Douglas Rennehan, PhD

Affiliation	Center for Computational Astrophysics, Flatiron Institute
Address	162 5th Avenue, New York, NY, USA 10010
Email	drennehan@flatironinstitute.org
Website	https://doug.science

EDUCATION

PhD in Physics (Concentration in Astronomy), *University of Victoria* May, 2022
Dissertation title: "Simulating the Universe: The evolution of massive galaxies"

Bachelor of Science (Physics Honours), *University of Victoria* May, 2015
Dissertation title: "Metallicity as a Tracer for Mixing"

PUBLICATIONS

S. Koudmani, **D. Rennehan**, R. S. Somerville, C. C. Hayward, D. Anglés-Alcázar, M. E. Orr, I. S. Sands, S. Wellons. 2024.
Diverse dark matter profiles in FIRE dwarfs: black holes, cosmic rays and the cusp-core enigma.
arXiv preprint arXiv:2409.02172.

G. Gozaliasl, A. Finoguenov, A. Babul, O. Ilbert, M. Sargent, E. Vardoulaki, A. L. Faisst, Z. Liu, M. Shuntov, O. Cooper, K. Dolag, S. Toft, G. E. Magdis, G. Toni, B. Mobasher, R. Barré, W. Cui, **D. Rennehan**. 2024.
COSMOS Brightest Group Galaxies--III: Evolution of stellar ages.
arXiv preprint arXiv:2408.02577.

P. Araya-Araya, R. K. Cochrane, C. C. Hayward, R. M. Yates, L. Sodré Jr., M. C. Vicentin, **D. Rennehan**, R. Overzier, M. van Daalen. 2024.
Modelling the multi-wavelength detection of protoclusters. I: An excess of submillimetre galaxies in protocluster cores.
arXiv preprint arXiv:2408.00062.

U. P. Steinwandel, **D. Rennehan**, M. E. Orr, D. B. Fielding, C. Kim. 2024.
Pumping Iron: How turbulent metal diffusion impacts multiphase galactic outflows.
arXiv preprint arXiv:2407.14599.

F. J. Jennings, A. Babul, R. Dave, W. Cui, **D. Rennehan**. 2024.
Hyenas: X-ray Bubbles and Cavities in the Intra-Group Medium.
arXiv preprint arXiv:2407.14415.

K. E. Heintz, J. S. Bennett, P. A. Oesch, A. Sneppen, **D. Rennehan**, …, A. Covelo-Paz. 2024.
A massive, neutral gas reservoir permeating a galaxy proto-cluster after the reionization era.
arXiv preprint arXiv:2407.06287.

G. C. P. Wang, S. C. Chapman, N. Sulzenauer, F. Bertoldi, C. C. Hayward, R. Hill, S. Kikuta, Y. Matsuda, **D. Rennehan**, D. Scott, I. Smail, C. C. Steidel. 2024.

A 100 Mpc^2 structure traced by hyperluminous galaxies around a massive = 2.85 protocluster.
arXiv preprint arXiv:2406.16637.

D. Rennehan. 2024.
The Manhattan Suite: Accelerated galaxy evolution in the early Universe.
arXiv preprint arXiv:2406.06672.

R. T. Hough, Z. Shao, W. Cui, S. I. Loubser, A. Babul, R. Davé, **D. Rennehan**, C. Kobayashi. 2024.
Simba-C: the evolution of the thermal and chemical properties in the intragroup medium.
arXiv preprint arXiv:2406.04761.

O. K. Leste, J. P. Willis, R. E. A. Canning, **D. Rennehan**. 2024.
A morphological analysis of the galaxy cluster XLSSC 122 at z = 1.98.
MNRAS, 533, 3, pp. 2927-2947.

D. Rennehan, A. Babul, B. Moa, R. Davé. 2024.
The obsidian model: three regimes of black hole feedback.
MNRAS, 532, 4, pp. 4793-4809.

A. R. Arendt, Y. C. Perrott, A. Contreras-Santos, D. de Andres, W. Cui, **D. Rennehan**. 2024.
Identifying galaxy cluster mergers with deep neural networks using idealized Compton-y and X-ray maps.
MNRAS, 530, 1, pp. 20-34.

J. Szpila, R. Davé, **D. Rennehan**, W. Cui, R. Hough. 2024.
The Nature and Evolution of Early Massive Quenched Galaxies in the Simba-C Simulation.
arXiv preprint arXiv:2402.08729.

D. de Andres, W. Cui, G. Yepes, M. De Petris, A. Ferragamo, F. De Luca, G. Aversano, **D. Rennehan**. 2023.
The three hundred project: mapping the matter distribution in galaxy clusters via deep learning from multiview simulated observations.
MNRAS, 528, 2, pp. 1517-1530.

S. Chapman, …, **D. Rennehan**, …, A. Weiss. 2023
Brightest cluster galaxy formation in the z= 4.3 protocluster SPT 2349-56: discovery of a radio-loud active galactic nucleus.
ApJ, 961, 1, pp 120.

V. Saeedzadeh, S. L. Jung, **D. Rennehan**, A. Babul, M. Tremmel, T. R. Quinn, Z. Shao, P. Sharma, L. Mayer, E. O'Sullivan, S. I. Loubser. 2023.
Cool and gusty, with a chance of rain: dynamics of multiphase CGM around massive galaxies in the Romulus simulations.
MNRAS, 525, 4, pp. 5677-5701.

R. Hough, **D. Rennehan**, C. Kobayashi, S. I. Loubser, R. Davé, A. Babul, W. Cui. 2023.
SIMBA-C: an updated chemical enrichment model for galactic chemical evolution in the SIMBA simulation.
MNRAS, 525, 1, pp. 1061-1076.

A. Trudeau, J. Willis, **D. Rennehan**, R. Canning, E. Noordeh, A. Carnall. 2022.
The XXL Survey: Revealing the star formation history of a mature galaxy cluster at z = 2.
MNRAS, 515, 2, pp. 2529-2547.

S. L. Jung, **D. Rennehan**, V. Saeedzadeh, A. Babul, M. Tremmel, T. R. Quinn, S. I. Loubser, E. O'Sullivan, S. K. Yi. 2022.
Massive central galaxies of galaxy groups in the Romulus simulations: an overview of galaxy properties at z = 0.
MNRAS, 515, 1, pp. 22-47.

R. Hill, …, **D. Rennehan**, …, A. Weiss. 2022.
Rapid build-up of the stellar content in the protocluster core SPT2349−56 at z = 4.3.
MNRAS, 512, 3, pp. 4352-4377.

D. Rennehan. 2021.
Mixing matters.
MNRAS, 506, 2, pp. 2836–2852.

S. Lim, D. Scott, A. Babul, D. Barnes, S. Kay, I. McCarthy, **D. Rennehan**, M. Vogelsberger. 2020.
Is there enough star formation in simulated protoclusters?
MNRAS, 501, 2, pp. 1803–1822.

D. Rennehan, A. Babul, C. C. Hayward, C. Bottrell, M. H. Hani, S. C. Chapman. 2020.
Rapid coeval star formation and assembly of the most massive galaxies in the universe.
MNRAS, 493, pp. 4607-4621.

D. Rennehan, A. Babul, P. F. Hopkins, R. Davé, B. Moa. 2019.
Dynamic Localised Turbulent Diffusion and its Impact on the Galactic Ecosystem.
MNRAS, 483, pp. 3810-3831.

T. B. Miller, …, **D. Rennehan**, …, A. L. Strom. 2018.
A massive core for a cluster of galaxies at a redshift of 4.3.
Nature, 556, pp. 469-472.

A. Zehtabi-Oskuie, H. Jiang, B.R. Cyr, **D.W. Rennehan**, A.A. Al-Balushi and R. Gordon, 2013.
Double nanohole optical trapping: dynamics and protein-antibody co-trapping.
Lab on a Chip, 13(13), pp. 2563-2568.

AWARDS AND HONORS

NSERC CGS-D (Alexander Graham Bell Canada Graduate Scholarship) 2019 - 2022
Highly competitive national award for Canadian PhD students.

The R. M. Pearce Memorial Fellowship 2018
Competitive academic institutional scholarship for graduate students.

M.A. & D.E. Breckenridge Graduate Awards 2017
Competitive academic institutional scholarship for graduate students.

Melva J. Hanson Graduate Scholarship 2017
Competitive academic institutional scholarship for graduate students.

University of Victoria Graduate Fellowship 2015 – 2016
Competitive academic institutional funding award for graduate students.

University of Victoria Outstanding Graduate Entrance Award 2015
Competitive academic entrance monetary award.

Jamie Cassels Undergraduate Research Award 2014
Competitive funding award for undergraduate honors research.

NSERC Undergraduate Student Research Award 2012, 2014-15
Competitive institutional funding awards for a semester of undergraduate research, received on 3 separate occasions.

CONFERENCE PRESENTATIONS

Contributed talk: *Accelerated galaxy evolution in the early Universe* 2024
First structures, Paris.

Contributed talk: *Three regimes of black hole feedback* 2024
Building galaxies from scratch, Vienna.

Contributed talk: *Accelerated galaxy evolution in the early Universe* 2024
Extreme galaxies in extreme environments, Reykjavik.

Contributed talk: *Accelerated galaxy evolution in the early Universe* 2024
RAMSES user meeting, New York.

Invited talk: *Cluster evolution in the early Universe* 2023
Galaxy cluster seminar series, Harvard CfA.

Invited talk: *Rapid evolution of the most massive galaxies in the Universe.* 2022
Galaxy group meeting, Harvard CfA.

Invited talk: *Rapid evolution of the most massive galaxies in the Universe.* 2021
CIERA galaxy group meeting, Northwestern University.

Contributed talk: *Rapid assembly of the most massive galaxies in the universe*. 2021
Galaxy Cluster Formation II, held virtually. Contributed talk.

Contributed talk: *Rapid formation of the most massive galaxies in the universe*. 2021
Royal Astronomical Society, held virtually.

Contributed talk: *Rapid assembly of the most massive galaxies in the universe.* 2019
Canadian Astronomical Society: "Annual General Meeting" in Montreal, Canada. Oral presentation.

Invited talk: *Turbulent Diffusion and Gas Metallicity*. 2016
Banff International Research Station for Mathematical Innovation and Discovery: "Computing the Universe: At the Intersection of Computer Science and Cosmology" conference in Oaxaca, Mexico. Oral presentation.

COMMITTEES

Black holes on broadway conference, *Local & scientific organizing committee* 2023
Co-created and co-organized the successful "Black holes on broadway" conference at the Center for Computational Astrophysics at the Flatiron Institute in New York City. The conference had 100+ applicants.

Physics & Astronomy Graduate Student Association, *Academic Representative* 2018 - 2020
Organized various workshops at the University of Victoria relating to professional development. Acted as head of the "Software Plumbing" sub-committee, dedicated to increasing the software engineering capabilities of incoming graduate students.

Astronomy Research Centre Sub-Committee, *Graduate Student Representative* 2018 - 2019
Represented graduate students on the ARC (Astronomy Research Centre) Computing Resources Sub-Committee. The committee investigated the future outlook of computing resources for University of Victoria (and associated) researchers.

Physics & Astronomy Chair Search Committee, *Graduate Student Representative* 2018
Represented undergraduate and graduate students on the committee tasked to replace the Chair of the Physics & Astronomy department at the University of Victoria.

CASCA Graduate Student Committee, *Vice-chair* 2017 – 2019
Duties include, but not limited to, organizing the astronomy graduate student committee annual general meeting, inviting relevant speakers, and planning workshops.