics Session- Speaker

Cen-Shawn Wu

Department of physics, National Changhua University of Education

Email: wucs@cc.ncue.edu.tw

Presentation title

Topological Properties of Graphene and Photonic Extension

Brief biography

Cen-Shawn Wu received the Ph.D. degree in Graduate Institute of Photonics and Optoelectronics from National Taiwan University, Taiwan, in 2007. Prof. Wu joined the Department of Physics, National Changhua University of Education, as an assistant professor in 2007 and now is a professor. Our recent research work mainly focuses on studies the quantum properties of novel micro- and nano-structured electronic devices and their interaction with classical and quantum electromagnetic fields. As one focus topic, we study the fundamental physics of matter/light interaction in the context of cavity quantum electrodynamics (QED). The strong coherent coupling between a single quantum two-level system and a single mode of a quantized electromagnetic field allows us to explore interactions in solid-state electronic circuits on the single photon level.

Abstract

Superconducting quantum computing is one of the most promising platform to realize quantum supremacy due to its outstanding performance, scalability and reliability. To implement programmable and reconfigurable computation, one ultimate goal is to enhance some characteristic properties of superconducting circuit quantum electrodynamic (cQED) such as decoherence and dephasing time. Therefore, an appropriate fabrication approach which can promptly produce devices while remaining simplified to avoid degradation is significant for development of superconducting quantum computing technology. In this talk, we introduce an electron beam lithography approach to fabricate superconducting qubit and Graphene QDots in one-step lift-off process. In the former part, two types of high electron-sensitivity resists and gentle sonication are adopted to reduce exposure time and enhance the control of undercut. Based on this setup, we present a fabrication approach by using one-step process and apply it to fabricate aluminum Xmon qubit devices. In the latter part, we build a hybrid system contains an aluminum single electron transistor (SET) stacks on graphene quantum dot (GQD) for study electron dynamics of a Graphene quantum dot. This technique has the ability to detect individual charges in real-time, making it possible to count the electron passing through the GQD.

One-step Electron Beam Lithography can simplify fabrication process and can shorten sample producing time by saving photomask-associated process. In our case, for each 5 mm x 5 mm chip, the patterning time for all essential components in quantum devices is around 30 minutes, and the chip producing time from a blank sample can be suppressed within one day. The rapid sample turnaround time is expected to benefit the development of superconducting quantum computing with massive design-and-fabricate demands.

Physics Session- Speaker

Guang-Yin Chen

Phys. dep., National Chung-Hsing University

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Presentation title

Non-Hermiticity induced tunable sensitivity

Brief biography

Dr. Guang-Yin Chen was born in Kaohsiung city, Taiwan. He received his B. S. from the physics department at National Chung-Hsing University in 2004, and his M.S.and Ph. D in physics from institute of Physics at National Chiao Tung University, Taiwan, in 2006, and 2010, respectively. From Oct. 2008 to Aug. 2009, he was a visiting scholar at the University of Freiburg in Germany. He was a postdoctoral fellow at the South branch of National Center for Theoretical Physics in Taiwan and an adjunct researcher at RIKEN in Japan before joining the physics department at National Chung-Hsing University in 2013, where he is now a full professor.

Dr. Guang-Yin Chen's research interests are theoretical quantum optics, quantum entanglement, quantum biology and non-Hermitian quantum physics.

Abstract

In this presentation, I will first introduce the background information and some recent progress in non-Hermitian physics, especially in the parity-time (PT) symmetric optical systems. Recent experimental results have revealed that the sensitivity of a non-Hermitian PT system to the external perturbations can be significantly enhanced at the exceptional points. I will report that with the external coherent perturbations, the sensitivity of the system can not only be enhanced but further tuned. Moreover, instead of enhancing the sensitivity, I will show that it can be also suppressed

Transportation to NCHU

Orange Line from Wucyuan W. Rd. Interchange:

Wucyuan W. Rd. turn right → Wucyuan S. Rd. turn left → Cingda Rd. go straight → NCHU

Blue Line from Taichung Port Rd. Interchange:

Taichung Port Rd. turn right → Yingcai Rd. → Guoguang Rd. → turn right → NCHU

Green Line from Taichung Train station:

Taichung Rd. turn right → Xingda Rd. → NCHU

Bus :

Taichung Bus No. 33 & No. 35 / Ubus No. 50 & No. 59 & No. 73 / Chbus No. 58 & No. 65

Campus Map

Opening Ceremony & Keynote Speech: Science College Building International Conference Hall

Chemistry Session: Chemistry Building T609、T628

Applied Mathematics Session: Information Science Building 501、502

Physics Session: Science College Building S104、S409

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