

Chloe M. Cheng

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PRINCIPAL INTERESTS

Galaxy formation and evolution. I currently work on understanding the formation and assembly histories of massive quiescent galaxies using ultra-deep spectroscopy to measure elemental abundances and stellar population parameters.

EDUCATION

Doctorate

Expected Aug. 2026

[Leiden Observatory](#), Leiden University, Leiden, The Netherlands

- Supervisor: Professor [Mariska Kriek](#).
- Thesis: Unravelling the formation histories of distant quiescent galaxies using ultra-deep spectroscopy.
- Projects:
 - Age & metal gradients in massive quiescent galaxies at $0.6 \lesssim z \lesssim 1.0$ using LEGA-C, [10.1093/mnras/stae1739](#), [arXiv:2407.10974](#).
 - Ages and metallicities of quiescent galaxies: confronting broadband (UVJ) colours with stellar absorption lines, [10.1093/mnras/staf806](#), [arXiv:2505.08858](#).
 - Building up SUSPENSE: clues to the assembly of massive quiescent galaxies at $1.1 < z < 2.2$ from age and metal gradients. In prep.
 - Measuring the stellar initial mass function in massive early-type galaxies at $z \sim 0.7$ using JWST-IMFERN0. In prep.

Master of Science

Oct. 2022

[University of Waterloo](#), Department of Physics & Astronomy/Waterloo Centre for Astrophysics, Waterloo, Ontario, Canada

- Supervisor: Professor [Michael L. Balogh](#).
- Thesis: Testing the extremes of initial mass function variability using compact stellar systems (<http://hdl.handle.net/10012/18473>, [arXiv:2309.14415](#), [10.1093/mnras/stad2967](#), [arXiv:2309.14415](#)).
- Completed the Fundamentals of University Teaching Program, 2020 - 2021.
- Cum. GPA: 83.5% / 100%

Honours Bachelor of Science with Distinction

Jun. 2020

[University of Toronto](#), Faculty of Arts & Science, Trinity College, Toronto, Ontario, Canada

- Astronomy & Physics Specialist, Mathematics Minor
- Supervisor: Professor [Jo Bovy](#).
- Thesis: Testing the chemical homogeneity of chemically-tagged dissolved birth clusters ([10.1093/mnras/stab2106](#), [arXiv:2010.09721](#)).
- Cum. GPA: 3.24 / 4.0

OTHER RESEARCH EXPERIENCE

Research Assistant

May – Aug. 2019

GRIFFIN Collaboration, TRIUMF, Vancouver, BC, Canada

- Supervisor: Dr. Adam B. Garnsworthy
- Project: Probing shape coexistence in ^{192}Hg through combined electron and γ -ray spectroscopy (established spin-parity assignments for negative-parity band and 8^- state; measured mixing ratio for $8^- \rightarrow 7^-$ transition).

NSERC USRA/Institute of Medical Science Research Student May - Aug. 2018
Toronto Western Hospital/Krembil Research Institute, Toronto, ON, Canada

- Supervisor: Dr. Liang Zhang, Department of Fundamental Neurobiology
- *Project*: Verification of the mouse model for MRI-negative temporal lobe epilepsy (duties detailed below). *Leadership role*: taught, organized, supervised, and managed undergraduate students, Research Fellows, and Faculty members.

PUBLICATIONS *As First Author*

- **Cheng, C. M.**, et al. “Building up SUSPENSE: clues to the assembly of massive quiescent galaxies at $1.1 < z < 2.2$ from age and metal gradients”. In prep.
- **Cheng, C. M.**, Kriek, M., Beverage, A. G., Slob, M., Bezanson, R., Franx, M., Leja, J., Mancera Piña, P. E., Suess, K. A., van der Wel, A., van de Sande, J., van Dokkum, P. G. “Ages and metallicities of quiescent galaxies: confronting broadband (UVJ) colours with stellar absorption lines”. 2025, MNRAS, 540, 1527, doi: [10.1093/mnras/staf806](https://doi.org/10.1093/mnras/staf806). [arXiv:2505.08858](https://arxiv.org/abs/2505.08858).
- **Cheng, C. M.**, Kriek, M., Beverage, A. G., van der Wel, A., Bezanson, R., D'Eugenio, F., Franx, M., Mancera Piña, P. E., Nersesian, A., Slob, M., Suess, K. A., van Dokkum, P. G., Wu, P.-F., Gallazzi, A., & Zibetti, S. “Age and metal gradients in massive quiescent galaxies at $0.6 \lesssim z \lesssim 1.0$: implications for quenching and assembly histories”. 2024, MNRAS, 532, 3604, doi: [10.1093/mnras/stae1739](https://doi.org/10.1093/mnras/stae1739). [arXiv:2407.10974](https://arxiv.org/abs/2407.10974).
- **Cheng, C. M.**, Villaume, A., Balogh, M., Brodie, J. P., Martín-Navarro, I., Romanowsky, A. J., & van Dokkum P. G. “Initial mass function variability from the integrated light of diverse stellar systems”. 2023, MNRAS, 526, 4004, doi: [10.1093/mnras/stad2967](https://doi.org/10.1093/mnras/stad2967). [arXiv:2309.14415](https://arxiv.org/abs/2309.14415).
- **Cheng, C. M.**, Price-Jones, N., & Bovy, J. “Testing the chemical homogeneity of chemically tagged dissolved birth clusters”. 2021, MNRAS, 506, 5573, doi: [10.1093/mnras/stab2106](https://doi.org/10.1093/mnras/stab2106). [arXiv:2010.09721](https://arxiv.org/abs/2010.09721).

As Co-Author

- Slob, M., Kriek, M., de Graaff, A., **Cheng, C. M.**, et al. “Fast Rotators at Cosmic Noon: Stellar Kinematics for 15 Quiescent Galaxies from JWST-SUSPENSE”. 2025, A&A, submitted. [arXiv:2506.04310](https://arxiv.org/abs/2506.04310).
- Beverage, A. G., et al., **Cheng, C. M.** “Carbon and Iron Deficiencies in Quiescent Galaxies at $z = 1 - 3$ from JWST-SUSPENSE: Implications for the Formation Histories of Massive Galaxies”. 2024, ApJ, 979, 249, doi: [10.3847/1538-4357/ad96b6](https://doi.org/10.3847/1538-4357/ad96b6). [arXiv:2407.02556](https://arxiv.org/abs/2407.02556).
- Slob, M., et al., incl. **Cheng, C. M.** “The JWST-SUSPENSE Ultradeep Spectroscopic Program: Survey Overview and Star-Formation Histories of Quiescent Galaxies at $1 < z < 3$ ”. 2024, ApJ, 973, 131, doi: [10.3847/1538-4357/ad65ff](https://doi.org/10.3847/1538-4357/ad65ff). [arXiv:2404.12432](https://arxiv.org/abs/2404.12432).
- Romanowsky, A. J., et al., incl. **Cheng, C. M.** “Low-density star cluster formation: discovery of a young faint fuzzy on the outskirts of the low-mass spiral

galaxy NGC 247”. 2023, MNRAS, 518, 3164. doi: [10.1093/mnras/stac2898](https://doi.org/10.1093/mnras/stac2898). [arXiv:2210.03220](https://arxiv.org/abs/2210.03220).

Non-Astronomy

- Rocchini, M., et al., incl. **Cheng, C.** “First Evidence of Axial Shape Asymmetry and Configuration Coexistence in ^{74}Zn : Suggestion for a Northern Extension of the $N = 40$ Island of Inversion”. 2023, Phys. Rev. Lett., 130, 122502, doi: [10.1103/PhysRevLett.130.122502](https://doi.org/10.1103/PhysRevLett.130.122502). [arXiv:2302.07394](https://arxiv.org/abs/2302.07394).
- Liu, H., et al. incl. **Cheng, C.** “EEG features of spontaneous recurrent seizures in a mouse model of extended hippocampal kindling”. 2021, Clinph, 132(9), e2, doi: [10.1016/j.clinph.2021.03.028](https://doi.org/10.1016/j.clinph.2021.03.028).
- Liu, H., et al., **Cheng, C.** “Electrographic Features of Spontaneous Recurrent Seizures in a Mouse Model of Extended Hippocampal Kindling”. 2021, TexCom, 2(1), doi: [10.1093/textcom/tgab004](https://doi.org/10.1093/textcom/tgab004).
- MacLean, A. D., et al, incl. **Cheng, C.** “High-precision branching ratio measurement and spin assignment implications for ^{62}Ga superallowed β decay”. 2020, Phys Rev C, 102(5), doi: [10.1103/physrevc.102.054325](https://doi.org/10.1103/physrevc.102.054325). [arXiv:2011.03857](https://arxiv.org/abs/2011.03857).
- Liu, H., et al. incl. **Cheng, C.** “Impaired Spatial Learning and Memory in Middle-Aged Mice with Kindling-Induced Spontaneous Recurrent Seizures”. 2019, Front. Pharmacol., 10, 1077, doi: [10.3389/fphar.2019.01077](https://doi.org/10.3389/fphar.2019.01077).
- Song, H., et al. incl. **Cheng, C.** “Effects of Antiepileptic Drugs on Spontaneous Recurrent Seizures in a Novel Model of Extended Hippocampal Kindling in Mice”. 2018, Front. Pharmacol., 9, 451, doi: [10.3389/fphar.2018.00451](https://doi.org/10.3389/fphar.2018.00451).

CONFERENCE *Invited Talks*

- CONTRIBUTIONS**
- *York University Lunch Talk*. “New clues to assembly history: Exploring age and metallicity gradients in quiescent galaxies over cosmic time with LEGA-C and JWST”. 18 Sept. 2024; York University, Toronto, Ontario, Canada.
 - *TASTY Lunch Talk*. “New clues to assembly history: Exploring age and metallicity gradients in quiescent galaxies over cosmic time with LEGA-C and JWST”. 17 Sept. 2024; University of Toronto, Toronto, Ontario, Canada.
 - *APOGEE Monthly Teleconference*. “Testing the chemical homogeneity of chemically-tagged dissolved birth clusters”. 10 Nov. 2020.

Contributed Talks

- *Cosmic Chemical Enrichment: A tale of stars and galaxies*. Symposium at the European Astronomical Society (EAS) Annual Meeting 2025. “Quiescent Galaxy Evolution: Age/Metal Gradients and the IMF at $0.6 < z < 3.0$ ”. 23-27 June, 2025; Cork, Ireland.
- *Dancing in the Dark: When Galaxies Shape Galaxies*. “New clues to merger histories: age and metal gradients and the initial mass function in massive quiescent galaxies at $0.6 < z < 3.0$ ”. 16-20 June, 2025; Sexten, Italy.
- *Massive Galaxies Across the Universe*. “Decoding Massive Quiescent Galaxy Evolution: Age and Elemental Abundance Gradients and the Initial Mass Function at $0.6 < z < 3.0$ ”. 9-13 June, 2025; Naples, Italy.
- *RUBIES and Friends Meeting*. “Building up SUSPENSE: Clues to the assembly of massive quiescent galaxies at $0.6 < z < 2.2$ from age and metal gradients”. 5-9 May, 2025; Bergen, The Netherlands.

- *Lorentz Workshop: Big Galaxies, Big Problems*. “Ages and metallicities of quiescent galaxies: confronting broadband (UVJ) colours with stellar absorption lines”. 28 Apr. - 2 May 2025; Leiden, The Netherlands.
- *Observing and Simulating Galaxy Evolution in the Era of JWST*. “New clues to assembly history: Exploring age and metallicity gradients in quiescent galaxies over cosmic time with LEGA-C and JWST”. 21 Aug. 2024; Ascona, Switzerland.
- *NOVA NW1 Autumn 2023 Meeting*. “Age and metal gradients in quiescent galaxies over cosmic time with LEGA-C and JWST”. 23 Nov. 2023; Leiden, The Netherlands.
- *A Life Devoted to Stellar Populations*. “Age and metal gradients in quiescent galaxies over cosmic time with LEGA-C and JWST”. 5 Oct. 2023; Puerto de la Cruz, Tenerife, Canary Islands, Spain.
- *SDSS 2020 Collaboration Meeting Lightning Talks*. “Testing the chemical homogeneity of open clusters”. 23 Jun. 2020.
- *TRIUMF Summer Undergraduate Student Symposium*. “Examining internal conversion electrons in ^{192}Hg ”. 15 Aug. 2019; TRIUMF, Vancouver, BC, Canada.

Posters

- “Age and metal gradients in massive quiescent galaxies at $0.6 \lesssim z \lesssim 1.0$: implications for quenching and assembly histories”. Presented at: *NAC 2024*; 13-15 May 2024, Egmond aan Zee, The Netherlands.
- “Initial mass function variability from the integrated light of diverse stellar systems”. Presented at: *A Life Devoted to Stellar Populations*; Oct. 2023, Tenerife, Canary Islands.
- “Resolving the formation histories of $0.6 < z < 2.5$ galaxies with LEGA-C and JWST”. Presented at: *IAU Symposium 377: Early Disk-Galaxy Formation from JWST to the Milky Way*; Feb. 2023; Kuala Lumpur, Malaysia.
- “Testing the extremes of initial mass function variability using compact stellar systems”. Presented at: *CASCA 2022 AGM*; May 2022; Waterloo, Canada.
- “Probing shape coexistence in ^{192}Hg through combined electron and γ -ray spectroscopy”. Presented at:
 - *The Canadian Conference for Undergraduate Women in Physics 2020*; 19 Jan. 2020; University of Toronto, Toronto, Canada.
 - *The Department of Physics Undergraduate Research Fair 2019*; 26 Sept. 2019; University of Toronto, Toronto, Canada.
 - *The TRIUMF Users’ Group AGM Student Poster Slam and Oral Presentation Competition*; 22 Aug. 2019; TRIUMF, Vancouver, Canada.
- “Verification of the mouse model for MRI-negative temporal lobe epilepsy”. Presented at: *50th Annual Institute of Medical Science Summer Undergraduate Research Day*; 15 Aug. 2018; Toronto, Canada.

AWARDS AND ACHIEVEMENTS

- *Leids Kerkhoven-Bosscha Fonds (LKBF) Grant* (300EUR), subsidy number 25.1.100, May 2025 - Oct. 2025.
- *IAU Grant* (450EUR) for Symposium 396: Massive Galaxies Across the Universe, Naples, Italy, June 9-13, 2025.

- *2024 Student Paper Prize* (500CAD), Waterloo Centre for Astrophysics (WCA), University of Waterloo, Dec. 2024.
- *LKBF Grant* (600EUR), subsidy number 24.1.017, May 2024 - Oct. 2024.
- *LKBF Grant* (400EUR), subsidy number 23.2.009, Nov. 2023 - Apr. 2024.
- *IAU Grant* (320EUR) for Symposium 377: Early Disc-Galaxy Formation from JWST to the Milky Way, Kuala Lumpur, Malaysia, Feb. 6-10, 2023.
- *Science Graduate Award* (8332CAD), University of Waterloo, 2020-2022.
- *Marie Curie Graduate Award* (4100CAD), University of Waterloo, 2020-2022.
- *2nd Place*, Department of Physics Undergraduate Research Fair for poster “Probing shape coexistence in ^{192}Hg through combined electron and γ -ray spectroscopy”, University of Toronto, Sept. 2019.
- *Undergraduate Student Research Award (USRA)* (5625CAD), Natural Sciences and Engineering Research Council (NSERC), University of Toronto/Toronto Western Hospital/Krembil Research Institute, May-Aug. 2018.
- *President’s Entrance Scholarship* (2000CAD), University of Toronto, Sept. 2016.

OBSERVING PROPOSALS

- I am a Co-PI on a Cycle 3 JWST program ([GO-5629](#): “Extremely deep spectroscopy of quiescent galaxies at $z \sim 0.7$: A direct measurement of the stellar initial mass function beyond the low-redshift universe”. PI: Mariska Kriek, Co-PIs: Aliza Beverage and Chloe Cheng. 40.24 hours on NIRSpec/MSA).
- I am a Co-I on a Cycle 4 JWST program ([GO-8317](#): “The Return of the Giants: Constraining the TP-AGB Phase across Cosmic Time”. PI: Mariska Kriek. 7.6 hours on NIRSpec/PRISM).
- I have submitted one JWST observing proposal as PI.
- I have submitted two JWST observing proposals as a Co-PI.
- I have participated as a Co-Investigator on observing proposals for JWST (6), HST (2), ALMA (5), and Magellan (1).

TECHNICAL SKILLS

Languages

Python • Bash shell • \LaTeX • C++ • MATLAB • Fortran • R

Tools

alf • PyeIt • GALFIT • SourceExtractor • EAZY • FSPS • Bagpipes • apogee • astropy • SLURM

Techniques

spectroscopy • stellar population synthesis • full spectrum fitting • photometry • SED fitting • data reduction • Bayesian statistics • forward modeling

TEACHING

Student Supervision

- Andreea Suta (joint w/ Mariska Kriek), 1st-year Master’s Research Project, “Cosmic relics tracing the evolution of low-metallicity quiescent galaxies from high to low redshift”. Leiden Observatory, Oct. 2024 - Jul. 2025.
- Ying Wang (joint w/ Mariska Kriek), 2nd-year Master’s Research Thesis, “Low-metallicity quiescent galaxies in the low-redshift Universe”. Leiden Observatory, Oct. 2023 - Jun. 2024.

Teaching Assistant

- Galaxies & Cosmology, Leiden University, Feb. - Jun. 2025.

- Galaxies & Cosmology, Leiden University, Feb. - Jul. 2024.
- Galaxies & Cosmology, Leiden University, Feb. - Jun. 2023.
- Stars (PHYS 375), University of Waterloo, Jan. - Apr. 2022.
- Electricity & Magnetism 2 (PHYS 342), University of Waterloo, Sept. - Dec. 2021.
- Physics 2 Laboratory (PHYS 112L), University of Waterloo, Jan. - Apr. 2021.
- Mechanics (PHYS 121), University of Waterloo, Sept. - Dec. 2020.

LEADERSHIP AND EXTRA- CURRICULAR

Committees

- Member, Social Committee, Leiden Observatory, Apr. 2023 - Present.
- Member, Borrel Committee, Leiden Observatory, Sept. 2023 - Sept. 2024.
- Member, Equity, Diversity, & Inclusion Committee, Leiden Observatory, Sept. 2022 - Apr. 2024.
- Social Media Coordinator and Representative, Graduate Student Committee, Canadian Astronomical Society (CASCA), Sept. 2021 - Aug. 2022.

Extra-Curricular Activities

- Test knitter for designers Woolbird Knits, The Knit Purl Girl, Kutovakika, and Maiden Knitwear.
- Member, Phski Comittee, Leiden Observatory, Aug. 2023 - Jan. 2024.
- Player, Rotterdam Ravens Quidditch Team, Rotterdam, Sept. 2022 - Aug. 2023.
- Player, University of Toronto Centaurs Quidditch Team, University of Toronto, Sept. 2017 - Apr. 2022. Co-Captain & Vice President, Sept. 2019 - Apr. 2020. Treasurer, Sept. 2018 - Aug. 2021.
- Voice Experience, Sept. 2010 - Apr. 2022. National Association of Teachers of Singing (NATS) Ontario Chapter Auditions 3rd Place (Nov. 2021). NATS Ontario Chapter Auditions 2nd Place (Nov. 2019).

VOLUNTEER EXPERIENCE

Seeing Stars Leiden

Sept. 25, 2023

Leiden, The Netherlands

- Supervised observing station for the public.

Canadian Conference for Undergraduate Women in Physics

Jan. 19, 2020

University of Toronto, Toronto, ON, Canada

- Directed conference attendees and speakers to workshops, talks, and activities. Arranged refreshments and gifts. Led small-group lab tours.

Zhang Lab

May - Aug. 2017

Toronto Western Hospital/Krembil Research Institute, Toronto, ON, Canada

- Kindled seizures in mice. Sectioned brain tissue and prepared slides. Performed cell counting. Soldered electrodes. Analyzed EEG recordings of seizures with MATLAB.

LANGUAGES

English (native), French (conversational), Dutch (basic, A2)