Ting-Yun CHENG (Sunny)

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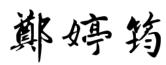🏠 tycheng-sunny.github.io | ✉ ting-yun.cheng@durham.ac.uk

iD 0000-0001-8670-4495 | tycheng-sunny

Education

School of Physics and Astronomy, University of Nottingham
PhD in Physics

Nottingham, United Kingdom
Oct 2017 — Oct 2020

- **Supervisor:** Prof. Christopher J. Conselice and Prof. Alfonso Aragón-Salamanca
- **Thesis:** The Narrative of Galaxy Morphological Classification Told Through Machine Learning

Institute of Astronomy, National Tsing Hua University
MSc in ASTRONOMY

Hsinchu, Taiwan
Sep 2014 — Aug 2016

- **Supervisor:** Prof. Ing-Guey Jiang
- **Thesis:** Investigating Dark Matter Distribution in Early-Type Galaxies

Department of Physics, National Taiwan Normal University
BSc in PHYSICS

Taipei, Taiwan
Sep 2010 — Jun 2014

Work Experience

Department of Physics, Durham University
Postdoctoral Research Associate

Durham, United Kingdom
Nov 2020 — Now

Research Experience

Centre for Extragalactic Astronomy, Durham University
Postdoctoral Research Associate

Durham, United Kingdom
Nov 2020 — now

- Collaborating with Dr Ryan Cooke at Durham University (UK) in several studies of the Lyman alpha forest and intergalactic medium (IGM), including the identification and characterisation of the Lyman alpha forest using convolutional neural networks. **The paper is submitted.** Follow-up plans include the applications of the catalogue produced in this work to investigate the physical properties of IGM.

- Collaborating with Dr Helena Domínguez Sánchez at Institute of Space Sciences (Spain) on a massive comparison of two largest galaxy morphological classification catalogues, including over 20 million galaxies each. This comparison provides a further cross-validation for catalogue users and a better understanding in deep learning applications for future users of convolution neural networks. **The paper is under the Dark Energy Survey organisation internal review.**

School of Physics and Astronomy, University of Nottingham
PhD in Physics

- PhD Thesis - "***The Narrative of Galaxy Morphological Classification Told Through Machine Learning***"

- Compared several supervised machine learning methods such as k-nearest neighbour, support vector machine, random forest, neural networks, and convolutional neural networks on the galaxy morphological classification using imaging data from Dark Energy Survey (DES). **The paper is published on MNRAS.**

- Collaborated with Dr Nan Li at the University of Chinese Academy of Sciences (China) on the project of classifying galaxy-galaxy strong lensing system using an unsupervised convolutional autoencoder. **The paper is published on MNRAS**.

- Built one of the largest galaxy morphological classification catalogues for the DES organisation, which includes 20 million galaxies, using convolutional neural networks for DES Y3 data. **The paper is published on MNRAS**.

- Collaborated with Prof. Marc Huertas-Company at LERMA, Observatoire de Paris (France) and the Instituto de Astrofísica de Canarias (Spain) on the study of galaxy morphology using an unsupervised machine learning technique. **The paper is published on MNRAS**.

University of California Santa Cruz
Kavli Student Fellow, 1.5 months summer program

Santa Cruz, CA, United States
Jul 2019 — Aug 2019

- I carried out two projects: (1) unsupervised galaxy morphology classification, and (2) high fidelity synthetic galaxy images emulation, during this program. In a month, I created novel unsupervised machine learning pipelines for the two projects using a machine learning technique called 'Vector Quantised Variational Autoencoder' from Google DeepMind in 2019. Scientific report can be viewed in the archive of *Kavli Summer Program in Astrophysics*.

Institute of Astronomy, National Tsing Hua University
MSc in Astronomy

Hsingchu, Taiwan
Sep 2014 — Aug 2016

- MSc Thesis - "***Investigating Dark Matter Distribution in Early-Type Galaxies***"

- Analysed imaging data from the Hubble Space Telescope to obtain the surface brightness profile of early-type galaxies (ETG).

- Carried out a numerical analysis to convert 2D Sérsic index into 3D numerical model for luminosity density model, and introduce a novel functional total mass-to-light ratio as a function of radius to construct the total mass distribution of ETG. With this numerical model, we further investigated the dark matter distribution of ETG and showed that a majority of ETG in our samples does not have a significant fraction of dark matter.

National Cheng Kung University
Research Assistant, UCAT Summer Program

Tainan, Taiwan
Jul 2011 — Sep 2011

- Used software IDL to re-analyse a famous solar flare event called 'Bastile Day event' happened on 14 July 2000. By comparing the output energy measured in observation with the theoretical model, this study supports the theory of the magnetic reconnection for the origin of solar flares.

Teaching Experience

Department of Physics, Durham University

- *Year 1 Laboratory Demonstrator, 2021—2022*
  - Weekly laboratory demonstration and supervision.
  - Formative and summative report marking and feedback.
  - Oral presentation examination and feedback.
- *Supervision — Year 4 student/Masters degree*
  - S. M. William, 2021—2022
  - A. Lowe, 2021—2022

School of Physics and Astronomy, University of Nottingham

- *Coursework Marker, 2017—2020*
  - PHYS1001 (F31CO1): From Newton to Einstein
  - PHYS1004 (F31QP1): Quantitative Physics.

Institute of Astronomy, National Tsing Hua University

- *Teaching Assistant for Summer Program in Astrophysics*
  - Instruct undergraduates from the department of Physics at the University of Hong Kong to carry out astronomical observation and analyses.
  - The program included one-week lectures of general Astronomy and the tutorial of astronomical softwares, two-days observation at the Lulin Observatory (Taiwan), the tutorial of data analysis, and final presentation.
- *Teaching Assistant*
  - Compulsory course — ASTR610000: Observational Astronomy

Department of Physics, National Tsing Hua University

- *Teaching Assistant*
  - Optional course — PHYS317000: Numerical Analysis
  - Optional course — PHYS241000: General Astronomy (I)
  - Optional course — PHYS242000: General Astronomy (II)

Awards and Grants

Physics Department Award for Excellence

- For contributing extensively to the health and well-being of the astronomy group, including the design of a mental health awareness poster, a seminar on imposter syndrome, and organising a one-day panel discussion for students and postdocs to get a perspective on both academic and industry career paths.

The Alan Turing Institute Post- Doctoral Enrichment Awards

- The award offer flexible funds to top researchers in data science to build on their current research and develop and grow activities.

Graduate School Travel Prize

- The prize supports postgraduate students at the University of Nottingham to attend national/international conference/meeting.

Conference/Meeting Travel Grants

- The prize supports researchers to attend national/international conference/meeting.

Kavli Student Fellow

- Salary is provided to Selected fellow of the Kavli Summer Program in Astrophysics.

Vice-Chancellor's Scholarship for Research Excellence (International)

- PhD living stipend and full tuition awarded to top international applicants. (£20,700+£12,000 annually)

ASROC Special Award for Oral Presentation

- Awarded to an excellent postgraduate student at the Annual Meeting of the Astronomical Society of the Republic of China (Taiwan).
- Presentation title: "*On the General Form of Mass-to-Light Ratio in Elliptical Galaxies*".

Seminars & Conference

Sep 2022	**What matter(s) around galaxies 2022**, Connecting the dots between the CGM and the larger-scale environment, Contributed	*Champoluc, Italy*
Jul 2022	**National Astronomy Meeting (NAM)**, Royal Astronomical Society, **Session Co-organisers**	*Warwick, UK*
Jun 2022	**European Astronomical Society (EAS) Annual Meeting**, EAS, Contributed	*Valencia, Spain*
May 2022	**National Chen Kong University, Physics Department**, **Invited Speaker**	*Tainan, Taiwan*
Mar 2022	**AI UK: UK's national showcase of artificial intelligence (AI) and data science research and collaboration**, The Alan Turing Institute, **Awardee Presentation**	*Virtual*
Dec 2021	**Australia National University**, Colloquium, **Invited Speaker**	*Virtual*
Oct 2021	**Debating The Potential of Machine Learning In Astronomical Surveys**, Institut Astrophysique de Paris (IAP), Contributed	*Virtual*
Oct 2021	**Artificial Intelligence for Science, Industry and Society (AISIS)**, National Autonomous University of Mexico (UNAM), **Invited Speaker**	*Virtual*
Jun 2021	**238th Meeting of the American Astronomical Society (AAS)**, AAS, **Invited Speaker**	*Virtual*
Feb 2021	**National Tsing Hua University, Institute of Astronomy**, **Invited Speaker**	*Hsinchu, Taiwan*
Jan 2021	**Durham University**, Lunch Talk	*Virtual*
Jan 2021	**Academia Sinica Institute of Astronomy and Astrophysics**, **Invited Speaker**	*Taipei, Taiwan*
Oct 2020	**University of California Santa Cruz**, Machine Learning club, **Invited Speaker**	*Virtual*
Jul 2020	**Kavil Summer Program Astrophysics Alumni Meeting**, University of California Santa Cruz, Contributed	*Virtual*
Nov 2019	**Dark Energy Survey Collaboration Meeting**, University of Sussex, Contributed	*Sussex, UK*
Oct 2019	**University College London**, Astroparticle Seminar, **Invited Speaker**	*London, UK*
Oct 2019	**University of Nottingham**, Lunch Talk	*Nottingham, UK*
Mar 2019	**University of Nottingham**, Lunch Talk	*Nottingham, UK*

Mar 2019	**Royal Astronomical Society (RAS) Specialist Discussion Meeting: Machine Learning and AI applied to Astronomy**, RAS, Contributed	*London, UK*
Nov 2018	**Royal Astronomical Society (RAS) Specialist Discussion Meeting: Dark Energy Survey: More than dark energy**, RAS, Contributed	*London, UK*
Sep 2018	**Machine Learning Applications for Astronomy**, University of Nottingham, Contributed	*Nottingham, UK*
Jun 2018	**Planning for Surprises in the era of Data-Driven Astronomy**, University of Oxford, Contributed	*Oxford, UK*
May 2018	**University of Nottingham,** Lunch Talk	*Nottingham, UK*
May 2016	**Annual meeting of the Astronomical Society in Taiwan**, ASROC, Contributed	*Tainan, Taiwan*
Jan 2016	**Annual meeting of the Astronomical Society in Taiwan**, ASROC, Poster	*Kaohsiung, Taiwan*
May 2015	**Annual meeting of the Astronomical Society in Taiwan**, ASROC, Poster	*Ilan, Taiwan*

Peer-reviewed journal referee ———————————————

Journal Name	*Impact factor*	*Number*
Monthly Notices of the Royal Astronomical Society (MNRAS)	5.287 (2020)	2 papers
Astronomy and Computing	1.927 (2020)	2 papers
The Astrophysical Journal (ApJ)	5.847 (2020)	1 papers
Astronomy and Astrophysics (A&A)	5.802 (2020)	1 papers

Academic Service & Leadership

Taiwanese Young Researcher Association (Tyra)
- Project Tyra provides a platform for Taiwanese young researchers in diverse research fields, including social science, natural science, arts, etc, to share their experience and communicate with each other.
- Member of IT supports
- Outreach talk (November 2021)

Project Tyra (Virtual)
2022 —

AstroIDEA EDI Members
- Organised and hosted a session of discussion on the topic of Imposter Syndrome.
- Created a poster of mental health awareness for the Physics department.
- Initiated and organised an annual one-day PhD career event.

Durham University
United Kingdom
2022 —

Lunch Talk Organiser
- Organising weekly lunch talk for the Centre for Astronomy and Particle Theory.

University of Nottingham
United Kingdom
Sep 2019 — Jul 2020

Student Union of the Physics department

- Committee position: Academic activity officer (2012-2013)
- Organised academia events for undergraduates:
  — Tour to the Institute of Physics, Academia Sinica
  — Physics lab introduction tour at NTNU
  — Interviewed professors for sharing their academic career path
- Edited scientific posts on the FB page of the SU of Physics

Orientation Events Organiser, Physics Department

- Organised a three-days camping activity for undergraduate orientation

Outreach Activities —————————————————————————

Outreach Talk:

- CUNY Baruch College Forum (June 2022, Virtual)

NTNU Physics Camp

- The summer and winter multiple-days Physics camps for year 15-18 students which we conveyed the concept of Physics through a variety of activities.
- Committee position: Outreach activity officer (2011-2012)

Extracurricular Activities —————————————————

Durham University Staff Volleyball Club

- Weekly casual volleyball play.

Durham City Table Tennis Club

- Weekly casual table tennis play.

UoN Aikido Club

- Attended the Student Nationals at York in March 2019, and won the 3rd place in Embu — Randori no Kata. The female team has won the 2nd place among universities in the Randori.
- Committee position: **Treasurer** for the year of 2019/20.

Actor

- Acted several side roles in a play called "Night of the Souls".

Working Holiday in Canada

- Went to Canada for working holiday while applying my PhD position in 2016—2017.
- Spent 1.5 months travelling around Canada through railway.

Actor

- Worked for the Apple Troupe as a part-time actor in two children plays.
- Our "Water Elf" play did a round trip at the primary schools in Kaohsiung City, Taiwan.
- We presented a play called "The Adventures of Spider" at a family-friendly activity held by the Taoyuan City Council, Taiwan.

Actor

- Acted the daughter in a Taiwanese musical entitled "Taiwan as a Young Man — Jiji".
- Our group was invited as visitor to a acting workshop at the TsingHua University in China. Acted the main character, Anna in a play entitled "The Late Christopher Bean".

The Art Centres, NTHU
Taiwan
Mar 2016 — Sep 2016

Audio Book Volunteer

- Recorded audio books for visually impaired people.

Foundation for the Blind
Taiwan
2015 — 2016

Female Volleyball Team Starter, Physics Department

- Our team has won the championship and the 2nd place at the Taiwan Universities Physics Cup in 2014 and 2015, respectively.

NTHU
Taiwan
2014 — 2015

Radio DJ

- Held an hour late-night weekly program.
- Held a 30-minutes Live dinner broadcast on every Wednesday.
- Organised a special interview with University Baseball team from both National Tsing Hua University and National Chiao Tung University for the sport competition — Mei-Chu Tournament between two universities.

Tsing Hua Broadcasting
NTHU, Taiwan
2014 — 2016

Amanuensis

- Aid hearing impaired students in taking note and minute during lectures.

Special Education Centre,
NTNU
Taiwan
2013 — 2014

Female Volleyball Team member, Physics Department

- Had become one of the starter for the team since 2011.
- Committee position: Vice president (2011); president (2012)

NTNU
Taiwan
2010 — 2014

Cheerleader Team member, Physics Department

- Attended the cheerleader competition for fresher at NTNU

NTNU
Taiwan
2010