Valerian H. Hall-Chen

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Education

University of Oxford **Oxford, UK**

DPhil in Theoretical Physics (Plasma Physics and Controlled Fusion) 2016 – Present

- **Thesis title**: Using beam tracing and reciprocity to interpret measurements of turbulence in fusion plasmas.
- **Supervisors**: Felix Parra (Oxford) and Jon Hillesheim (UKAEA/CCFE).
- **Courses attended**: Kinetic Theory, Advanced Fluid Dynamics, Collisional Plasma Physics, Collisionless Plasma Physics.

Our model, provides an understanding of how the Doppler reflectometry signal is localised and the quantitative effect of the mismatch angle. Consequently, one can now correct for the attenuation due to mismatch, avoiding the need for empirical optimisation. The model can be extended to other diagnostics, such as high-k and cross-polarisation scattering.

University of Cambridge **Cambridge, UK**

M.A. in Natural Sciences (Physics), Double First Class Honours 2012 – 2015

- **Part IA**: Physics, Materials Science, Computer Science, Mathematical Methods.
- **Part IB**: Physics A, Physics B, Mathematical Methods.
- **Part II**: Experimental and Theoretical Physics.

Career History

Institute of Materials Research and Engineering, A*STAR **Singapore**

Specialist I 2016 – 2016

Institute of High Performance Computing, A*STAR **Singapore**

Research Engineer 2015 – 2016

Designed and fabricated various optical and photonic structures as a staff researcher at the Agency for Science, Technology, and Research (A*STAR). I also co-supervised three high school student interns.

Republic of Singapore Air Force **US and Singapore**

Corporal 2010 – 2012

Drafted into the military for two years. For the most part, I organised ground logistics at the Peace Prairie Detachment in Texas, a joint chinook detachment run by the Republic of Singapore Air Force and the Texas Army National Guard. This typically involved checking inventories and ensuring that the right people signed appropriate forms on time.

Research Internships

California Institute of Technology **Pasadena, CA, US**
Summer Undergraduate Research Fellow Summer 2014
Harry Atwater; Department of Applied Physics and Materials Science
Performed FDTD simulations of photonic gyroid structures, fabricated them using 3D 2-photon lithography and various deposition techniques, and characterised them using FTIR and SEM.

Data Storage Institute, A*STAR **Singapore**
Research Intern Summer 2013
Kwaku Eason; Spintronics and Magnetism Group
Simulated magnetisation reversal of macrospins under conditions close to the Curie temperature. By systematically surveying stability and reliability, I evaluated the suitability of different materials for heat assisted magnetic recording devices.

Institute of Materials Research and Engineeering, A*STAR **Singapore**
Research Intern Summer 2008 – 2010 and 2012, Winter 2008
Nikolai Yakovlev; Analysis and Characterisation Group
Developed in-house characterisation equipment and characterised magnetic thin films. Explained their behaviour by leveraging different models.

Honours and Awards

Scholarships and fellowships

- A*STAR National Science Scholarship (PhD) (2016).
- A*STAR National Science Scholarship (BS) (2010).

Awards for examination results

- Carter Prize, University of Cambridge (2015).
- Caldwell Scholarship, University of Cambridge (2013).

Awards for science competitions

- Lee Kuan Yew Award for Mathematics and Science (2010).
- Gold Award, Singapore Science and Engineering Fair (2009).
- Commendation, A*STAR Talent Search (2009).

Teaching and Outreach

College Tutor, University of Oxford 2019 – Present

- Taught five third-year students a physics module.
- Taught seven first-year students a mathematics module.

Co-chairperson, Cambridge University Physics Society 2014 – 2015

- Founded a YouTube channel to broadcast our talks, which were given by esteemed academics.

Selected Journal Publications

[6] Y Liu, H Wang, J Ho, RC Ng, RJ Ng, **VH Hall-Chen**, EH Koay, Z Dong, H Liu, CW Qiu, JR Greer, JKW Yang, *Structural color three-dimensional printing by shrinking photonic crystals*, Nature Communications 10, 4340 (2019).

[5] JR Ong, HS Chu, **VH Chen**, AY Zhu, P Genevet, *Freestanding dielectric nanohole array metasurface for mid-infrared wavelength applications*, Optics Letters 42 (13), 2639-2642 (2017).

[4] **VH Chen**, JR Ong, CE Png, *Polarisation independent silicon-on-insulator slot waveguides.* Scientific Reports 6, 37760 (2016).

[3] S Peng, R Zhang, **VH Chen**, ET Khabiboulline, P Braun, HA Atwater, *Three-dimensional single gyroid photonic crystals with a mid-infrared bandgap.* ACS Photonics 3 (6), 1131-1137 (2016).

[2] JR Ong, **VH Chen**, *Optimal geometry of nonlinear silicon slot waveguides accounting for the effect of waveguide losses.* Optics Express 23, 33622-33633 (2015).

[1] NL Yakovlev, YY Tay, ZJ Tay, **HV Chen**, *Distribution of switching fields in thin films with uniaxial magnetic anisotropy.* Journal of Magnetism and Magnetic Materials, v.329, 170-177 (2013).

Book Chapters

[1] L Wu, **VH Chen**, P Bai, S Sun, *Localized polaritons of multi-particle systems*, in Nanophotonics and Plasmonics: An Integrated View. Eds. YA Akimov and CE Png, CRC Press (2017)

Selected Conferences and Seminars

[4] **VH Hall-Chen**, FI Parra, JC Hillesheim, *Modelling the effects of misaligning the probe beam and magnetic field in Doppler backscattering measurements*, oral presentation, 14th International Reflectometry Workshop (2019).

[3] **VH Chen**, FI Parra, JC Hillesheim, *Effects of misaligning the probe beam and magnetic field in Doppler backscattering measurements*, poster presentation, 45th European Physical Society Conference on Plasma Physics (2018).

[2] **VH Chen**, FI Parra, JC Hillesheim, *Doppler backscattering measurements of fusion plasmas*, technical seminar, IEEE Nuclear and Plasma Sciences Society (Singapore Chapter) (2017)

[1] **H Chen**, YY Tay, ZJ Tay, YJ Nguoi, NL Yakovlev, Poster Presentation, *Magnetic and optical properties of cobalt thin films with uniaxial anisotropy*, International Conference for Young Researchers on Advanced Materials (2012)