Zehao Jin 金泽灏

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Education

2020 – Present   🔖 **Ph.D. in Physics, New York University Abu Dhabi**
Advisor: Prof. Andrea Valerio Macciò & Prof. Joseph Gelfand

2015 – 2019   🔖 **B.S. in Physics, University of Illinois Urbana Champaign**
Advisor: Prof. Gilbert Holder
Physics major, Astronomy and Mathematics minor

Research Interests

Astrophysics, Machine Learning, and *Causality*

Galaxy, Black hole, Cosmological simulation, Observation, Transients

Causal discovery, Symbolic Regression, Anomaly detection, Reinforcement Learning, Neural Networks

Publications

1   🔗 **Beyond Causal Discovery for Astronomy: Learning Meaningful Representations with Independent Component Analysis**

Z Jin, M Pasquato, BL Davis, AV Macciò, Y Hezaveh

NeurIPS 2024, Causal Representation Learning Workshop

2   🔗 **Evaluating Sparse Galaxy Simulations via Out-of-Distribution Detection and Amortized Bayesian Model Comparison**

L Zhou, ST Radev, WH Oliver, A Obreja, **Z Jin**, T Buck

NeurIPS 2024 , Machine Learning and the Physical Sciences Workshop

3   🔗 **A Data-driven Discovery of the Causal Connection between Galaxy and Black Hole Evolution**

Z Jin, M Pasquato, BL Davis, T Deleu, Y Luo, C Cho, P Lemos, L Perreault-Levasseur, Y Bengio, X Kang, AV Macciò, Y Hezaveh

Submitted to The Astrophysical Journal

4   🔗 **HELLO project: high-z evolution of large and luminous objects**

S Waterval, AV Macciò, T Buck, A Obreja, C Cho, **Z Jin**, BL Davis, KL Dixon, X Kang

Monthly Notices of the Royal Astronomical Society

5   🔗 **Identification of Intermediate-mass Black Hole Candidates among a Sample of Sd Galaxies**

BL Davis, AW Graham, R Soria, **Z Jin**, ID Karachentsev, VE Karachentseva, E D'Onghia

The Astrophysical Journal

6 🔗 **Quantitatively rating galaxy simulations against real observations with anomaly detection**

Z Jin, AV Macciò, N Faucher, M Pasquato, T Buck, KL Dixon, N Arora, M Blank, P Vulanovic

Monthly Notices of the Royal Astronomical Society

7 🔗 **Causa prima: cosmology meets causal discovery for the first time**

M Pasquato, **Z Jin**, P Lemos, BL Davis, AV Macciò

NeurIPS 2023 , Machine Learning and the Physical Sciences Workshop

8 🔗 **Discovering Black Hole Mass Scaling Relations with Symbolic Regression**

Z Jin, BL Davis

NeurIPS 2023 , Machine Learning and the Physical Sciences Workshop

9 🔗 **Discovery of a Planar Black Hole Mass Scaling Relation for Spiral Galaxies**

BL Davis, **Z Jin**

The Astrophysical Journal Letters

10 🔗 **Learning Principle of Least Action with Reinforcement Learning**

Z Jin, JYY Lin, SF Li

AAAI 2021 , Machine Learning and the Physical Sciences Workshop

Conferences, Workshops, and Talks

Feb-Mar 2024   🔖 **Ciela Institute, Université de Montréal**

Montréal, Canada –Visiting Student

Dec 2023   🔖 **NeurIPS 2023, Machine Learning and the Physical Sciences Workshop**

New Orleans, USA –Poster presentation

Oct 2023   🔖 **ASTROINFORMATICS 2023, INAF NATIONAL AUDITORIUM Observatory of Capodimonte**

Naples, Italy – 🔗 Contributed talk

Aug 2023   🔖 **CZS Summer School, Interdisciplinary Center for Scientific Computing (IWR) Heidelberg**

Heidelberg, Germany –Poster presentation

May 2023   🔖 **Cosmic Connections Symposium, Flatiron Institute**

New York, USA –Poster presentation

Conferences, Workshops, and Talks (continued)

Jan 2023   🔖 **Timescales in Astrophysics, New York University Abu Dhabi**
Abu Dhabi, UAE –LOC

Jun 2021   🔖 **UAE Graduate Student Research Conference (GSRC) 2021**
Remote –Contributed talk

Mar 2021   🔖 **AAAI 2021 Spring Symposium on Combining Artificial Intelligence and Machine Learning with Physics Sciences**
Remote –Contributed talk

References

Prof. Andrea Valerio Macciò   🔖   ✉ maccio@nyu.edu
New York University Abu Dhabi, Center for Astrophysics and Space Science (CASS)
Max-Planck-Institut für Astronomie
PhD advisor

Dr. Mario Pasquato   🔖   ✉ mario.pasquato@gmail.com
Ciela Institute, Montréal, Canada
Mila - Quebec Artificial Intelligence Institute
Département de Physique, Université de Montréal
Dipartimento di Fisica e Astronomia, Università di Padova
Istituto di Astrofisica Spaziale e Fisica Cosmica (INAF IASF-MI)
Close collaborator

Dr. Benjamin Lee Davis   🔖   ✉ ben.davis@nyu.edu
New York University Abu Dhabi
Close collaborator, colleague at NYUAD