

Physics Matters

Show Time for Venus



↑ Planet Venus making its way across the face of the Sun

On 5-6 Jun planet Venus made a rare expedition across the face of the sun and drew excited observers all over the world. The passage, which lasted some six and a half hours, could be seen in its entirety in the far northwest of America, the Arctic, the western Pacific and east Asia.

The orbits of Venus and Earth do not lie in the same plane and a transit can only occur if both planets and the Sun are in alignment. There have only been seven transits of Venus since the invention of the telescope in 1610.



↓ Crowds gathered to watch Venus transit

continued on pages 4 & 5...

Book Launch and Lecture by Nobel Laureate

The Physics Department, together with World Scientific Publishing (WSPC), was proud to host Prof Claude Cohen-Tannoudji in a public lecture he delivered in NUS entitled "Advances in Atomic Physics: From Optical Pumping to Ultracold Atoms" on 20 Jan. The talk was held in conjunction with his book launch "Advances in Atomic Physics: An Overview" published by World Scientific.

Prof Cohen-Tannoudji's presentation on topics from the laser cooling of atoms, optical clocks, ultracold quantum gases to frontiers of atomic physics never failed to enthral his audience consisting of high-school students to professors.

Hailed by *Physics Today* as "second to none in his understanding of the modern theory and application of atom-photon interactions", Prof Cohen-Tannoudji was the recipient of the Nobel Prize in Physics in 1997 with Prof Steven Chu and Dr William D Phillips for their work in the development of methods to cool and trap atoms

Early astronomers studied the transits to explore the fundamental facts about the solar system. Today, planetary transits could help scientists find planets orbiting distant stars.

Over at the Faculty of Science, a series of activities was launched at both the University Town and Kent Ridge campuses to mark such a special occasion.

Prof Roy Kerr, currently an Emeritus Professor from the University of Canterbury, delivered a public lecture on "Discovering the Universe". It was really an honour to hear Prof Kerr shared from his wealth of knowledge on topics from Einstein's general relativity to rotating black holes to superstring theory.

Visiting lecturer Prof Richard Strom gave an engaging talk on "When Venus Transits the Sun". Prof Strom, who is also an Emeritus Professor of Astronomy at the University of Amsterdam and Adjunct Professor at James Cook University, spoke about the previous transits of Venus and their historical and scientific significance. The intriguing subject matter certainly appealed to every listener.



↑ From Left: Prof Phua from WSPC and Prof Feng with Mrs & Prof Cohen-Tannoudji with his latest book

with laser light.

Prof Cohen-Tannoudji travelled widely to deliver lectures and has written about 200 theoretical and experimental papers dealing with various problems of atomic physics and quantum optics. He is currently an Honorary Professor of Atomic and Molecular Physics at the Collège de France in Paris.

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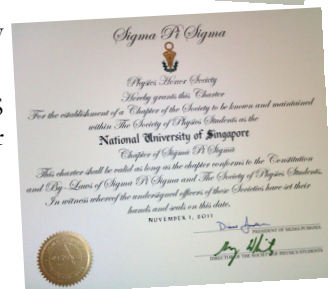
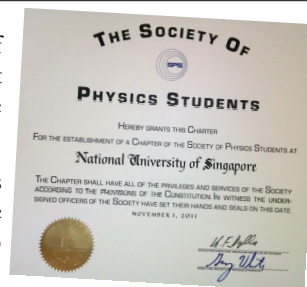
Charters for the Society of Physics Students & Sigma Pi Sigma

In Nov 2011, NUS was granted the charters for the establishment of a Chapter of the Society of Physics Students (SPS) as well as a Chapter of Sigma Pi Sigma. The SPS is a professional student association which houses Sigma Pi Sigma. This unique two-in-one society operates within the American Institute of Physics.

Sigma Pi Sigma elects members based on outstanding academic achievement (at least a 2nd class honours). It aims to honour outstanding physics scholarship, encourage interest in physics, promote an attitude of service of its members towards others and provide a fellowship among those who excel in physics.

The official inauguration of Sigma Pi Sigma at the recent Venus Transit event was graced by distinguished Prof Roy Kerr who was the discoverer of the theory of rotating black holes.

Dr Cindy Ng and A/P Phil Chan from the Physics Department are pioneering advisors for the SPS and Sigma Pi Sigma Chapters respectively. Any interested outstanding physics student (graduate or undergraduate) may also seek Dr Ng Wei Khim for advice regarding the Sigma Pi Sigma election.



JPS Meeting 2012



The Institute of Physics Singapore (IPS) Meeting was held from 23 – 24 Feb at the Faculty of Science, NUS. The annual meeting brought together the physics community in Singapore for a time of sharing of their latest research findings.

This year's meeting attracted many original poster contributions from various research groups. There were two plenary sessions and 74 invited and contributed talks that covered a wide range of topics from econophysics, graphene to organic electronics.

As Prof Christian KurtSiefer, Chairman of IPS Meeting 2012, put it, "While there are numerous meetings we all attend all the time, let's make sure that we form an identity as physicists here in Singapore, by having a strong annual research meeting of our own." Truly the IPS meeting serves as a platform for such.

Physics Enrichment Camp 2012

The 16th Physics Enrichment Camp (31 May – 5 Jun) attracted over 550 participants from secondary schools and junior colleges, more than last year's.

Besides talks by faculty, visits to the labs, interesting demonstrations and quizzes, students had fun engaging themselves in a series of hands-on activities.

A special highlight this year was the launch of the Physics Photo Competition and Physics Video Competition. Mr Chang Sheh Lit, who was behind the idea, said the objective is to let students showcase their talents in photography and videography by capturing pictures or videos depicting the principles of physics.

Sheh Lit also gave a talk on "Tips for Taking Physics Photos" much to the delight and benefit of participants.



Awards

Congratulations to our fellow colleagues and students for being the proud recipients of the following awards!

Mentors of winning projects at the Singapore Science and Engineering Fair (SSEF) 2012:

Gold: *Asst/P Andrew A Bettiol*

Bronze: *A/P Sow Chong Haur, Prof B V R Chowdari and Dr M V Reddy*

Merit: *A/P Peter Ho, Prof B V R Chowdari and Dr M V Reddy*

NUS High School Inspiring Research Mentor Award 2012:

Dr M V Reddy and A/P Sow Chong Haur

Taiwan International Science Fair 2012 (Engineering Category) 1st Award:

Miss Iris Ng: Student from Dunman High School who received guidance from PhD student Ms Lim Xiaodai Sharon from the Nanomaterial and Colloidal Systems Lab

Outstanding Lectureship Award by the Chemical Society of Japan (CSJ):

Asst/P Zhang Chun

Rubicon Grant:

Mr Wang Xiao

Winter School at NTU

Physics major Mr Tan Hong Qi shared with *Physics Matters* his experience of attending the 1st Institute of Advanced Studies School on Particle Physics and Cosmology and Implications for Technology held from 9 to 31 Jan at the Nanyang Technological University.

During the earlier part of this year, the Institute of Advanced Studies (IAS), NTU, organised a school themed on particle physics and cosmology. I was glad to be able to attend this school and as a consequence have benefitted greatly from it.

Personally, I think there are three main reasons why turning up for the IAS school was not a wasted trip: (1) It has widened my horizon in the area of particle physics and cosmology; (2) I get to meet many great minds who are currently working in the frontiers of physics; (3) Just for Physics alone.

The IAS school invited a large number of speakers who work on different areas to come together to present a myriad of topics in physics from the more theoretical ones like string theory, beyond the standard model to something more experimental in nature like the detection of dark matter or accelerator and detector physics.

Such exposure made me realise that research in particle physics is really multi-faceted and extends beyond the Lagrangian of the GWS standard model that I learnt in my particle physics course.

For example, one particular talk delivered by Prof Albert De Roeck on how the Higgs search was carried out at the LHC was loaded with tons of plotted graphs and some error



↑ Prof John Ellis giving a lecture

analysis work, not something seen in a typical particle physics textbook. Nonetheless, the talk offered reconciliation between the theory we learnt in class and the experiment that is carried out at the frontiers.

Even though the content of the lectures sounded very technical and specialised such that I was in a daze much of the time, I did learn a lot – I learnt of what I do not know.

The IAS school also allowed me to personally hear from a number of world-renowned speakers such as Profs Harald Fritzsch and John Ellis. I even managed to take close-up pictures of them. Prof John Ellis looks like the “Gandalf” of Theoretical Physics!

Loving and learning physics for its inherent value is sufficient motivation for me to attend the school and enjoy it! A good analogy will be physics is to me as K-pop is to a girl. It is a kind of irrational passion.

I will conclude my short sharing with a quote from Prof Richard Feynman, “Fall in love with some activity, and do it! Nobody ever figures out what life is all about, and it doesn't matter. Explore the world. Nearly everything is really interesting if you go into it deeply enough.”



↑ Hong Qi (fourth from the right) with participants at the IAS School

University Physics Competition 2011

Several of our physics students have done the department proud by being winners in the 2nd University Physics Competition held from 4 – 5 Nov 2011.

In this annual international contest, undergraduates have to work in teams of three at most in their home colleges or universities over a weekend analyzing a real-world scenario using the principles of physics and then submitting a formal paper describing their work, all within 48 hours.

The University Physics Competition is officially sponsored by both the American Physical Society and American Astronomical Society.

Congratulations to our students and their supervisors!

Supervisor: Chang Sheh Lit

Silver Medal:

Year-1 group: Kwang Siu Yi, Ng Kia Boon and Tang Weijie Shawn

Year-4 group: Kwong Chang Jian, Law Yun Zhi and Wong Songhan

Accomplished Competitors:

Year-3 group: Lee Kang Hao, Seah Yi-Lin and Tan Hong Qi

Year-4 group: Liew Ji Shen, Tan Da Yang and Wu Zhenzhou

Supervisor: Andreas Dewanto

Bronze Medal:

Year-2 group: Guan Yilun Aaron, Lin Mao and Nguyen Duy Quang

Show Time for Venus

↓ It's stargazing night at the open field



← Audience enjoys music performance at the Green



← Conductor Dr Robert Casteels



↑ Breathtaking celestial photographs on display

⇒ Brass musicians performing the Venus Transit Symphony



...continued from page 1

There was also an AstroChallenge 2012 organised by the NUS Astronomical Society which saw enthusiastic participation from secondary schools and junior colleges. Breathtaking celestial photographs captured by astrophotographer Mr Remus Chua were on display on both days.

Prior to the start of the Venus transit, schools and the public had been invited to set up their telescopes on the open field in NUS for stargazing. The Physics Department had also set up telescopes with solar filters and solar glasses were made available to viewers on the field. Long queues were formed as students, staff and the public waited patiently for their turn to witness this rare astronomical event.

The focus is not all science only. Adding a touch of arts to the Venus transit was a stunning musical performance at the University Town. Conductor Dr Robert Casteels captivated audience with his *Venus Transit Symphony*, a piece he wrote for brass instruments incorporating celestial sounds. Playwright Mr Huzir Sulaiman contributed a poetic text to complement the symphony with interpretation from actress Ms Claire Wong from Checkpoint Theatre.

Indeed what a way to commemorate Venus' trek across the Sun! You won't have another chance in your lifetime since the next transit will be in the year 2117!



⇒ Viewing the transit through solar glasses



⇐ Setting up the telescopes



⇒ Waiting in queue to watch a rare event



⇐ Prof & Mrs Roy Kerr with A/P Phil Chan



↑ From left: Prof Richard Strom on "When Venus Transits the Sun" & Prof Roy Kerr on "Discovering the Universe"



⇐ Enthusiastic audience packed the lecture theatre

Some participants' comments:

"The entire event was, in my opinion, a major success despite the mood being slightly dampened by cloudy conditions during the overnight skygazing session and the peak of the transit. I believe that the entire ensemble of activities, incorporating the Astrochallenge to stimulate Singapore's brightest astronomers, lectures by prominent figures in the field and a stunning astrophotography exhibition, truly achieved its goal of opening the eyes of the public to astronomy – that it is not an obscure field of science, reserved only for eggheads, but really an advent of passion, and an accessible one to boot. I really wish I had attended a similar event when I was younger...it was truly unforgettable!"

Mr Hoe Kian Guang, Secondary 3 student, Raffles Institution

"It's a great experience to be able to witness the last ever Venus transit for our generation. Thanks to NUS Physics department for organizing this event, as well as the available telescopes for the public. I hope there will be more stargazing & astronomy activities in the future."

Mr Tan Wei Hou, Physics Major, NUS

"I am excited for having witnessed this astronomical wonder. I was unaware of the previous transit of Venus in 2004. Thanks to the media attention to such rare events. Also NUS had done a great preparation to view the transit. The supply of solar glasses and the availability of many telescopes made it easier to witness the event."

Ms Sudarkodi Sukumar, PhD student, Singapore-MIT Alliance

Tongji Delegation Visit, 7 - 9 February



A group of nine faculty members from Tongji University, Shanghai, visited our department from 7-9 Feb to explore possible collaboration and undergraduate or postgraduate exchanges.

Tongji University has initiated an international postdoc fellowship with an attractive annual stipend. The fellowship recipient can conduct research at NUS.

A one-day workshop was organised here to initiate the collaboration with each Tongji delegate sharing an introduction of his work. Several of our faculty members also presented their research findings.



International Conference of Young Researchers on Advanced Materials (ICYRAM), 1-6 July

ICYRAM aims to provide a platform for researchers under age 40 to present their technical findings and to network with peers in the international materials community.

Organised by the Materials Research Society of Singapore with support from NUS, NTU and A*STAR, the first ICYRAM meeting, held at Biopolis, received over 900 participants and about 950 oral and poster presentations were made.

Young researchers had the opportunity to hear from senior experts too through plenary sessions and instructive seminars. Panel sessions were also held for focused and general discussions.



A Day in the Life of ...



You will never miss her at the departmental meeting. Indeed Wee Lee will be there to put on record any issues raised during the meeting.

With over ten years of administrative experience, Wee Lee's greatest job satisfaction is to see that everything runs smoothly in the office, big or small. While experience is one thing, dedication is quite another. Wee Lee excels too in her supportive role for the Head of Department and all Deputy Heads.

A day in Wee Lee's life sees her handling a myriad of responsibilities for student-related matters, like graduate admissions, appeals, exams, thesis submissions, exchange and internship

programmes. For the academic and non-academic staff, such as recruitment, promotion and tenure, liaison with the Office of Human Resources and Dean's Office, and arranging campus visits for visitors.

Additionally, she has to answer all sorts of queries from students, staff and members of the public. Involving in

annual event like the NUS or FoS open house and providing care support to students in need as a Care Officer are duties she also undertake with pride.

With so much on hand, knowing how to prioritise her tasks is important. Wee Lee is always appreciative of colleagues around her who are friendly, approachable and compassionate. She values sincerity which is a virtue which appeals much to her.

Wee Lee enjoys celebrating special occasions with colleagues and the company of food especially titbits. Familiar with the Korean culture and knowing a bit of Korean language, she is comfortable travelling on her own in South Korea. She is particularly fond of visiting the prayer mountain which is a quiet, peaceful place for physical and spiritual recharge for her.



↑ Wee Lee (seated, left) with her colleagues.

Announcements

Singapore Science Festival 2012
27 Jul – 17 Aug, Singapore Science Centre
& satellite locations
More info at: <http://www.sciencefest.sg>

8th China-Singapore Joint Symposium on Research Frontiers in Physics
23 – 25 Sep 2012, Guangzhou, China
Contact: Prof Feng Yuan Ping, phyhead@nus.edu.sg

Stargazing
@ NUS Football Field: 7 Sep, 5 Oct, 2 Nov
@ Punggai, Johor: 14 Sep, 12 Oct, 16 Nov
Contact: A/P Phil Chan, phycabp@nus.edu.sg

A Quantum Physicist Speaks ...

Prof Berge Englert, principal investigator at the Center for Quantum Technologies, shares with *Physics Matters* his passion for quantum science and some advice to students.

As a physicist specialising in the field of quantum cryptography, could you share with us what promises this area of research hold?

Well, I am not actually "a physicist specialising in quantum cryptography". That was one activity of many in the past. I am really interested in quantum physics in general, currently with a focus on the question: What can we know about quantum systems? For me, the ultimate promise is a more profound understanding of quantum phenomena, from which useful quantum-physics-based technology will emerge eventually.

What are some challenges you face personally working in your research area?

Lack of time.

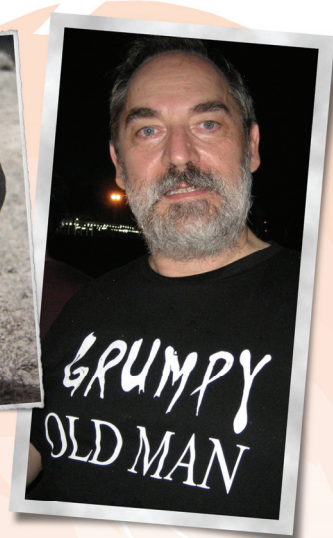
What do you think characterise a good researcher?

Curiosity and open-mindedness, combined with a willingness to work hard, respect for your predecessors and peers with a readiness to assess their contributions critically and fairly. And never trust yourself; you are your own most important critic.

How do you think we could encourage our Physics students to pursue R&D as a career option?

Well, I don't have a "golden rule" for that. But it is always good to expose the students to a research environment early. The NUS environment offers quite good opportunities for that (UROPS, ISM, ..., HYP).

⇒
In his
much
younger
days...
and the
present
Prof
Berge
Englert



As a teaching professor too, what is one important message you wish to tell our Physics graduates today?

Keep your curiosity alive and do your share to get the next generation interested in science. Remember that you have only one life to live, and it is your choice how: You can get rich and enjoy superficial pleasures, or you can do something meaningful.

What are some of the most satisfying moments in your academic life so far?

Nothing, of course, beats the joy of making a real scientific discovery. But much more frequently I am rewarded by observing a student turning from an immature teenager into a serious person; the occupation with science surely helps in this transition.

If there is one thing you wish could change in the world, what will that be?

I wish people and societies would get their priorities right.

Are there any non-academic interests that you pursue and like to share with us?

I am an omnivorous reader, and I like chess.

Staff Outing, 12 July



A trip organised by the Staff Welfare Committee to the Gardens by the Bay attracted over 50 staff who spent a relaxing afternoon strolling at the latest National Garden.

Dubbed the "horticultural sanctuary in the heart of the city", the Bay South Garden offers a scenic flora view from exotic species to towering vertical gardens known as "Supertrees". Indeed it was a memorable outing for staff.

Congratulations Class of 2012!

Bachelor of Science

Abel Ho Zhong Hao
Chan Guofeng
Chen Chang Pang
Chun Mun Yi Debbie
Clement Yong Yao Ming
Foong Sheng Hui
Gerald Anthony

Guo Qingkai
Huang Po Chieh
Jerusha Lieow Lengse
Lau Hui Ping
Lee Longfu
Lenzo Kazuki Enkizen
Lim Mei Ying
Lim Weicheng

Lim Yu Ling Eileen
Loh Zheng Yi
Luqman Akasyah B Zaini
Lynette Tay Wan Qing
Ma Rui
Pham Ha Thanh
Phan Min Er
Poh Soon Ming
Sanjay s/o Sekaran

Suryanto Adeputra
Tan Kuo Liang
Tan Liang Chye Stanley
Tang Soo Ming
Teo Qiang Long Christopher
Toh Bee Ling
Xu Ke
Yap Lin Nah

Bachelor of Science with Honours

Ang Wei Kean (*IPS Medal & Jurong Shipyard Prize*)

Chen Huiyi

Cheng Kok Cheong (*Jurong Shipyard Prize*)

Choi Kwan Bum

Fang Yongwei

Han Weiding

Huang Shu Jia (*Lijen Industrial Development Medal*)

Kwong Chang Jian

Lau Chit Siong

Law Yun Zhi

Lee Suling

Leong Pei Theng

Leong Qixiang

Lim Hai Bee

Lim Kai Ming



Lin Yicheng Kelvin
Mah Jingyi
Moahan Murugappan
Ng Shi Lin

Ng Xin Zhao (*USP scholar*)

Soh Wee Tee (*Outstanding Undergraduate Researcher Prize*)

Tan Da Yang

Tan Hong De Calvin

Tan Jun Kai

Tan Jun You

Tan Wee Leng

Tang Zhongkan Kamiyuki

Thi Ha Kyaw

Too Soon Yee

Wong Songhan

Wu Zhenzhou

Zachary Kok Zhi Hoe (*USP scholar*)

Zhang Song (*Jurong Shipyard Prizes*)

Zhang Zhang



Master of Science

Bikkarolla Santosh Kumar
Carmen Cristina Hunziker
Choo Kah Lip Sean
Deng Wensheng
Divya George
Edwin Tan Pei Ming
Ho Hui Kiat Melvyn
Ho Tianyu, Basil Caleb
(*NUS-French Double Degree Programme*)
Kwek Eng Yeow
Lee Wei Chai
Li Benliang
Naomi Nandakumar
Rui Qing
Sim Mong Chea
Ting Yuan Sen (*NUS-French Double Degree Programme*)
Zhang Lingjun
Zhao Wenwen

Doctor of Philosophy

Andrej Grimm
Argo Nurbawono
Arkajit Roy Barman
Binu Kundukad
Cai Yongqing
Chen Jie (*World Future Foundation PhD Prize in Environmental & Sustainability Research*)
Chen Qian
Chen Shi
Dai Li



Edwin Ong Bin Leong
Hoi Siew Kit
Li Wen
Lim Siew Leng
Ni Xiaoxi
Png Rui Qi
Sheng Su
Shi Lihong
Sujit Kumar Barik
Syed Md Assad (*NUS-The Australian National University Joint Degree Programme*)

Vinayak Bharat Naik
Vinitha Balachandran
Wang Yuzhan
Xie Lanfei
Yan Yuanjun
Zeng Minggang
Zhang Lifa (*Materials Research Society of Singapore Medal*)
Zhao Xiaodan
Zou Hailin



Physics Matters is a biannual publication of the Physics Department, NUS. The online version is available at <http://www.physics.nus.edu.sg/newsletter>

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