The 9th International Conference on Computational Physics (ICCP9) was successfully held from 7 to 11 January 2015, in the Faculty of Science, on the Kent Ridge Campus of the National University of Singapore (NUS), Singapore. The 5-day conference was attended by a total of 611 participants which is the largest in the history of the ICCP conference series.

ICCP

This is the second time the conference was held in Singapore. NUS hosted ICCP4 in 1997. Launched in Beijing in 1988, the conference was held in various cities in Asia: Beijing (1993), Chung Li, Taiwan (1995), Singapore (1997), Kanazawa, Japan (1999), Beijing (2004), Beijing (2010) and Hong Kong (2013). “The conference is organized to provide a platform for researchers working in areas related to computational physics, including mathematicians, physicists, materials scientists and engineers, to share their latest findings, to exchange views, to interact and develop collaborations”, said Professor Yuan Ping Feng, Chair of ICCP9, in his opening remarks during the opening ceremony of ICCP9.

During the welcome address, Professor Andrew Wee, Vice President for University and Global Relations at NUS remarked that “with the steady increase of computational power over the years, understanding of natural phenomena (including condensed matter and materials science) is no longer possible without scientific computation. This has important implications for technological advances, and stems from both improved hardware and algorithms.”

Organization

ICCP9 was jointly organized by the Department of Physics, Department of Mathematics, the Institute of Mathematical Sciences at the National University of Singapore, and the Institute of Advanced Studies (IAS) at the Nanyang Technological University (NTU), and the Institute of Applied Physics and Computational Mathematics (IAPCM) in Beijing, China. Professor Yuan Ping Feng of the Physics Department at NUS and Professor Weizhu Bao of the Mathematics Department at NUS jointly chaired the conference. Members of the Local Organizing Committee included Shaffique Adam (Yale-NUS College), Miguel Dias Costa (NUS), Leong Chuan Kwek (National Institute of Education at NTU and Center for Quantum Technologies at NUS), Baowen Li (NUS & Tongji
University), Jie Liu (NUS), Kok Khoo Phua (IAS at NTU), Su Ying Quek (NUS), Weiqing Ren (NUS), Lei Shen (NUS), Roger Tan (NUS), Giovanni Vignale (University of Missouri), Jian-Sheng Wang (NUS), Xijun Yu (IAPCM), Chun Zhang (NUS). The conference Secretariat was Ms Hilary Ng of Physics Department at NUS.

Professor Xiantu He of IAPCM and Peking University, academician of the Chinese Academy of Science, was the chair of the International Scientific Advisory Committee (ISAC) which steers the conference series. The ISAC was made up of distinguished computational physicists who are also stakeholders of the conference series and/or organizers of past conferences. Besides Professor He, nine other ISAC members attended ICCP9. They are Shi Jin (University of Wisconsin), Vijay Kumar (Dr. Vijay Kumar Foundation and Shev Nadar University in India), Hua Li (IAPCM), Hai-Qin Lin (Beijing Computational Science Research Center), Lev Shchur (Laudau Institute for Theoretical Physics, Russia), Hideaki Takabe (Osaka University, Japan), Tao Tang (Hong Kong Baptist University). Chi Tat Chong and Zuowei Shen, who also represent IMS and Faculty of Science at NUS, as Director and Dean, respectively, attended some of the activities.

Organization of the conference was supported by a large number of voluntary helpers who are graduate and undergraduate students, and postdoctoral fellows from NUS and NTU, management and technical staff from the Department of Physics, Institute of Mathematical Sciences, Dean’s Office in Faculty of Science, and Computer Center at NUS, as well as Materials Research Society of Singapore.

Programme

Under three major themes, Mathematical and Computational Methods, Theoretical and Computational Physics, and Emerging Applications, the conference covered a wide range of topics in computational physics, including condensed matter and materials physics, optical and plasma physics, astrophysics, nuclear and particle physics, fluid dynamics, multiphase and complex fluids, non-linear and complex systems, energy and environment, numerical methods for partial differential equations, fast algorithms, uncertainty quantification and rare events, multiscale modeling & simulation, density functional theory and beyond, parallel and cloud computing, visualization, big data and data mining, etc. The conference programme consisted of 10 plenary lectures delivered by prominent scientists, 42 mini-
symposia (see Appendix 1 for the full list of mini-symposia) organized in 13 parallel sessions with invited and contributed oral presentations, as well as a poster session. In addition, a pre-conference reception, a half-day city tour and a grand conference banquet were organized and were open to all participants free of charge. The technical sessions of the conference were very well attended. The entire conference went smoothly and orderly, and all sessions proceeded according to the plan, without any significant delay or other problem.

Plenary Lectures

At the meeting, the following plenary speakers presented overviews of the latest developments in their respective fields and shared latest results from their own groups: Qiang Du (Columbia University, USA) on Nonlocal models and asymptotically compatible discretizations, Jisoon Ihm (Seoul National University, Korea) on Computational Physics Approach to Design Novel Materials and Analyze Unusual Phenomena in Solids, David Landau (University of Georgia, USA) on Replica-Exchange Wang-Landau Sampling: A New Paradigm for Petascale Monte Carlo Simulation, Hua Li (IAPCM, China) on Numerical studies of wire array Z-Pinch for inertial confinement fusion, Steven Louie (University of California at Berkeley, USA) on Theory and computation of excited state phenomena.
in condensed matter: First principles GW and GW-BSE approach, Michele Parrinello (ETH, Zurich and Universita della Svizzera Italiana, Switzerland) on Atomistic modeling of crystal nucleation and growth, Weiqing Ren (NUS, Singapore) on coupled atomistic-continuum methods for the study of complex fluids and micro-fluidics, Ulrich Rüde (Friedrich-Alexander Universitat Erlangen Nuremberg, Germany) on Coupled physical models for Exa-Scale Computing, Andrew Stuart (university of Warwick, UK) on Well posed Bayesian geometric inverse problems and Pingwen Zhang (Peking University, China) on Computable Modeling.

Keynote Speakers

In addition to distinguished plenary speakers, the conference drew a large number of outstanding computational scientists. 57 of them delivered keynote talks in various mini-symposia. See Appendix 2 for the list of keynote speakers.

Poster Session and Poster Awards

The poster session was held from 7 to 9 pm on January 8 and was well attended. A total of 46 posters were presented. With generous support from QuantumWise and Springer, six Best Poster Awards were presented to authors who best demonstrate high-quality research, display strong understanding of the material, and with excellent oral and visual presentation of their work. Professor Shaffique Adams who chaired the poster session and the Poster Award Selection Committee said that it was an extremely difficult task to determine the best six posters. The judging panel, consisting of distinguished scientists in computational physics: Fakher Assaad (Wuerzburg, Germany), Mukunda Das (Australian National University), Nguyen-Mahn Duc (Culham Centre for Fusion Energy, UK), Igor Mazin (Naval Research Labs, USA), Francois Peeters (Antwerp, Belgium) and Wenjun Ying (Shanghai Jiaotong University, China), worked very hard and finally decided to give the awards to the following participants:
• Sandhya Chintalapati (National University of Singapore) for her poster on “Influence of surface orientation on the magnetism of non-magnetic doped semiconductors”

• Madhuparna Karmakar (Harish Chandra Research Institute, India) for her poster on “Strong coupling s-wave superconductors in the extreme Pauli limit”

• Joohee Lee (Seoul National University) for her poster on “High-throughput Calculation for Doped Zinc Oxide”

• Qingyun Wu (National University of Singapore) for his poster on “Efficient Spin Injection into Graphene by Tunnel Barriers: Overcoming Spin Conductance Mismatch”

• Xiaofei Zhao (National University of Singapore) for his poster on “Multiscale methods for highly oscillatory differential equations”

• Jun Zhou (National University of Singapore) for his poster on “Why the insulator-metal transition of Lanthanum Aluminate – Strontium Titanate is a step function at four Lanthanum Aluminate unit cells”

Each winner of the poster awards received a cash prize (provided by QuantumWise) and a book (provided by Springer) at the conference banquet from the Guest of Honour, Professor Barry Halliwell.

Social Programmes

In addition to the technical programmes, a welcome reception was held in the evening of January 6 which was attended by many participants.

The conference banquet was held in the evening of January 9, in the Ban Heng Restaurant at HarbourFront. Participants enjoyed a spectacular view of the Singapore Harbour as well as the recreation center on the Sentosa Island across the harbour, from the balcony of the banquet hall before the start of the banquet. NUS Deputy President for Research and Technology and Tan Chin Tuan Centennial Professor Barry Halliwell attended the banquet as the Guest of Honour and presented the prizes to winners of the Best Poster Awards. Participants were entertained by a grand opening of the banquet, and spectacular performance by NUS very own star performers, Professor and Mrs Koh Kee Meng. Professor Koh has been a faculty member in the Department of Mathematics at NUS for 42 years. He is an expert in graph theory and combinatorics, and was also a winner of the university’s prestigious Outstanding Educator Award. At the banquet, Nicolas Walker, Lead Architect of HPC
Center of Competence in Asia Pacific – Emerging Markets, Lenovo Technology spoke on behalf of Lenovo Technology which is a Gold Sponsor of ICCP9. Professor Hua Li, Director of IAPCM, also expressed his thanks to the Local Organizing Committee for the successful organization of the conference. 550 participants of the conference attended the banquet.

A half-day city tour was organized for participants in the afternoon of Sunday, January 11. Professor Leong Chuan Kwek, volunteered to be the leader and tour guide. Participants visited Mount Faber, Asian Civilization Museum, Merlion Park, Gardens by the Bay and finally enjoyed a free evening at Vivocity, one of the largest shopping complexes in Singapore.

Statistics of Participants

The conference drew a total of 611 participants from 36 countries/regions, with the largest numbers of participants from China, Singapore, USA, Japan, Korea, etc. The full details are given below.

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<thead>
<tr>
<th>Country</th>
<th>Participants</th>
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<td>China</td>
<td>190</td>
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<td>Singapore</td>
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<td>USA</td>
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<td>Japan</td>
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<td>Korea</td>
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<td>France</td>
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<td>Germany</td>
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<td>Hong Kong</td>
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<td>India</td>
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<td>Taiwan</td>
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<td>UK</td>
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<td>Russia</td>
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<td>Australia</td>
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<td>Philippines</td>
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<td>Saudi Arabia</td>
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<td>Serbia</td>
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<td>Thailand</td>
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Finance

Each of the five co-organizers of the conference (NUS Physics Department, NUS Mathematics Department, Institute of Mathematical Science at NUS, Institute of Advanced Studies at NTU, and IAPCM) provided financial support to the organization of ICCP9. The conference also received generous sponsorship from Lee Foundation, Lenovo, SGI, Netweb/Tyrone, Novatite, QuantumWise and Springer. The registration fee for the conference was SGD350 (before October 31, 2014) or SGD400 for regular participants and SGD150 (before 31 October 31, 2014) or SGD180 for student participants. 398 participants paid the registration fee, including a few at reduced rates. Plenary speakers, keynote speakers (based on one for each half-day session) and mini-symposium organizers
(one or two depending whether the technical programme of the symposium is within or beyond one full day) were given registration fee waiver. Registration fee was also waived for a small number of needy participants.

**ICCP10**

During the conference, members of the ISAC who attended ICCP9 met in the evening of January 7. One of the agenda of the meeting was to discuss and decide the venue of the next ICCP meeting. University of Macau came up as the top choice. Preliminary contact was made subsequently with University of Macau and very positive response was received. The ISAC will work with University of Macau and announce the details of ICCP10 such as dates of the conference as soon as they become available.

**More Information**

More information about ICCP9 can be found at the conference web site given below:  

The Facebook and WeChat pages of the conference can be accessed by scanning the QR codes below:
Appendix 1: List of Mini-symposia, ICCP9

A. Mathematical and Computational Methods
A2. Numerical Simulation of Quantum and Kinetic Problems
A5. Numerical Methods for Inverse Scattering Problems
A6. Recent Advances in Finite-Difference Time-Domain Method
A7. Rare Events: Modeling, Computation, and Applications
A8. Modeling and Simulation of Complex Fluids and Biological Systems
A9. Dynamical Systems Generated by 2D and Quasi-2D Navier-Stokes Flows
A10. High Order Methods and Applications to Complex Flows
A11. Fluid Structure Interaction and Interface Problems
A12. Bayesian Inverse Problems and Data Assimilation
A13. High-Order Methods and Their Applications

B. Theoretical and Computational Physics
B1. Multiscale Modeling and Simulations
B2. Multiscale Computations on Thermoelectric Materials
B3. Multiscale Simulation for Nano-device Design
B4. Molecular Scale Electronics/Spintronics
B5. Lattice QCD
B6. Quantum many body systems
B7. Novel superconductors: Multi-band and Nano systems
B8. First Principles Approach Towards Superconductivity
B9. Density Functional Theory and Beyond
B10. Thermal Transport in Nanoscale
B11. Novel Methods for Computational Photonics and Electromagnetics
B12. Quantum Transport Modeling and Simulation for Atomic Scale Two-Dimensional Materials
B13. Accelerating the Discovery of Advanced Materials Using the Materials Genome Approach
B15. Monte-Carlo Simulations
B17. Global Observatories and New Discoveries in Time-Domain Astronomy and Astrophysics

C. Emerging Applications
C1. Progress in Valleytronics – Physics and Materials
C2. Theoretical Exploration of Defects in and Formation Mechanism of Carbon Nanomaterials
C3. Enhanced Spin-Orbit Coupling & Emergent Topological Phenomena in Graphene & Related Materials
C4. Topological Insulators
C5. Computational Semiconductor Materials Science
C6. Advanced Materials Modeling for Energy Applications
C7. New Energy Harvesting Materials Search by Computer Simulation
C8. Novel Properties Introduced by Surface and Interface Effects
C10. Recent advances in the science of clusters
C12. Water Science
C13. Many body quantum optics: Merging condensed matter with AMO physics
C14. Computational Nuclear Physics
C15. Micromagnetism
Appendix 2: List of Keynote Speakers, ICCP9

1. Qin LI, National Aerodynamics Center, Mianyang, China
2. Shi JIN, University of Wisconsin-Madison, USA & Shanghai Jiao Tong University, China
3. Anton ARNOLD, Vienna University of Technology, Austria
4. Haiqing LIN, Beijing Computational Science Research Center
5. Jie SHEN, Purdue University, USA
6. Yanzhao CAO, Auburn University, USA
7. Jialin HONG, Institute of Computational Mathematics and Scientific/Engineering Computing, CAS, China
8. Hervé TORTEL, Institut Fresnel, France
9. Ping LIN, University of Dundee, UK (talk presented by co-author Zhenlin Guo)
10. Huazhong Tang, Peking University, China
11. V. SHAYDUROV, Institute of Computational Modeling, Russian Academy of Science
12. Hervé TORTEL, Institut Fresnel, France
13. Colin FOX, University of Otago, New Zealand
14. Claudio CANUTO, Dipartimento di Matematica, Politecnico di Torino, Italy
15. Qing Huo LIU, Duke University, USA
16. Roger SMITH, Loughborough University, UK
17. Satoru WUIDCAREV, Culham Centre for Fusion Energy, UK
18. Ursula ROETHLISBERGER, Ecole Polytechnique Federale de Lausanne, Switzerland
19. Wanlin GUO, Nanjing University of Aeronautics and Astronautics, China
20. Paolo CARLONI, German Research School for Simulation Sciences, Germany
21. Yonatan DUBI, Ben-Gurion University, Israel
22. Asen ASENOV, University of Glasgow, UK
23. Satoshi WATANABE, University of Tokyo, Japan
24. Guanhua CHEN, The University of Hong Kong, China
25. Naoki KAWASHIMA, University of Tokyo, Japan
26. Frederic MILA, Ecole Polytechnique Federale de Lausanne, Switzerland
27. Fakher ASSAAD, Universitat Wurzburg, Germany
28. Ribhu KAUL, University of Kentucky, USA
29. Francois PEETERS, University of Antwerp, Belgium
30. E K U GROSS, Max-Planck Institute of Microstructure Physics, Germany
31. WeiTai YANG, Duke University, USA
32. Pawel KEBLINSKI, Rensselaer Polytechnic Institute, USA
33. Ke-qi CHEN, Hunan University, China
34. Pablo ORDEJÓN, ICN2 - Institut Català de Nanociència i Nanotecnologia, Spain
35. Rajeev AHUJA, Uppsala University, Sweden
36. Thomas BLIGAARD, SLAC National Accelerator Laboratory, USA
37. Chow Choong NGEOW, National Central University, Taiwan
38. Qian Niu, University of Texas Austin, USA
39. Inti SODERMANN, University of Texas Austin, USA
40. Christophe BICHARA, CInA, CNRS and Aix Marseille University, France
41. Sean SMITH, University of New South Wales, Australia
42. Xiangang WAN, Nanjing University, China
43. Arun BANSIL, Northeastern University, USA
44. Sheng-Bai ZHANG, Rensselaer Polytechnic Institute, USA
45. Chris G. VAN DE WALLE, UC Santa Barbara, USA
46. Zhipan LIU, Fudan University, China
47. James R. CHELIKOWSKY, University of Texas, USA
48. Lars G. M. PETERSON, Stockholm University, Sweden
49. Rosario FAZIO, Scuola Normale Superiore, Italy
50. Ulrich SCHOLLWÖCK, University of Munich, Germany
51. Weili SUN, Institute of Applied Physics and Computational Mathematics, China
52. Yan ZHOU, The University of Hong Kong, Hong Kong