

# Wei Chieh Ng

## Research

- Duration September 2018 - Present  
Title Working title: Understanding the Nature of Neutron Stars  
Supervisor Professor Deepto Chakrabarty, Massachusetts Institute of Technology  
Description Understanding neutron stars through a myriad of techniques, including pulsation searches, burst oscillation searches, and X-ray spectroscopy. These techniques were applied on several sources, including NGC 300 ULX-1, XTE J1739-285, and XTE J1701-407.

## Research

- Duration February 2018 - July 2018  
Title *Magnetic Fields and Stellar Atmospheres*  
Supervisors Professor Martin Asplund, Australian National University  
Description Investigated the effects of different magnetic field strengths and configurations on the structure of the stellar atmosphere of solar-type stars.

## Research

- Duration December 2017 - February 2018  
Title *Kinematics of the OVI Circumgalactic Medium*  
Supervisors Dr. Nikki Nielsen and Associate Professor Glenn Kacprzak, Swinburne University of Technology  
Description Studied absorber kinematics of 31 OVI absorbers, which exhibited a strong halo mass dependence, where absorbers hosted by  $L^*$  galaxies have the largest velocity dispersions compared with lower masses and group environments, due to a match between virial temperature and the temperature at which OVI ionization fraction is greatest. Total column densities follow the same behavior, consistent with simulations. Relative absorber–galaxy kinematics of the same sample was studied, though the mass dependence was first normalized out to account for the range of halo masses in the sample. Non-virialized motions due to outflowing gas was observed. Accreting gas signatures were not observed due to multiple line-of-sight structures that were observed, resulting in “kinematic blurring”. These results indicate that OVI is not an accurate probe of baryon cycle processes.

## Research

- Duration March 2017 - November 2017  
Title *Inflationary Model Selection ft. Dark Matter in the CMB*  
Supervisor Professor Richard Easter, The University of Auckland

Description Performed evidence calculations with a trio of codes on several inflationary models, most notable of which is the inflection point inflationary model, a new model in the literature. Results obtained showed that it is comparable in likelihood to quadratic potentials. Work was also carried out on quantifying the impacts of dark matter on the cosmic microwave background, in order to demonstrate the predictive power of dark matter. It was found that dark matter was needed at least at the  $10^{100}$  level. While the physical effects of dark matter are well-understood, this quantitative calculation has not been reported in the literature.

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## Research

Duration November 2016 - January 2017

Title *Diagnosing poor seeing of the SkyMapper telescope*

Supervisors Associate Professor Christian Wolf and Dr. Christopher Onken, Australian National University

Description The project involved training a computer to predict image quality from the SkyMapper telescope by considering environmental conditions and telescope configurations. The SkyMapper telescope atop Siding Spring Observatory surveys the entire Southern sky in multiple wavelengths. SkyMapper will inevitably find millions of celestial objects. One result was that the angle of rotation of the CCD camera resulted in visibly lower quality images. Once this was discovered, the SkyMapper team disabled that telescope setting.

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## Research

Duration December 2015 - February 2016

Title *Modelling the spectra of hot stars*

Supervisor Associate Professor JJ Eldridge, The University of Auckland

Description Working with Georgie Taylor, we created over 1300 stellar atmosphere models for use in BPASS, the state-of-the-art code incorporating binary stellar systems to predict properties of stellar populations. Results of our work have contributed to the analysis of the recently announced gravitational waves, where it was concluded that similar events are more likely to occur in low-metallicity environments.

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## Publications

2019 **M. Ng**, N.M. Nielsen, G.G. Kacprzak et al. (2019) *Kinematics of the OVI Circumgalactic Medium: Halo Mass Dependence and Outflow Signatures*. The Astrophysical Journal, 886, 66.

2017 J.J. Eldridge, E. R. Stanway, L. Xiao, L.A.S. McClelland, G. Taylor, **M. Ng** et al. (2017) *Binary Population and Spectral Synthesis Version 2.1: construction, observational verification and new results*. Publications of the Astronomical Society of Australia (PASA) 34.

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## Research Talks

Aug 2016 **Auckland Astronomical Society**.

Titled 'Modelling the spectra of hot stars' (**Invited**)

Apr 2016 **Royal Astronomical Society of New Zealand Conference 2016**.

Titled 'Modelling the spectra of hot stars'

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## Education

2018-Present **Ph.D. in Physics**, *Massachusetts Institute of Technology*, Cambridge, USA, GPA: 4.60/5.00.

2017 **Bachelor of Science (Honours)**, *The University of Auckland*, Auckland, New Zealand, GPA: 8.63/9.00. Major: Physics.

2014-2016 **Bachelor of Science**, *The University of Auckland*, Auckland, New Zealand, *GPA: 8.74/9.00*.  
Majors: Physics and Mathematics.

## Employment History

- Mar 2017 - **Graduate Teaching Assistant (Physics)**, *The University of Auckland*, Auckland.  
Nov 2017 Tutored over three hundred students for the course PHYSICS 107/107G: Planets, Stars and Galaxies.
- Jul 2015 - **Marker (Mathematics)**, *The University of Auckland*, Auckland.  
Nov 2017 Performed assignment marking duties for six undergraduate mathematics courses.  
Jul 2015 **Tutor**, *NCEACampus*.  
Presented a NCEA Level 3 Physics class to a group of 6 students.
- Mar 2015 - **Teaching Assistant (Physics)**, *The University of Auckland*, Auckland.  
Nov 2016 Tutored over five hundred students in first year undergraduate physics courses and the Assistance Room.  
Nov 2014 **Examination Supervisor**, *New Zealand Qualifications Authority*, Auckland.  
/2015/2016 Supervised NCEA examination candidates for various levels in Lynfield College.

## Awards

- Dec 2016 **Department of Physics Scholarship, 2017**, *The University of Auckland*.  
This scholarship is financed by the Department of Physics of The University of Auckland for students enrolled in a BSc or BSc (Honours) majoring in physics.
- Dec 2016 **University of Auckland Postgraduate Honours/PG Diploma Scholarships**, *The University of Auckland*.  
A postgraduate scholarship awarded by The University of Auckland. It is awarded to domestic students with a GPA of 8.0 ('A' grade) or higher in an undergraduate degree from a recognised university.
- Jul 2016 **Joyce Mary Clark Scholarship**, *The University of Auckland*.  
The Scholarship was established in 2012 to honour Joyce Mary Clark. It is intended to assist undergraduate students, with a major in Physics, financially.
- 2014-2017 **First in Course Award**, *The University of Auckland*.  
The Award recognises the student(s) who attained the highest overall mark in the course. Was awarded 6 times over 4 years.
- Mar 2014 **Scholarship**, *New Zealand Qualifications Authority*.  
Obtained successful scholarships in Physics, Calculus, Earth and Space Science, and Chemistry.
- Nov 2013 **The Trusts Charitable Foundation Scholarship**, *The Trusts Charitable Foundation*.  
A student academic scholarship administered by Lynfield College based on merit.
- Nov 2013 **Dux Litterarum**, *Lynfield College*.  
Jointly awarded for the top of the year award, Dux Litterarum, with two others.

## Computer skills

Basic UNIX operating systems, Python, T<sub>E</sub>X, L<sup>A</sup>T<sub>E</sub>X, HPC

## Leadership

- May 2020 - **Chair of Development Subcommittee**, *Graduate Student Council External Affairs Board*.  
Present Investigating alternative advocacy methods and maintaining the annual Advocacy 101 program.
- May 2019 - **Co-Chair of Public Outreach Subcommittee**, *Graduate Student Council External Affairs Board*.  
May 2020 Focused on publicizing the benefits of science to the public.
- Mar 2017 - **Executive Member**, *Science Students' Association*.  
Oct 2017 Part of the working group which revived the student association for Faculty of Science.

- Feb 2015- **President**, *The Physics Association of The University of Auckland*.
- March 2017 Organized various seminars, workshops and social events for undergraduate Physics students. Most notable are the annual Physics Honours Info Session and the Physics Careers Panel Discussion.

## Membership

- 2011-Present **Member**, *Auckland Astronomical Society*.