JAN 2011

Physics Matters

Flavor Physics Conference

The Large Hadron Collider (LHC) at CERN brings particle physics research to an unprecedented tera electron-volt (TeV) energy frontier, at which some long-standing questions associated with the Standard Model (SM) will be answered. New physics concepts are expected to be discovered.

In the LHC era, the study of flavor physics is very important for two reasons: first, such a study is a precision test of the SM itself; second, the study of flavor physics is crucial to the discovery of new physics beyond the SM.

At the helm of the International Conference on Flavor Physics in the LHC Era (8 – 12 Dec, 2010) were distinguished Professors Harald Fritzsch from the University of Munich and Phua Kok Khoo from the Institute of Advanced Studies (IAS), Nanyang Technological University (NTU). The event was jointly organised by the Physics Department of the National University of Singapore, IAS of NTU and the Institute of Physics Singapore.

⇧ Prof Harald Fritzsch, co-organiser of conference

The conference aimed at providing an opportunity for high energy particle theorists and experimentalists to discuss topics of special interest in flavor physics. These topics included B physics, charm physics, light flavor physics, CKM matrix and CP violation, lepton flavor violation, neutrino physics, leptonic, CP violation and leptogenesis, the interplay between flavor and collider physics and new physics associated with flavors.

Physics Safety Day

In conjunction with the Science Faculty Safety Week, the Physics Safety Committee organized its 2nd Physics Safety Day on 24 Sep 2010. It is hoped that this annual event would create more awareness among staff and students concerning safety issues and their importance as the university strives to create a healthy and safe environment for all to work in.

A day too to thank staff and students for their contributions toward the department's safety endeavours, the Physics Safety Day attracted over 100 participants including faculty, support staff, researchers and graduate students.

Following the opening addresses by the Chairman of the Physics Safety Committee A/Prof Johan R C Van Der Maarel and Deputy Head Asst Prof Chung Keng Yeow were talks on "Cancer Prevention" and "Tips on How to be a Safety Award-Winning Lab". 30 happy winners walked away with attractive prizes during the lucky draw and all participants were treated to a sumptuous buffet lunch.

Inside this issue:

Department of Physics
NUS National University of Singapore

A Quantum Text for School Students

High school students searching for a text on quantum physics will not have to look far. A book specially written for them titled Six Quantum Pieces – A First Course in Quantum Physics* has just been published.

While involved in a science project, Lynn Chua and Liu Shiyang from the NUS High School met A/Prof Valerio Scarani from the Centre for Quantum Technologies who then invited them to be his co-authors. The text was illustrated by physics honours student Haw Jing Yan. A report about the publication appeared in the 14 Oct 2010 edition of The Straits Times.

"Quantum physics is fascinating as it underlies much of modern physics as well as many new applications and discoveries today. It is also interesting as it involves many nonintuitive concepts," Lynn commented in an email interview with *Physics Matters*.

ShiYang remarked, "If given a chance, I would like to work in a quantum lab, to observe how quantum experiments are run and to see quantum phenomena in action."

Both young authors aspire to pursue physics in future and are currently engaged in research in the Colloid Lab in the Physics Department.

** Available from World Scientific Publishing*
http://www.worldscibooks.com/physics/7965.html

⇧ From left: Miss Liu Shi Yang, Miss Lynn Chua, Mr Haw Jing Yan, A/Prof Valerio Scarani @ CQT

Where Physics Meets the Mountains

"I am a physicist by training, but a mountaineer by passion!" This is what I would proudly exclaim when asked to describe myself. Let me explain why.

How physics underlies mountaineering has always intrigued my mind. Take for instance an auxiliary cord wrapped around a climbing rope to form a friction knot or 'prusik' in mountaineering term. Without tension, the prusik cord slips easily along the rope. Otherwise, the cord grabs tightly onto the climbing rope providing friction strong enough to counter your body weight (or much more)! A simple but vivid example of how the physics of friction finds its application in mountaineering. Indeed this was how past explorers scaled vertical walls before the invention of mechanical climbing devices.

Physics is also employed in tools from the pulley mechanism of crevasse rescue devices, nanotechnology-based ice tools to light-weight synthetic fabrics. Mountaineering gear manufacturers do well to deliver the most high-performance gears to satisfy the demands of mountaineers in extreme circumstances by engaging in advanced research.

What caught my attention is also how mountaineering would present more challenges without the knowledge of the dynamics of weather science and the geophysical formation of mountain range.

Andreas with fellow mountaineers at Hanuman Tibba, India

Closer to my heart, however, I find both physics and mountaineering uniquely complementary. While it is one thing to study gravitational law it is quite another to experience being swallowed by gravity when dangling at more than 5000 m up the mountain abyss – I had to remind myself that this was just a consequence of curvature in space-time geodesic. Through either equations studied in the classroom or direct experience in an ever-changing mountain wilderness, the same story is told: the awe-inspiring beauty of mother nature… and the danger of dabbling with it in ignorance!

I am glad I am not alone in my quest as a mountaineer. My past expedition to Island Peak, Nepal, and my most-recent one to Hanuman Tibba, India, would be different without the company of my students-turned-climbing mates Suling and Jonathan. They are physics majors and also ex-NUS Mountaineering Club presidents.

I am optimistic there will be more physics students joining me in my future expeditions. Well, if we could be trained to solve Schrodinger equation of many-body systems in infinite-dimension complex Hilbert space, I think we could also be trained for something more down-to-earth, like climbing a mountain!

Contributed by Mr Andreas Dewanto

Beyond Undergraduates

Physics Matters gets close with four graduate students to find out their graduate experience here in the department.

I was seeking a good institution to do my research and learn new things. The NUS Graphene Research Lab offers an attractive option to not only pursue my PhD but my field of interest.

My research involves the non-volatile memory application of graphene and ferroelectric gating combined. Graphene is a carbon sheet one atom thick. The 2010 Nobel Prize for Physics is awarded to its discovery back in 2004. Although graphene is being studied extensively, efforts are still needed to explore its applications.

Experiments in the lab could be time consuming, unpredictable and don't lead to results. These problems are amplified especially during my coursework and exam time. On the other hand, our research group work well together and we celebrate whenever our hard work pays off. I would feel very contented and rejoice at such moments. I envision myself following an academic path after my graduate study since career options may still be limited in my field.

The Physics Department is a fantastic place to work in as staff are always ready to help when I need assistance. I could also get all the cooperation when I require facilities from other research groups.

Deeply interested in physics, I wanted to carry out research in frontier areas of materials physics which would lead to cutting edge technologies. NUS was a good choice to me given its topnotch research environment. I knew I was on the right track pursuing my PhD here.

I currently work on multiferroics – ferroelectric, ferromagnetic and ferroelastic – materials in the Spintronics and Magnetic Materials Lab. This area holds promises in applications like multistate non-volatile memories such as ferroelectric and magnetic random access memories.

For the past three years, I have enjoyed the multicultural setting in NUS and participated in departmental events like the graduate symposium, seminars and talks by international renowned scientists. The Friday departmental tea is always refreshing just like the coffee I prepared with the water dispensing facility.

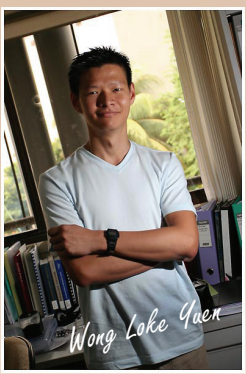
I'm excited to be nominated to take part in an international scientific conference (3rd HOPE meeting) in Japan this March where I hope to engage in interdisciplinary discussions with distinguished scientists. My dream is to join a hi-tech research company in future and I believe the experience and knowledge I have gained here would be valuable then.

Before coming to NUS, I have earned my Master's degree and acquired some research experience. I decided to uproot myself here so I could continue to pursue my research interest.

Currently I work on the thermoelectric properties in nanostructures in the Phononics Lab. This is a hot topic in the field of energy conversion and harvest. I focus particularly on the thermoelectric behaviors in nanowires.

Encountering problems is a common part of a graduate's life. I am thankful I could solve them with the assistance my supervisors provided. My research ability has sharpened tremendously which makes my graduate course thoroughly fulfilling. Sometimes, despite much time being devoted on one project, the research still progressed very slowly. That's where I train myself to be patient.

I hope to embark on a career related to my research field after obtaining my PhD. I have a wonderful time in the Physics Department with its excellent research environment. For instance the department even provides a high performance computing facility. I also receive lots of support from kind people around me and I am grateful to be here.



Having spent some wonderful time as an undergraduate with the Organic Nano Device Laboratory doing research in organic semiconductors, I decided to embark on a graduate course to deepen my knowledge in this field. This will also facilitate a future career as a company researcher. A graduate training is essential and relevant in a knowledge-based economy too.

As guided by breakthroughs in fundamental research, I aim to develop some methodologies in inkjet printing for printed electronics. As a researcher, some of my tasks include keeping abreast with the state of the art through literature review, running experiments, writing simulation programmes for computer modeling, troubleshooting malfunctioned equipment and guiding junior research students. It is never a boring day.

I enjoyed the different daily challenges and having the chance to meet people of various nationalities. Another rewarding experience is being able to present my research results in numerous overseas conferences.

Having grown over the years from a physics undergraduate, the Physics Department has given me a homely feel with the presence of friendly and helpful staff. In addition, the high staff to student ratio also makes us a close knitted community.

Physics in Action!

NUS-Science Mentorship Programme (SMP)-Physics 2010

Dr M V Reddy won the Science Mentorship Programme (SMP) Outstanding Mentor Award 2010. He shared with Physics Matters about SMP and the role he played.

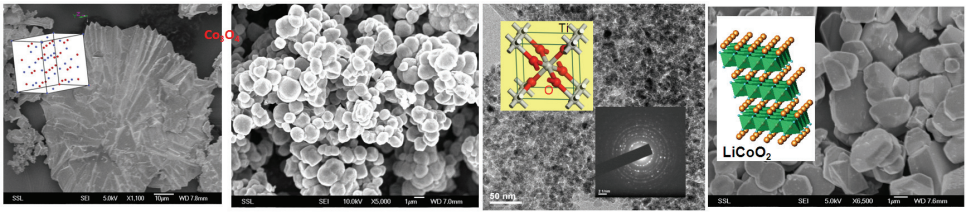
I greatly enjoyed working with the 15 young SMP students during my scientific journey with them. All our students are highly motivated in doing basic science research and they have consistently made good progress. The various achievements are testimonials which speak for themselves.

As a mentor to the SMP students, I explained basics on physics, chemistry and materials science, literature studies, scientific ethics, lab safety rules and maintenance of research record book. I also guided students on the selection and preparation of new materials, explained the role of solid state physics and nanotechnology, basics of Bragg law, theoretical calculations of d and 2 theta values, density and energy storage values, indexing miller indices and X-ray diffraction.

Students learned to solve materials structures by Rietveld refinement using TOPAS software and scanning and transmission electron microscopy. They were briefed about the measurement of density and surface area of solids, basics of energy science and lithium ion transport mechanisms in batteries. Finally, I also trained students for poster presentations and writing research papers.

Our SMP students have worked on five different new research projects. They prepared and characterized the materials by various physical techniques and analyzed their data. In particular, one paper written of an SMP project was accepted in Electrochemical Solid Letters and another four research publications are to be submitted in international journals (tier 1). The students presented their research work in both national and international conferences. More details are available in our website (http://www.physics.nus.edu.sg/solidstateionics/ - SMP presentation).

I would like to thank the Ministry of Education, Gifted Education Branch, for its support and recognition of my assistance. Appreciation also goes to my mentors Profs B V R Chowdari and G V Subba Rao for their kind advice in the teaching of scientific ethics, Faculty of Science, lab officer Mr A Karim for his helpfulness as well as research and support staff from the Physics Department.



⇧ **Materials prepared and photographs taken by SMP students**

⇨ **From left : Miss Nicholette Li Jia'en, Mr Zhang Beichen, Miss Zhang Kaimeng, Duman High School**

Spending time in lab and in front of computer and machines, doing research is not a comfortable and easy thing, but from Dr Reddy, I learned the important spirit needed in science – devotion and rigorousness. – ***Kaimeng, Durman High School***

⇦ **From left : Mr Emmanuel Hsu En-chi, Mr Shahid Hussain Nowshad, Mr Poh Yu Quan, NUS High School of Mathematics and Science**

⇩ **From left : Miss Nguyen Thi Bao, Miss Michelle Lim Yi Ying, Miss Valerie Teoh Xiao Wie, NUS High School of Mathematics and Science**

Our mentor, Dr Reddy, was very patient with us and guided us through every step. He also knew what was wrong whenever our results were off. I learnt a lot more about materials science through this. – ***Michelle, NUS High School of Science and Mathematics***

⇦ **From left : Miss Bernadette Lee Chu Yin, Miss Zhang Jia Le, Miss Zeng Boran Ellen, Nanyang Girls High School**

⇩ **From left : Mr Winston Tan, Mr Zeph Yap, Mr Justin Liu, Raffles Institution, seen here with Dr Reddy**

We have learnt how batteries undergo electrochemical analysis that can give us information about the capacity and capacity fading of the battery. Our mentor has taught us a lot through this project, and has made it easier for us to understand the physics and chemistry behind the batteries.
– ***Zeph, Winston, Justin, Raffles Institution***

Contributed by Dr M V Reddy, Research Fellow, Advanced Batteries Laboratory

Discovering Physics - Researches Done Using Synchrotron Radiation

One of my research interests is to study an interplay of spin, charge, orbital and lattice degrees of freedom in strongly correlated electron systems and such oxides, from experimental and theoretical points of view. It is believed that this interplay is responsible for many exotic quantum phenomena (EQP) such as high critical temperature (high-T_c) superconductivity, spin and charge density waves, multiferroicity and diluted magnetic semiconductors, just to name a few.

Strong competing interactions give rise to such unusual phases with spontaneously broken symmetries, determine their relative stability, and drive the system from one phase to another, possibly through a quantum critical point. Knowing their role helps us understand the complexity of phenomena that result from correlations of a macroscopically large number of degrees of freedom in quantum systems. These EQP are not only exciting for fundamental physics but may also be very useful for engineering applications. The origin of many EQP, especially high -T_c superconductivity, remains a deep mystery in condensed matter physics, one reason being that many EQP are hidden states and we lack the so-called smoking gun experiments to reveal them.

To study EQP, we use unique synchrotron-based non-destructive experimental techniques including resonant soft X-ray scattering and ultraviolet-vacuum ultraviolet magneto-optical ellipsometry which will be available at the Singapore Synchrotron Light Source in NUS. The latter technique could reveal the electronic band structure of manganites which exhibit fascinating phenomena such as colossal magnetoresistance, charge-, spin - and orbital orderings, and transition from paramagnetic insulator to ferromagnetic metal, as well as multiferroic behavior.

Upon hole doping, the transition from antiferromagnetic insulator to ferromagnetic metal in manganites has been argued to occur through a mixed-phase process. Whereas for a fixed-hole doping where ferromagnetic order is found, insulator to metal transition simultaneously occurs as the temperature is lowered across the ferromagnetic transition. However, the explanation on the phenomena accompanying the ferromagnetic transition remains a hot and open subject.

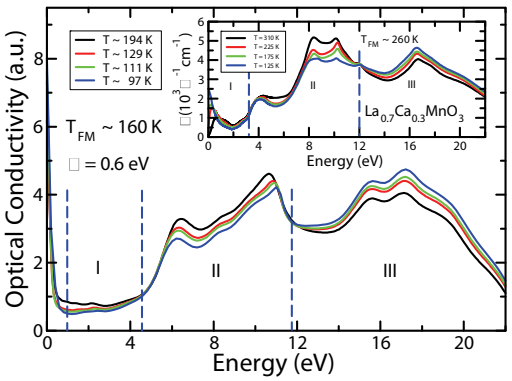


Fig. 1: Spectral weight transfer in the optical conductivity. Main panel: Results of the model. Excluding the region containing the Drude peak (0-1eV), the energy range is divided into three regions: I, II and III. The black curve represents the optical conductivity in the paramagnetic phase, while the red, green and blue curves correspond successively to lower temperatures in the ferromagnetic phase. The borders between regions I-II and II-III, denoted by the blue vertical dashed lines, are defined such that the curves cross at these energies. Inset: A replot of the corresponding experimental data for comparison.

A recent study of optical conductivity by our group has revealed for the first time strong temperature and doping dependences in $La_{1-x}Ca_xMnO_3$. The occurrence of spectral weight transfer has been strikingly found between low (<3eV), medium (3 – 12eV) and high energies (>12eV) across insulator-metal transition (see Fig. 1).

Surprisingly, as the temperature is decreased, the spectral weight transfer appears more noticeably in the medium and high energy regions than it does in the low energy region. These results contradict our common belief for many years that optical conductivity above 3 eV, ie medium and high energies, is temperature independent. Observing how the spectral weight in each region of energy simultaneously changes as the temperature is decreased past the ferromagnetic transition temperature, one suspects an interplay between low, medium and high energy charge transfers that may drive many phenomena occurring in manganites, including the insulator-metal transition. This conjecture is related to the fact that the hopping of an electron from one Mn site to another can only occur through an O site.

To explain this discovery, we propose a model and calculation within the Dynamical Mean Field Theory. We find the role of oxygen in mediating the hopping of electrons in manganese as the key that determines the structure of the optical conductivity. In addition, by parametrizing the hopping integrals through magnetization, our result suggests a possible scenario that explains the occurrence of spectral weight transfer, in which ferromagnetic ordering increases the rate of electron transfer from O2*p* to upper Mn e_g orbitals while simultaneously decreasing that from O2*p* to lower Mn e_g orbitals, as temperature is varied across the ferromagnetic transition. With this scenario, our optical conductivity calculation shows very good quantitative agreement with the experimental data. We expect to continue this study with other complex oxides.

It is our dream to understand the fundamental mechanism of EQP in correlated electron systems so that in the (near) future we are able to predict and fabricate complete new systems that do not exist in nature but can be very useful for mankind. These researches are carried out in close collaboration with researchers and scientists from different fields locally and abroad. Students are part of the team too and we welcome highly motivated students to join us in these exciting and cutting-edge researches.

Contributed by Asst Prof Andrivo Rusydi

Asst Prof Andrivo Rusydi obtained his PhD in Physics from the University of Groningen, the Netherlands, in close collaboration with Brookhaven National Lab. A recipient of several awards including the most recent Singapore National Academy of Science Young Investigator Award 2010, Asst Prof Rusydi is a visiting professor and scientist with several overseas institutions. He currently teaches at the Physics Department, NUS, and is a principle investigator with the NUS-NanoCore.

Graduate Students Symposium 2010

Graduate students in the department had an eventful day on 13 Aug 2010 when the 2nd Physics Graduates Symposium was held. Nearly 80 of them turned up for the event. 16 oral presentations covering a wide range of topics in Physics were presented. There were also 6 poster presentations.

The organiser of the event, the Physics Graduate Society, hopes that the symposium will provide an opportunity for all physics graduate students to present their research work and to communicate with each other and faculty. This event also serves to promote the research culture and atmosphere among the graduate students who will be our future physicists.

Like some of her peers, Sureerat Homhuan embraces such a symposium for graduate students. "I have gained a lot of new knowledge about what we do in our department. Most students do their experiments in their research group which limits them within their own field. Therefore, this is a good opportunity for them to interact and get to know what is going on around. I welcome the idea that the symposium be held on a regular basis."

The Best Oral Presenter Awards went to Ow Yueh Sheng Isaac, Zhang Lifa and Wu Xiang. Yao Guanggeng won the Best Poster Presenter Award.

Prof Feng Yuan Ping presenting the Best Poster Presenter Award to Mr Yao Guanggeng

Mr Chen Jie giving a presentation

An attentive audience at the symposium

A poster design competition

A/Prof Wang Xue-Sen talking to Mr Chen Xiao as Miss Sureerat Homhuan and Mr Wu Xiang look on

A Day in the Life of ...

Having problems with safety matters? Just approach Mr Teo Hoon Hwee, vice chairman of the Physics Safety Committee, who has spearheaded the University Annual Safety & Health Performance Award (ASHPA) Scheme in the department, been involved in surveillance audits and the crafting of the lab safety management system.

A laboratory technologist for the past 27 years, Mr Teo oversees the biophysics teaching and research labs. A typical day also sees him resolving graduate student accommodation and furniture allocation issues as a Space Committee member besides conducting safety and lab briefings and addressing any concerns raised. A Physics representative for the recent pandemic crisis management, he too assists in faculty-wide housekeeping, inter-departmental audits and organising the Faculty Safety Day as a member of the Science Faculty Safety Working Committee.

"Many major safety measures have been implemented in the department since the inception of the Physics Safety Committee in 2003," acknowledged a modest Mr Teo. Indeed the committee's laudable efforts have reaped numerous top safety accolades (including 4 silver ASHPA) for the department.

A recipient of the University Service Award 2009, Mr Teo remains unassuming and hopes to improve service provision for staff and students who have always been supportive. He cherishes learning on the job and admires the strong culture of camaraderie demonstrated among colleagues during happy or sad occasions. "Life is short. While we do our best in our work, we must also remember to treasure the people around us."

A big fan of the flora and fauna, Mr Teo enjoys his weekend brisk walks with his family in the midst of lush greeneries, birds and cranes. Indeed one of his most memorable trips was to the scenic Hailong Bay, Vietnam, a few years ago.

Of Music and Physics

A prominent physicist and well-liked academian, Prof Bernard Tan, the former Dean of Science Faculty, shares his views about music and physics.

What started or triggered your passion in music?

I guess music was always important for me from a very young age, as my parents (though they were not professional musicians) sang in the church choir and made sure I took piano lessons and was exposed to concerts even before I started school.

From a physicist's point of view, how do you look at music?

Music is one of the performing arts, and as an art form, it gives me and many people a great deal of pleasure and adds much meaning to life. As a physicist, I tend to look at almost everything we encounter in daily life from the point of view of physics (and physics does affect almost everything!). Therefore it is natural for me to think in terms of music as a physical phenomenon, and indeed music as an art form is very firmly grounded in both physics and mathematics. But the reasons for one to appreciate or be passionate about a particular piece of music cannot be fully explained by physics, and is the subject of constant study by researchers in other fields, such as neuroscience and psychology.

How do you view physics or science then as a musician?

As a musician, I view physics and science as supplying a logical basis and foundation for everything around us which physically exists, and which also gives us a way of looking at the world and the universe in a systematic and rational manner. Physics can explain much of music theory, but of course there are certain things which are a little outside the realm of science, such as religion and love, even though scientists are always trying to use scientific tools to study such aspects of life.

What is the most direct association you see between physics and music?

Perhaps the most direct connection is in the construction of the various musical scales which are the foundation of the different music cultures of the world. For example, the phenomenon of the octave interval, perceived when the frequency of a note is doubled, is the most basic (and mysterious) connection between a physical phenomenon (the doubling of frequency) and auditory perception (that an octave gives us a higher sound which resembles the lower sound).

Share with us some of your accomplishments in music.

I am largely a part-time composer and a mediocre pianist. I started writing music rather late in life – in my late twenties – and as a professor in NUS, I don't have much free time to write music. Composing music is very time consuming and laborious for me. But I am quite proud of having had a number of orchestral works performed by the Singapore Symphony Orchestra, including a piano concerto and a violin concerto.

In your view, how has music evolved over the years especially in this age of information technology?

Music has always developed in tandem with technology. All musical instruments are technological devices. The invention of the piano by Cristofori in the 18th century, and subsequent developments like the double escapement of Erard, are in my opinion technological accomplishments of the first order. Therefore the evolution of music technology to incorporate electronics and computers is just a continuation of a trend which has always been part of the development of music through the ages.

In which direction do you think music is heading in the future?

There is no doubt that information technology will continue to expand the sound worlds available to musicians, as well as make the diffusion and distribution of music much more widespread through the internet and through other developments which arise from the digitization of music.

What are some of the specific fields of study or research that students could pursue that combine physics and music?

I have had a number of Ph.D students work with me on digital musical analysis and synthesis and psychoacoustics, and

there are a number of other faculty in NUS who are experts in the area of music and new media and electronic music. Even at the polytechnic level, there are many diploma courses in electronic and computer music. The music industry is changing very rapidly, and the advent of internet music distribution is threatening to make CDs obsolete. There are many exciting developments in music synthesis which make it possible to replace live musicians for many performing situations.

What advice(s) do you like to give to students if they have a passion in music but are majoring in their own respective non-musical fields?

Please do carry on with developing your own musical skills, be they in performing, conducting or composing. It is still possible to have an active and dynamic musical life even if you are pursuing a non-musical field of study. I know of many musicians who may be doctors, scientists, lawyers, engineers, etc but who have become very fine musicians in their own right and who take part very actively in musical performances.

If you have a chance to start all over again, would you still consider music and/or physics as an option to pursue in your life?

That's a difficult question, as both are equally important to me. But as I don't think I am a very good musician, I guess I would still take up physics and try to be a part-time musician as I am right now! But one can enjoy both physics and music at the same time!

Awards - Congratulations to all winners!

IPS President's Medal: Prof Frank Watt

The former Director of the Centre for Ion Beam Applications (CIBA), Prof Watt has mentored numerous PhD candidates and young postdocs and demonstrates an exemplary role for his younger colleagues. Under his guidance and dedication, CIBA has performed excellently in research fields such as Biophysics, Medical Physics and Engineering Physics.

IPS World Scientific Medal: A/Prof Valerio Scarani

A/Prof Scarani has made significant contributions to research in Quantum Cryptography, Quantum Entanglement and Non-locality and also provided theoretical assessment for experimental groups.

Omicron Nanotechnology Medal: Asst/P Ariando

Asst/P Ariando has undertaken outstanding Nanotechnology research, namely, to explore the heterostructure, superlattices and quantum wells between various epitaxial films, both from a fundamental as well as device-oriented viewpoint.

Hear what our award recipients have to say about what their award meant to them.

"It is a great honor for me to receive this award. I would like to thank all my colleagues and students for their support. I regard the award as an encouragement to keep me going with determination and enthusiasm"

***Mr Setiawan**, Teaching Assistant Awardee*

"This award serves as a recognition of my effort and work done. I would also like to thank my colleagues for their continuous support and cooperation"

***Mr Lim Hwa Ngee**, Outstanding Service Awardee*

Business Event Ambassador Award 2010
Prof Chowdari, B V R

National Day Long Service Award 2010
Prof Lim Hock
Prof Tan Tiong Gie, Bernard

President's Science and Technology Award: Young Scientist Award 2010
Asst/P Andrivo Rusydi

SMP Outstanding Mentor Award
Dr M V Reddy

Faculty Teaching Excellence Award AY2009/2010
Dr Chung Keng Yeow
Prof Oh Choo Hiap
Dr Yeo Ye

Teaching Assistant Award AY2009/2010
Mr Chong Fu-Zhi, Jeremy
Ms Qiu Leiju
Mr Setiawan

Outstanding Scientist Award 2010
Assoc Prof Ho Kian Hoon, Peter
Prof Vlatko Vedral
Dr Yan Jie

Young Scientist Award 2010
Assoc Prof Valerio Scarani
Dr Tan Meng Chwan

Outstanding Service Award 2010
Mr Kek Chun Peng
Mr Lim Hwa Ngee
Ms Tan Teng Jar
Ms Tay Bee Hwee

NUS Quality Service Award 2010: Service Advocate
Mr Foong Chee Kong

NUS Quality Service Award 2010: Service Achiever
Mr Cheong Mun Yin
Mr Lim Geok Quee
Ms Ng Soo Ngo
Mr Tan Choon Wah
Ms Tan Teng Jar

NUS Quality Service Award 2010: Service Champion
Ms Foo Eng Tin

Announcements

Conferences

Phononics 2011
29 May – 2 Jun 2011, Sea-resort city of Sharm El-Sheik, Egypt
More info at http://ww.phononics2011.org

International Conference on Materials for Advanced Technologies ICMAT2011
26 Jun – 1 Jul 2011, Suntec, Singapore
More info at http://www.mrs.org.sg/icmat2011

Field Trips

China Immersion Programme
Contact: Prof Liu Xiang Yang, Email: phyliuxy@nus.edu.sg

Friday Star Gazing
28 Jan, 18 Feb, 25 Mar, 15 April 2011

Weekend Punngai (Johor) "Milky Way" Star Gazing Trips:
11 – 13 March and 8 to 10 April 2011
Contact Dr Cindy Ng, Email: phynsc@nus.edu.sg
or A/Prof Phil Chan, Email: phycahp@nus.edu.sg