

# E-News for Math Students & Alumni

*Staying in touch with You*

An online publication for Mathematics students and alumni

Issue 19 Jan ~ June 2021

## Congratulations to Dr Li Qianxiao, NUS Presidential Young Professor for being awarded the NRF Fellowship Class 2021



*Dr. Li shares his thoughts on his career and receiving the fellowship.*

*The Singapore National Research Foundation (NRF) Fellowship Scheme is a competitive programme that seeks to attract, recruit and root outstanding young scientists from around the world to conduct independent research in Singapore.*

### What or who inspired you to pursue a career in mathematics?

Throughout my education, mathematics has always been my favourite subject as it is one of the few fields that blends concreteness and flexibility: there is a right answer, but there are many ways to arrive at it, some of which require a great deal of creativity.

I enjoy learning mathematics, and I want to learn to create new mathematics too. This prompted me to take up a career in mathematics research. I have also been fortunate to meet many inspiring mentors in school and beyond that help set my career path.

### When did you join NUS, and what were some of the challenges you have faced in your academic career?

I joined NUS as an assistant professor in 2019, while holding a joint appointment with A\*STAR. As an early career mathematician, one of the major challenges I faced is how to balance exploration into new research areas/ collaborations while building a focused research identity. I cannot say that I have overcome this challenge yet, but I am learning to better direct my attention towards problems that contribute to my research programme.

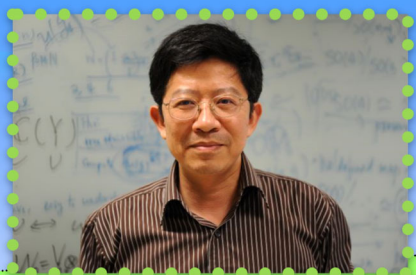
### What advice would you give to young aspiring mathematicians?

One advice I was given that I have found useful is to dedicate some time each day to simply think – about the big picture of your research programme, and the overall goals you want to achieve, and how to achieve them step by step. I feel that it is easy to get lost if one only focuses on the details of particular research problems while losing track of the big picture that actually matters.

### What are your thoughts on receiving the NRF Fellowship?

I have been fortunate to be given the NRF fellowship resources to work on a relatively large project. I see it as a great opportunity for me to lead an interdisciplinary research programme involving mathematics, computer science and the physical sciences.

As an applied mathematician, being able to drive a research programme that work closely with practitioners has always been my goal, and I am excited at this opportunity.



# A Chat with Prof Zhu Chengbo

*Invited Speaker, International Congress of Mathematicians (ICM) 2022*

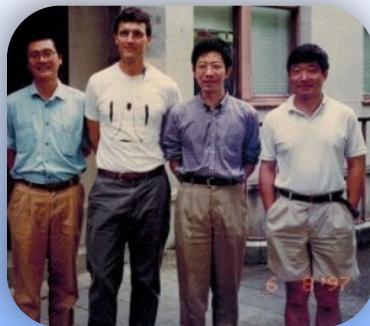
*The ICM is the largest and the most important conference in the mathematics community, and is held once every four years, hosted by the International Mathematical Union (IMU).*

## What/who inspired you to pursue a career in mathematics?

I received a BSc in Applied Mathematics from Zhejiang University in 1984. I knew I wanted to go further in mathematics and so after graduation I became a graduate student at the Institute of Mathematics of the Chinese Academy of Science. In the same year, I had the good fortune of being selected as one of the two graduate students from the Institute to compete in a national programme (the S. S. Chern Programme), that sends Chinese students for PhD study in mathematics in leading US universities. The programme was sponsored by the Ministry of Education (China) and the American Mathematical Society (AMS). This was also my first time to meet mathematicians of the highest caliber (Profs Shing-Tung Yau and Phillip Griffiths were in the interview team). I realized that a door had opened for me to pursue a career in mathematics.



## When did you join NUS, and what were some of the challenges you have faced in your academic career?



When I was in Yale (1985-1990), I already knew quite a lot about Singapore and NUS. President Tan Eng Chye entered Yale's PhD programme in the same year and we ended up working under the same advisor (Roger Howe). I also met Prof Peng Tsu Ann in Eng Chye's residence sometime in the spring of 1989. Prof Peng was visiting the Institute for Advanced Study (IAS) in Princeton, and came to

Yale for a visit. He was very dynamic and friendly, and talked with a few of us in one evening into the wee hours enthusiastically promoting Singapore and NUS. So when I joined NUS in 1991, I was not going to an unfamiliar place.

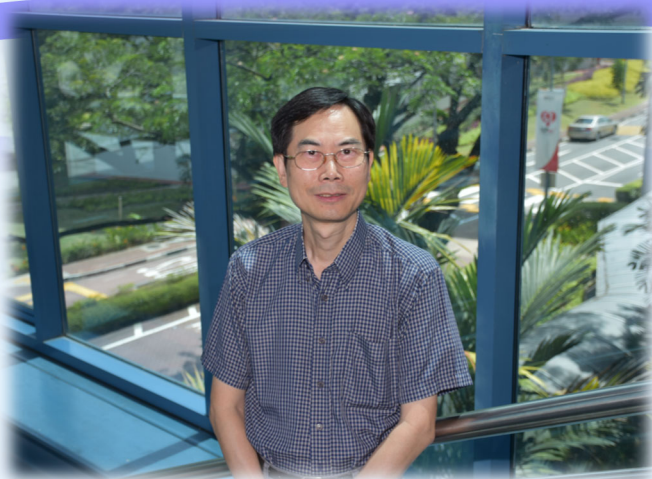
I faced less challenges than a typical staff joining NUS at the time when the university was still in an early stage of development. The Department already had Eng Chye as well as Helmer Aslaksen, and the three of us worked together on a number of projects in invariant theory. Soon, we were joined by Lee Soo Teck in 1993 returning from Yale after PhD, and a sizable group in Lie theory began to take its shape, resulting in several fruitful collaborations between the members. I also benefited a lot from the JSPS-NUS programme which supported mutual visits of Japanese and NUS researchers. The programme was especially valuable to us in Lie theory as Japan had a very strong tradition in the area. In addition, as I was still young, I had the energy to fly long distance to the US to attend conferences (even for a special session of the AMS for 2-3 days). That was in the 1990's, indeed an exciting time for a junior academic like me, when NUS was on its way to develop a worldwide reputation as a major research university.

## What advice would you give to young aspiring mathematicians?

Mathematics is very interesting but also very hard. While we can only do what we can, we should never forget that our aim is to do what is truly important. Thus some general advice is to read the most important literature to gain insight (like the originating papers of the subject), learn from people who are more advanced than you (work with them if you have the chance), and extend your expertise and horizon continually. Then you will have a good chance to do better work along the way.

## What are your thoughts on being invited to ICM 2022?

I have been very fortunate in my academic journey. I learned from a master whose ideas are extremely fertile; I joined a university in a remarkable ascendancy very early in my career; I had excellent collaborators who became lifelong friends. I am very honored to be invited to ICM 2022, and indeed pleased to be recognized as having contributed to the global enterprise of mathematics in the field of representation theory.



# Happy Retirement!

*Professor Tang Wai Shing retires from the Department of Mathematics on 30 June 2021 after a fulfilling career spanning 34 years.*

*The Department would like to thank him for his valuable contributions and wish him a fulfilling and relaxing retirement ahead.*

Prof Tang Wai Shing obtained his B. Sc. (Hons) degree from University of Hong Kong in 1979, and M. Sc. degree in 1980 and Ph. D. degree in 1984 from University of Toronto, Canada. He taught in North America (St. Louis University, U. S. A., and then St. Mary's University, Canada) for three years before joining the Department of Mathematics, NUS, as lecturer in June 1987.

During the 34 years of service at NUS, Prof Tang has taught a variety of courses in analysis and introductory numerical analysis. He has supervised one Ph. D. student, four M. Sc. students and over 30 Honours Project students. His service to the Department involves mainly curriculum and student advising, having served as chairman/deputy chairman of Departmental Curriculum Committee for more than 10 years.

His research areas are in operator theory and operator algebras, wavelet and frame analysis, and more recently linear algebraic aspects of quantum information theory.

*We have a chat with Prof Tang to find out more !*

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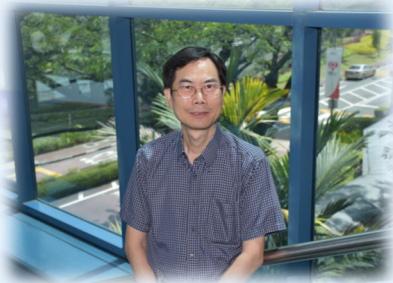
## What or who inspired you to pursue a career in mathematics?

When I started my secondary school study in Hong Kong, I was more interested in Chinese literature and history among various subjects.

A “coincidence” changed my direction in Secondary 3. For that school year, somehow (maybe because of height) I was assigned to be seated in the first row of the class adjacent to the teacher’s table. The mathematics teacher’s name is legendary, sounding like “division and multiplication” in Cantonese dialect (quiz for those understanding Cantonese, but no prize for the correct answer though). During the class, he often would ask students to give answers to the exercises assigned from previous lessons. As the student sitting in the front row, I had to be well-prepared, understanding thoroughly the subject and working out all the exercises. From that year onwards, mathematics became my favourite subject.

I am fortunate having inspiring mentors at different stages. During my undergraduate study at University of Hong Kong, I was taught by various dedicated teachers. Certainly my Ph.D. thesis advisor Professor Man-Duen Choi at University of Toronto had, and still has, deep influence in development of my pursuit in mathematics, particularly in the field of functional analysis. After I joined NUS in 1987, not too many colleagues conducted research in that area. I am grateful to Professor Lee Seng Luan, at the time just joined our Department too, who generously offered me opportunity to collaborate with him in his expertise area approximation theory. That started my research in a new direction of wavelet and frame analysis. In recent years, having been supervisor of a Ph.D. student, I return to the research subject of functional analysis, with connection to mathematical aspects of quantum information theory.

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# A Chat with Prof Tang Wai Shing

## What is the biggest challenge you have faced in your academic career?

Time management, distributing between teaching, research and service, is always difficult for me throughout my years at NUS. I have not learnt solving this problem though, even for my final task of clearing my office and returning key to the Department!

Back track a bit. After starting research collaboration with Professor Lee on approximation and wavelet, I became interested in applicable mathematics. Returning from my sabbatical leave in 1994, I started learning use of the software Matlab. From 1995 I taught the module Numerical Analysis I for several years (subsequently Numerical Analysis II and recently Matrix Computation too).

Together with Roger Tan and Tan Hwee Huat, we incorporated structured laboratory component into the module. In 1998, then Curriculum Committee recommended integration of computing component into the first-year modules MA1101 Linear Algebra I and MA1102 Calculus. Two work groups were formed for the respective task: Linear Algebra Work Group (Members: Chan Onn, Ma Siu Lun, Roger Tan, Tan Hwee Huat, Victor Tan, Tang Wai Shing) and Calculus Work Group (Members: Man Shing Hing, Ng Tze Beng, Wong Yan Loi, one more member?). Often work group members spent hours in designing the course material integrating theoretical aspects with hands-on laboratory component.

That is now history. Nevertheless, I am glad that our past efforts were not spent in vain. After more than 20 years, the two modules still retain some computing components, helping students understand better the concepts with visualisation.

## What advice would you give to young aspiring mathematicians?

Be more open and receptive to different areas of mathematics besides your primary field.

Attend seminars and talks held in Department, and (online) conferences overseas.

Mathematics is an organic subject. Often you will be surprised how results from other branches of mathematics may be relevant to your current research topic, be it “pure” or “applied”.

# Centre for Data Science and Machine Learning

A short opening ceremony for the Centre for Data Science and Machine Learning was held on 17 May 2021, in conjunction with the [Workshop in Data Science](#).

Prof Zhang Louxin, Director for the Centre, Prof Toh Kim Chuan, Head, Department of Mathematics, and Prof Sun Yeneng, Dean, Faculty of Science shared their vision for the centre's mission, future plan and importance in training data scientists for industrial and services sectors in Singapore.

## History of the Centre

In 1999, the Centre for Wavelets, Approximation and Information Processing was established and hosted at the Department of Mathematics. It was a faculty level research centre which emphasized the synergy of mathematics, engineering and computer science in image processing. With the rapid developments of data-related activities in the research landscape, the centre has expanded its research into emerging areas of data science and machine learning like compressive sensing and computer vision. It is high time to turn the focus of the Centre towards data science and its applications to meet the demand in education and research offered by the data revolution. In tandem with its new vision and functions, the centre has been expanded and renamed as the Centre for Data Science and Machine Learning. It will act as a focal point to promote research and education in data science and machine learning



Prof Zhang Louxin, Director, giving his opening speech

## About The Workshop in Data Science

*Organized by the Centre for Data Science and Machine Learning, NUS and AI Lab at Sea Limited, the event was held at the Institute for Mathematics Sciences, NUS. Its objective is to bring together data scientists to discuss cutting edge research in data science, machine learning and their applications. It serves as a platform to facilitate collaboration between data scientists in academia and industry in Singapore.*

*The workshop was held via zoom with about 60 participants, and comprised 11 invited talks on foundations of data science and its applications in vision intelligence, online business, healthcare and bio-medicine.*

# Promotion to Associate Professor

Congratulations to Dr ZHANG Lei and Dr ZHOU Chao on their promotion to Associate Professor, with effect from 1 July 2021.

Dr Zhou's research interests are in stochastic analysis and financial mathematics , and Dr Zhang works on number theory and representation theory.



**Dr Zhang Lei**

**Dr Zhou Chao**

# Staff and Student Accolades



Congratulations to our undergraduate **Bryan Wang Peng Jun**, for winning the Hofflin Prize at the Simon Marais Mathematics Competition 2020, for an impressively creative and elegant solution to one of the most challenging problems in the paper. The solution stood well above the others and drew well-deserved praise from the markers and the Problem Committee.

The Hofflin Prize (A\$3000) is awarded for most creative solution to any problem in the Competition.



**Simon Marais  
Mathematics Competition**

*Logo from [www.simonmarais.com](http://www.simonmarais.com)*

## Congratulations to our staff members for winning the Faculty Awards 2020!

### Faculty Teaching Excellence Award AY2019/2020

Dr Li Wei, Dr Ng Kah Loon, A/P Dilip Raghavan, A/P Victor Tan

### Teaching Assistant (Full-time) Award AY2019/2020

Mr Christian Ong Go, Ms Adriana Ewa Marciuk

### Teaching Assistant (Part-time) Award AY2019/2020

Ms Chu Thi Mai Hong (not in photo), Dr Teo Yi Han



# Heartiest Congratulations to the Class of 2020 and Class of 2021!

Due to the Covid-19 pandemic, commencement ceremony was held virtually for the first time ever, to mark the important milestone for our graduates. Congratulations and All the Best!

Our alumnus Ms Chan Kailin was the guest speaker who inspired and shared little nuggets of wisdom with our graduates.

Our valedictorians Mr Bay Wei Heng and Dr Nan Yuesong shared their thoughts on their education, challenges faced, and an exciting future ahead!



Our Faculty members sending their congratulatory messages to our graduates

from left: Dr Marko Weber, A/Prof Victor Tan and Prof Lee Soo Teck



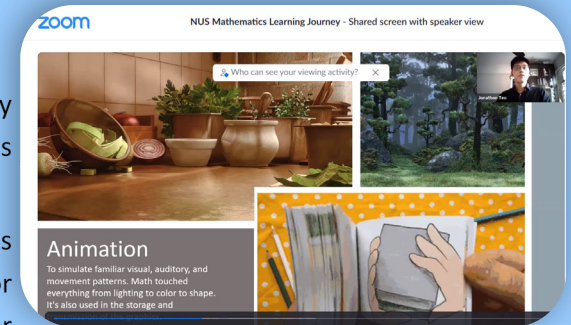
# Outreach Events

*In view of Covid-19 safe measures, our outreach events for prospective students and pre-university students were held via Zoom.*

## LEARNING JOURNEY, JAN TO APRIL 2021

Designed for pre-university students with interest and aptitude in mathematics and/or who plan to study mathematics at university, the Department hopes to introduce prospective students to NUS' Mathematics course and create awareness on the relevance and applications of mathematics in our daily lives.

The Learning Journey was cancelled in 2020 due to Covid19 and resumed via zoom this year. Five sessions were organized between January and Apr 2021, with participation of a total of 227 students from 10 junior colleges. The Learning Journey programme comprise a talk on department's programmes by Prof Victor Tan, a talk on "Real world applications of mathematics" by Dr Jonathon Teo and 2 enrichment talks by our colleagues, interspersed with Kahoot quizzes to engage the participants.



## COLLEGE OF HUMANITIES AND SCIENCES (CHS) E-OPEN HOUSE, 27 FEB, 14 & 15 MAY 2021

An E-Open House was held on 27 Feb, as well as 14-15 May 2021 to provide prospective students the opportunity to find out more about our programmes. Prof Victor Tan shared with the students on the programmes, curriculum and career opportunities, and Dr Wang Fei gave a masterclass on Calculus: The Determination of Changes. We are also honoured to have our alumnus Mr Khor Shi-Jie share his experience on studying mathematics and how it has helped in his current work as a Senior Software Engineer at Google.

## ENGAGEMENT PROGRAMME FOR PROSPECTIVE STUDENTS, 17 APRIL 2021

The Department of Mathematics organized a half-day engagement programme via zoom for prospective students and their parents on Saturday 17 April 2021. About 200 participants comprising students and parents signed up for the event.

Prof Victor Tan, Deputy Head (Teaching) shared a short webcast lecture video to give a preview of a typical mathematics lecture, followed by a comprehensive talk on the Mathematics and Quantitative Finance undergraduate curriculum and exciting career options for mathematics graduates. To provide the visitors with a more complete perspective of studying Mathematics at university level, a panel of four undergraduates from Mathematics, Applied Mathematics and Quantitative Finance programs, as well as the special program in mathematics, were invited to share their learning experience in studying mathematics at NUS. The event ended off with breakout room chats, for both students and parents to interact with our faculty members and students.

