JANUARY 2016

Physics Matters

Inside this issue :

Department of Physics

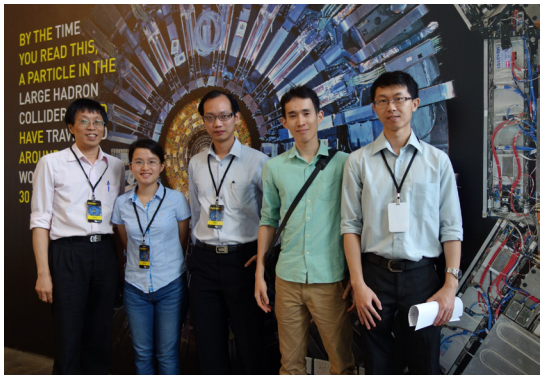
NUS National University of Singapore

DisCERNing the LHC

NUS has a long tradition in analysing high energy scattering data way back in the 80s. The aim is to understand the non-perturbative quantum chromodynamics regime and to throw light into the first few moments of the Big Bang by recreating some of the initial conditions at the Large Hadron Collider (LHC) at the European Centre for Nuclear Research (CERN) in Geneva.

In 2013 the historic NUS-CMS (CERN) EoI Collaboration was signed by Prof Oh Choo Hiap and A/P Phil Chan. CMS stands for Compact Muon Solenoid and is one of the seven particle detector experiments constructed at LHC. Students from the department could undertake research in high energy particle physics phenomenology and its related aspects at CERN. The first NUS-CERN collaborative resulted in a 32-page phenomenology paper published recently in the *Journal of High Energy Physics* by PhD student Mr Wang Wei Yang.

Selected students need to have knowledge in particle physics, quantum field theory, computer coding and mathematical statistics. A good CAP, strong recommendations and soft skills such as independence, creativity and diligence are also necessary. Students spend two months initially at CERN and then complete a thesis upon their return. Funding can be from self, CERN or the NUS research scholarship. So far, 10 (and another current) students have worked at CERN. PhD students will be invited back to CERN for further research.



⇧ A/P Phil Chan with students back from the CERN programme

Mars, Anyone?

It was a talk that would raise eyebrows—Colonisation of Planet Mars delivered by Nobel laureate in Physics (1999) Prof Gerard 't Hooft who is also an ambassador for the Mars One project. The public lecture on 27 Jan, organised by the Department of Physics in collaboration with the Netherlands Embassy, attracted a great turnout of students, NUS staff, the Dutch community and members of the public.

Mars One is a not-for-profit foundation with the aim of establishing a permanent human settlement on the planet Mars. Plans to launch an unmanned mission and selection of suitable candidates are already underway. In his talk, Prof 't Hooft shared about what led to his becoming an ambassador for Mars One. He supports and is optimistic about the mission to Mars though budget and timeline are practical concerns to be dealt with. Prof 't Hooft also addressed issues such as the feasibility and sustainability of the mission raised by audience.

If ever realised, Mars One will prove to be a very gigantic and historical leap for mankind as the voyage deeper into the universe is made.

⇧ Prof Gerard 't Hooft addressing a packed auditorium

Research Evenings

Research evenings were launched this semester with the aim of helping 3rd year physics majors acquire more prior knowledge of the research opportunities offered by the department. Faculty in the same field are invited to share about their research activities in a single session. Students are most welcome to stay for a buffet dinner specially prepared for them at the end of the sharing session. The response has been encouraging so far with a good turnout by students. Hopefully all the sessions will enable our undergraduates to make more informed and intelligent choices when it comes to choosing their final year project.

⇧ A sharing session in progress

Public Talk @ ArtScience Museum

On 14 Nov 2015, A/P Phil Chan was invited to share at a Conversations event at the ArtScience Museum, Marina Bay Sands. This coincided with the launch of an exhibition called Collider which originated from the Science Museum, London. A/P Chan gave a brief introduction to the particle physics activities in Singapore and the audience also witnessed a live chat between him and Prof Emmanuel Tsesmelis, a senior Oxford physicist and deputy head of international relations at CERN.

Public Lecture @ Science Faculty

Prof Douglas Brown (Emeritus Professor, Cabrillo College) and Prof Wolfgang Christian (Davidson College, North Carolina) were at the Science Faculty on 28 Oct 2015 to deliver a public lecture on video modelling and open source physics. Tracker combines videos with computer modelling and offers a fresh way of analysing physical problems. Its creator and developer, Prof Brown, explained to the audience what the tracker system could do and also gave demonstrations of its applications.

Prof Christian is an expert in open source software including Physlets which are physics applets free for non-commercial use. He also has extensive experience in building a multimedia physics curriculum in the world wide web platform using the Java programming language. He shared with the audience how open source code libraries whether for physics or other subjects could serve to advance learning.

Indeed, for educators, it was an engaging afternoon to hear from the experts how their teaching could be enhanced with useful software tools.

⇧ **Prof Wolfgang Christian shared about open source physics**

⇦ **Prof Douglas Brown with senior lecturer Dr Chammika Udalagama**

Singapore TELE Conference

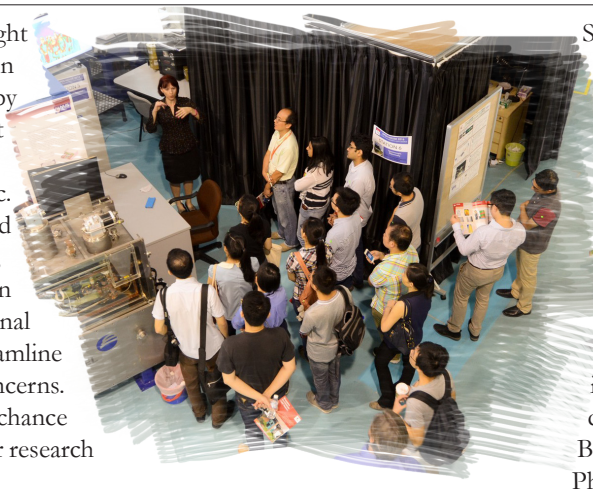
⇧ **Faculty attending the inaugural Singapore TELE Conference at the Hive, NTU**

The inaugural Singapore Technology-Enabled Learning Experience (Singapore TELE) Conference on 16–17 Nov 2015 at NTU brought together some 600 academics from the six local universities (NUS, NTU, SMU, SUTD, SIT and UniSIM). The key objectives of the conference are to raise awareness among the academic fraternity on the various modes of technology-enabled learning and to inspire learning and teaching transformation through the adoption of emerging technological tools that will enhance student learning.

The conference keynote speakers spoke at length of how current advancements in technology have opened up new opportunities in the areas of pedagogy to achieve self-directed, interactive, collaborative and team-based learning beyond the classroom, anytime and anywhere. Themed "Shaping Future@Universities", the conference also provided a platform to address the various challenges faced in creating a technology-mediated learning environment.

SSLS Open House

The Second Singapore Synchrotron Light Source (SSLS) Open House was held on 20 Jan. The open house was coordinated by Dr Sascha P Heussler, research fellow at SSLS, and attracted over 80 students, NUS staff and members of the public. Visitors had a great time discovering and learning about electron accelerators, synchrotron radiation and its application in science through guided tours, informational posters on display and friendly beamline scientists ready to address any of their concerns. The open house also presented an ideal chance for students and post-docs to explore their research and career opportunities.



⇧ **2nd SSLS Open House**

SSLS is a university-level research centre at NUS which has tie-ups with local and international groups from universities, research institutes and the industry. Commissioned in 1999, SSLS has since widened in scope and presently houses a R&D programme featuring micro/nanofabrication, various analytical applications and advanced synchrotron radiation instrumentation. The current director of SSLS is Prof Mark Breese from the Department of Physics.

On Writing and Physics

Recent physics honours graduate Ms Woo Jia Qian was named Writer of the Week for the Straits Times Forum Page on 3 Aug 2015. She shared with *Physics Matters* her passion for writing about social issues and how physics has helped her.

What leads to your passion to give a voice to social issues?

I first published in the Straits Times as a teenager in response to an issue raised by another forum writer. I wrote particularly about the Singapore education system—how students learned—being inspired by my secondary school teachers to be more effective learners. My transition from an independent secondary school to a government junior college enabled me to form my comparison and views about the different school systems with their unique cultures. I certainly benefitted from my NUS exchange programme in Finland and conversations with my physics coursemates, half of whom are teachers-to-be.

On a personal note, it really helped that my family is open to different opinions and we do not practise self-censorship. It is like in my secondary school where alternative voices were welcomed and though there were disagreements, diversity was embraced.

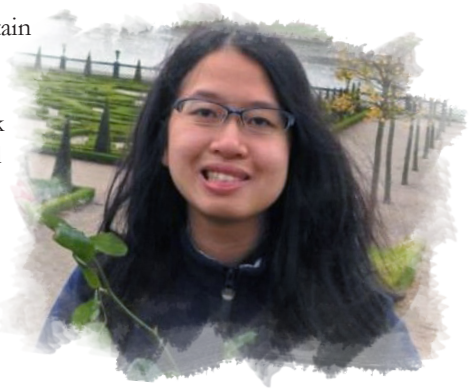
What motivates you to write to the press?

I love to construct my own arguments and I think it is important to do this about current issues. Whether it is getting a scholarship, internship or job, there is no escape from the countless rounds of interviews and assessments like writing an essay. The preparation is not an overnight process. If you wish to ace any of such, you need to have the habit of forming and communicating your own opinions about social and economic trends and policies!

I see writing as an art. We not only think about the content, but also how to raise issues in a tactful and non-offending way. Since I studied in different kinds of environment, I believe I have additional perspectives to offer. Thus, the courage to voice my opinions to the media springs forth!

You graduated with a physics degree. Does pursuing physics help in any way in your thought and writing process?

Definitely! Physics majors are trained to be analytical. When we study, we think about why some ideas are convincing and others fail to explain certain theories. Likewise, when we analyse trends and policies, we do think about what work and what don't. Besides, taking up a teaching subject like physics also made me think about how school students should be approaching the subject.



Describe to us your current undertaking.

Currently, I am an engineer at Micron Semiconductors. I examine wafers in the cleanroom and also monitor the production line. Operations are round the clock and I have an alternating 3-day or 4-day shift week with 12 hours per day! Off days could mean working overtime on projects. A typical day on shift begins with a passdown meeting and a review and allocation of action items for the day. We may have breakfast as a team followed by working on the action items. The shift ends with another passdown meeting.

Though I hardly have to apply my physics knowledge to my current job, the analytical, numerical reasoning and quantitative skills I have acquired are definitely relevant! I like to encourage all my juniors to have an open mind. Look beyond careers in teaching and research. Of course, treasure your school holidays because there's no such thing once you start work!

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

I treasure our environment, so I hope that people will use glass mugs rather than disposable cups whenever they can, and stop using styrofoam!

Well done, Team Physics Singapore

According to the Ministry of Education (MOE), Singapore students have performed well at international science and mathematics competitions held in 2015.

In the 28th International Young Physicists' Tournament held in Nakhon Ratchasima, Thailand from 27 Jun 27 to 4 Jul, 2015, the Singapore team secured a first place in a field of 27 countries, making them champions for the third year in a row. Singapore was placed 10th overall in the 46th International Physics Olympiad held in Mumbai, India from 5 to 12 Jul, 2015, out of a total of 83 countries.

⇧ **Representatives and their mentors at the International Young Physicists' Tournament (Photo credit: MOE)**

⇦ **High school students taking the Singapore Physics Olympiad practical round at the Physics E Lab**

⇨ **Representatives and their mentors at the 46th International Physics Olympiad (Photo credit: MOE)**

Experiencing Physics

Physics Matters gives a brief update on the upgrading works done in the recent past in the workshop and all the teaching laboratories.

⇦ Aerial view of the newly renovated workshop

Thanks to a campus wide upgrading project, planning and preparation for renovation to all the physics teaching laboratories as well as the workshop in the department began as early as May 2013 and were completed by July 2015.

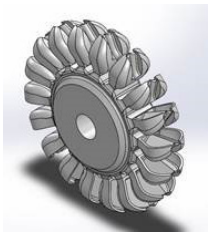
The workshop became fully operational again in September 2015 after eight months of renovation. Workshop manager Mr Goh Eng Kee shared with *Physics Matters* a few improvements to the workshop. They included a fully air-conditioned working environment, increased illuminance and, with some walls knocked down, more space in the work area which improves mobility and space usage. Recycled furniture has also replaced many of the old storage racks, cabinets and cupboards which gives the workshop a more orderly look. The materials storage room has greater ease of access now after refurnishing and reorganization.

Mr Goh also highlighted two important enhancements to the workshop. He was particularly enthusiastic about the addition of three 3D printing machines which not only facilitates the fabrication of more complicated tools or parts of equipment but also speeds up the process. A Student Corner is also carved out in the work area whereby students could have hands-on experience in drilling, milling and turning.

All the workshop staff have their own workspace in one large office setting. There is also a pantry with comfortable sofa set for staff to rest or interact. It could also serve as a meeting room for visitors. Mr Goh strongly believes that the overall improvement in the ergonomics of the workshop after renovation has translated into better communication at work and also greater efficiency. He has statistics to prove this: the workshop has handled 135 job requests in 2015—almost the same amount (150) in 2014—in just six months, with the same amount of time taken up due to renovation and logistics activities.

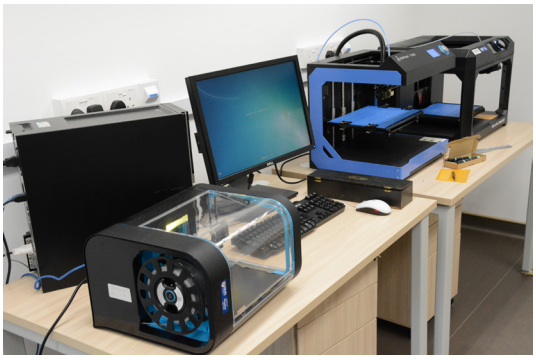
The same sentiments are also echoed by the lab managers of the teaching laboratories which underwent renovations in the past two years. "Everybody would feel happier working in a newly renovated environment," expressed Ms Lee Soo Mien from the Year 3 Lab. "The service area and work stations are redesigned and furnished with more ergonomic furniture, and students like the renovated lab." In Year 1 and 2 Labs, space usage was greatly improved, and as a result additional experimental tables could be added. The laboratories also look brighter and more spacious.

The improvements would not have been possible without the cooperation and due diligence of everyone involved; from planning, meetings, negotiations, packing, shifting, storing, unpacking till the final setting up, each and every support staff has demonstrated that no task is insurmountable and the way to go is great team work!



⇧ Software modelling of fabricated part

⇧ Fabricated product using 3D printing



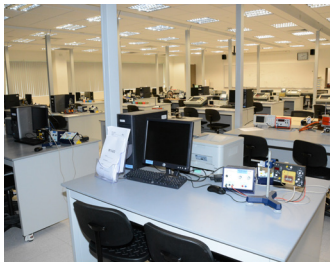
⇧ The latest addition: 3D printers

⇧ A beaming Mr Goh showing colleagues some fabricated parts done by the 3D printers

⇧ Student Corner in the workshop

⇧ The brighter and more spacious Year 1 and 2 Labs

⇧ Maroon curtain adorns the dark room in the Year 3 Lab



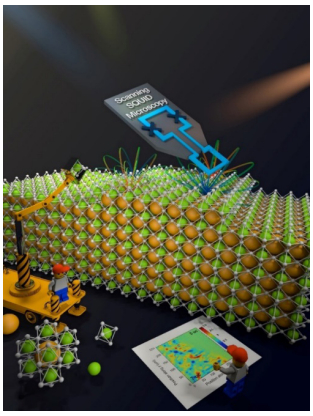
⇧ Storage space has improved in the Physics E Lab

Discovering Physics: Beyond Moore: Control of emerging functionalities at oxide interfaces

Silicon microelectronics is the engine that drives modern society in terms of information processing, storage and transmission. In a more interconnected future, personalised wearables requiring high performance electronic devices will become important. With the current technology approaching its physical limits, enhanced functionality built into silicon architecture is the goal of most electronic companies. There has been extensive research effort therefore to explore the fundamental properties of new materials.

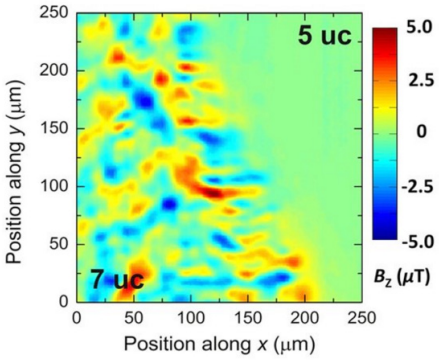
Among different material systems, transition metal oxides constitute a promising route in a multifunctional context. The oxides have properties, such as ferroelectricity and magnetism, which are not exhibited by silicon and can significantly increase the functionality of devices. Using ferroelectricity, for example, large amount of charges can be switched rapidly in a device which in turn will create a new functionality such as physical motion or change of magnetic state.

With advances in deposition techniques, synthesis of oxide heterostructures and interfaces has reached an unprecedented level of sophistication with atomic-level control over the thickness. Coupled with the broad compatibility of the oxygen sublattices of different materials and the sensitivity of charge, spin and orbital degrees of freedom on the atomic structure of the heterostructures and interfaces, this technical control has made oxide heterostructures and interfaces a playground for exploring phenomena that are absent in the bulk constituents. Highly mobile two-dimensional electron gas and magnetic order have been shown for example to emerge at the interface between two insulating and non-magnetic oxides. Many scientists are mesmerised by the unexpected phenomena that are emerging at the oxide heterostructures and interfaces. Our group here at the Department of Physics and NUSNNI-Nanocore is one of the frontiers in this field.



⇦ **Fig. 1: A cartoon showing the magnetic layer being grown by depositing atomic layer by atomic layer of LaMnO3 on a substrate crystal. After the growth, the magnetic field is recorded by scanning the surface of the grown LaMnO3 film with a tiny superconducting coil placed over it.**

In a recent work, we discovered a special effect relating to the magnetism of one such oxide heterostructure based on lanthanum manganese oxide ($LaMnO_3$). This particular oxide consists of stacking $LaMnO_3$ unit cells, quite comparable to stacking blocks of LEGO. In this case, the individual building blocks are only 0.4 nanometer in size (one nanometer is one millionth of a millimeter). By growing thin layers of $LaMnO_3$ on a perfectly flat crystal of nonmagnetic strontium titanium oxide ($SrTiO_3$) using a technique called pulsed laser deposition, we discovered that magnetism in the $LaMnO_3$ layer is switched on abruptly when the number of manganese atomic layers changes from five to six. Adding the sixth atomic layer switches the magnetism in $LaMnO_3$ from antiferromagnetic (antiferromagnets produce no magnetic field) to ferromagnetic. Such an abrupt transition has never been seen before. Using SQUID, a scanning microscope that employs superconducting electronics to measure magnetic field with exquisite sensitivity (one hundred thousand times smaller than the earth's field), a direct image of the change in magnetic properties was obtained. The abrupt switch from antiferromagnetism to ferromagnetism just by adding one extra atomic layer can be explained due to an avalanche of electronic charge inside the $LaMnO_3$ from the top surface of the film to the bottom.



⇦ **Fig. 2: An image of the magnetic field recorded by scanning the surface of a $LaMnO_3$ film grown on a substrate crystal with a tiny superconducting coil placed over it. The magnetic left-hand side is seven LaMnO3 blocks thick (~ 3 nm) while the nonmagnetic right-hand side is five blocks thick (2 nm).**

The discovery of such a sharp critical thickness for the appearance of ferromagnetism makes it possible to define magnetic structures on a nanoscale. It also implies that a very sensitive new functionality is present, in which a slight alteration or addition can change the magnetic properties of the structures. We expect this to be not only limited to adding new layers, but possibly also to other manipulations such as applying electric field or adsorbing specific molecules. Magnetism in nanoscale layers only a few tens of atoms thick is one of the foundations of the big data revolution—all the information we downloaded from the Internet is stored magnetically on hard disks in server farms dotted across the world. With magnetic memory elements approaching nano dimensions, this technique promises new approaches in magnetic recording and computing.

References

[1] Ariando et al, *Nature Comm* **2**, 188 (2011)

[2] X Renshaw Wang et al, *Science* **349**, 716-719 (2015)

Asst/P Ariando leads a research group on advanced functional materials at the Department of Physics and NUSNNI-Nanocore. He has published over 80 research articles in international journals and also filed five patents. His research interests include superconducting, magnetic and new emerging properties at thin films, heterostructures, and interfaces of complex oxides. A pioneer in oxide interface field, he has contributed various important works towards the progress and understanding of 2D electron gas at oxide interfaces and other complex oxides. His work has been highlighted in *Nature Physics* and also picked as the editorial choice in *Science*. In recognition of his work, he was awarded the Omicron Medal for Nanotechnology in 2010 and the Faculty of Science Young Scientist Award in 2013.

Visitors to the Department

The department played host to nearly 30 faculty and administrative staff from the Universiti Sains Malaysia (USM) on 28 Aug 2015. They were briefed by Prof Sow and then made their visits to the labs and the General Office. On 21 Jan a small group of foreign delegates also visited the department. They were in Singapore as participants of the Global Young Scientist Summit (GYSS) 2016.

⇧ Visitors from USM at the Physics E Lab

⇧ GYSS participants with Asst/P Goki Eda at the Centre for Advanced 2D Materials

Welcome Reception cum Graduates Symposium

The department welcomed 38 new graduates on 6 Aug 2015 with a warm reception and briefing session. New graduates learned first-hand about the department and research opportunities available. The reception also linked them up with their seniors as it coincided with the annual Physics Graduates Symposium.

The symposium attracted over 70 participants and a total of 12 oral presentations were given. The topics covered included surface engineered nanomaterials, non-equilibrium quantum systems, Brillouin studies of surface acoustic waves and weak measurement in interferometric setups.

A Day in the Life of...

She gives excellent advice when it comes to food catering for departmental events or outings. Indeed since her favourite pastime is cooking, Ms Foo Eng Tin's kitchen is the place she relishes the joy and satisfaction of making a meal, be it for herself, her family or friends.

Ms Foo was one of the first woman technicians to be recruited by the former head of department, the late Prof Rajaratnam. Currently a laboratory manager at the Engineering Physics Lab, Ms Foo started work with the Physics Department at its Bukit Timah campus more than 40 years ago. She could fondly recall having worked with many academic and non-teaching staff, some of whom had left the department.

Ms Foo was attached to the year 3 and year 2 laboratories before being moved to the Engineering Physics Lab when the Engineering Physics curriculum was launched in 2002. With over 1000 students enrolled in the course every semester till recent years, she had to work around a rather hectic lab schedule. Though the enrolment has now gone down, there are more modules to look after. One could sense her tone of apology as she recalled having to "chase" students out from the afternoon lab session after the closing hour.

Besides scheduling lab duties for academic staff and students and the associated administrative matters, Ms Foo also oversees the purchase of equipment, ensures the smooth operation of the lab, dedicates work to colleagues in the lab and assists in departmental events such as the Physics Camp and Physics Olympiad practical sessions in the lab. "I have been with the department for so many years and have worked closely with many colleagues who have been very supportive and considerate towards me. I really appreciate them," acknowledged a grateful Ms Foo.

⇧ Ms Foo (centre) put her culinary skill to the test at a departmental event

A lover of Mother Nature and an outdoor person, Ms Foo misses her good old days when she did lots of trekking. Now she still engages in many physical activities; some colleagues in the department have also become her regular badminton playmates. She enjoys relaxing with yoga and meditation too.

An Interview with Prof Andrew Wee

Former Dean of Science and current Vice President (University and Global Relations) Prof Andrew Wee shared his views and thoughts.

As Vice President (University and Global Relations) of NUS, what are some common challenges you see facing universities globally and in particular in Singapore the little red dot?

Universities globally are facing major challenges particularly in issues such as the rising cost of education and reduction in research funding. Some parents are questioning why university education is so costly (especially in the US) when MOOCs can nowadays deliver educational content far more economically. Funding agencies in many countries are cutting research funding and/or focusing mainly on economically relevant research outcomes. Singapore may be a little red dot, but we punch above our weight in many fields of endeavour, particularly in higher education. Parents (in Singapore and Asia) still believe in investing in their children's university education, and our national funding agencies have continued to invest in both upstream and downstream research. This investment has helped in the rising reputation (and rankings) of Singapore's universities. Nevertheless we must not be complacent; NUS needs to continue to raise the quality of our education programmes and research impact.

It must have been an uphill task to steer the Faculty of Science before you passed the baton last March. Share with us what keeps you going.

I was merely "standing on the shoulders of giants", quoting Issac Newton, and building upon what the Deans before me have achieved. Although it was hard work during much of the 7 years as dean, it was extremely rewarding to see the faculty rise in reputation and rankings in all scientific disciplines. I have spent my last 25 years in NUS and have benefitted greatly in terms of my scientific career and job fulfilment; therefore I believe in giving back to NUS in whatever way I can.

How would you appraise the Physics Department on the global scene and what are some of your aspirations for it?

The NUS Physics Department has done extremely well over the last decade—we have risen in various disciplinary rankings and have one ISI highly cited researcher in physics. We excel in several research areas, e.g., quantum information and 2D materials. I regularly receive positive comments about NUS and our department in my overseas trips. We need to continue to invest in building up our faculty members as well as in excellent new hires. We also need to raise the quality of our PhD students and postdocs, and work at increasing our undergraduate physics intake. The latter can be achieved if all of us play a part in schools outreach and the general promotion of physics. My hope is that all our physics staff will actively support departmental efforts in physics outreach, such as giving talks, mentoring students, organising outreach events, etc.

Share with our undergraduates any tips on how to study physics.

The most important tip in my opinion is to enjoy physics; then you will look forward to learning physics. Read about the historical developments of physics as well as the recent breakthroughs in physics; these stories are often very inspiring. Participate in physics activities, e.g., practical astronomy, research projects (UROPS) and events by the Physics Society. We also need to encourage our school teachers (as well as university lecturers) to make our physics classes interesting by relating physics to our everyday life.

⇧ **Prof Andrew Wee in a recent trip to Zhangjiajie, Hunan, China**

What are some things you like to say to our physics graduates today?

A physics degree provides excellent intellectual training, not just in physics but also in general analytical and quantitative skills. Physics graduates are able to think from first principles and solve problems. Many employers (in various sectors) recognise this positive attribute and prefer to hire physics graduates. I find it interesting to talk to physics alumni as many have gone on to diverse careers beyond physics such as in finance, education, healthcare, administration, business and government. So you can look forward to a wide choice of careers; just remember your basic physics training, and be a good ambassador for physics!

How does one strike a good balance between teaching and research?

First of all, I must say that in the Physics Department, there are many staff who play important roles in our teaching (education track staff) and research (research staff) functions—we will not be able to fulfil our dual roles without their crucial contributions. For faculty doing both, it is certainly not easy as both are full-time jobs! Nevertheless, it helps that teaching benefits research, and research informs our teaching too.

Teaching is rewarding because we see the fruits of our labour every year as our students graduate and embark on various careers. It is a joy to meet our alumni who have succeeded in different spheres of life, including domestic! Besides, we often have to (re) learn beyond our research specialisation to teach, and this often helps to broaden our research perspective too.

Research, on the other hand, makes the teaching of physics alive because we are able to "walk the talk" with our work in the laboratory. Research fulfils the important function of knowledge creation in a university, and every academic should aim to do research that creates impact (fundamental or applied). Research is one practical way to get students passionate about physics, and hence it should be an integral part of every physics undergraduate's university experience.

I believe both teaching and research are fundamental to academic life. I have continued to teach even when I became dean and now vice president. I coteach a second-year nanoscience introductory module, which gives me a chance to nurture the interest of students in this research field. Some of the students have gone on to do their PhDs! I must also acknowledge that I learn from my PhD students and postdocs as much as I impart to them in our research endeavour together—in all, a busy but fulfilling profession (or hobby if you like)!

Awards

Congratulations to colleagues in the department for being the proud recipients of various awards in the year 2015!

Faculty Teaching Excellence Award AY2014/2015

Prof Gong Jiangbin
A/P Chan Aik Hui, Phil
A/P Tay Seng Chuan
Dr Hong Chong Ming, Kenneth
Dr Yeo Ye

Faculty Honour Roll AY2014/2015

A/P Tan Meng Chwan
Dr Chammika N B Udalagama

Faculty Teaching Assistant Award AY2014/2015

Mr Cheng Kok Cheong
Mr Leong Qixiang
Ms Angeline Shu Sze Yi

Faculty Young Scientist Award

Asst/P Lin Hsin

Faculty Outstanding Scientist Award

Prof Wee Thye Shen, Andrew

Faculty Top Graduate Researcher Award

Dr Di Kai

Young Scientist Award, Singapore National Academy of Science

Asst/P Goki Eda

Faculty Outstanding Service Award 2015

Ms Hilary Ng
Ms Lau Siew Keok, Maggie
Mr Lim Geok Quee
Mr Lim Teck Seng
Ms Ng Soo Ngo
Mrs Phua Swee Wah
Mr Seah Chong Huat, Dicky
Ms Tay Bee Hwee
Mr Wong How Kwong

Outstanding Mentor Award for SMP2015

Dr M V Venkatashamy Reddy

"Being recognised in this award has encouraged me to keep moving forward with my future endeavours in my research work. I am fortunate to have a great team to work with, and this award is a great validation for my team that hard work can pay off."
Asst/P Lin Hsin, Faculty Young Scientist Award

"I feel greatly humbled and honoured to receive this award and I would like to express my sincere gratitude to the Department of Physics and Faculty of Science. To me this award is not only a recognition of the past, but also an encouragement to become a better researcher in the future."
Dr Di Kai, 2015 Faculty Top Graduate Researcher Award

"I felt winning the Outstanding Service Award is an achievement to me as I work diligently in the department. In fact I am always motivated to help the department and will provide the best service I can with my knowledge and tools."
Mr Dicky Seah, Outstanding Service Award

Physoc Events

The 29th Management Committee of the NUS Physics Society (Physoc) was elected on 20 Aug 2105. The Physics Department likes to thank the past committee for a job well done and congratulate the newly elected committee! Here's a recollection of events and participation by Physoc in the second half of 2105.

⇦ **Physics Induction Workshop, 12 Aug**

⇨ **Mid-Autumn Festival Celebration, 17 Sep**

⇦ **BazzaRISE, 5 Oct**

Welcome On Board!

The department welcomes five new staff on board. They are LKY postdoctoral fellowship awardee Dr Matthias Steiner, adjunct associate professors James Lee, Patricia Thong and Ng Chee Mang, and teaching assistant Mr Tan Ying Zhe, Ernest.

⇧ **A/P Patricia Thong**

⇧ **A/P Ng Chee Mang**

⇧ **A/P James Lee**

⇧ **Dr Matthias Steiner**

⇧ **Mr Ernest Tan**