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1. [arXiv:2410.01721](#) [pdf, other] [astro-ph.GA](#) [doi](#) [10.1051/0004-6361/202450500](#)

## Multiple-scale gas infall through gravity torques on Milky Way twins

Authors: [Patrícia da Silva](#), [F. Combes](#)

**Abstract:** One of the main problems raised by the feeding of supermassive black holes (SMBHs) at the centres of galaxies is the huge angular momentum of the circumnuclear gas and of the gas reservoir in the galaxy disk. Because viscous torques are not efficient at kiloparsec or 100 pc scales, the angular momentum must be exchanged through gravity torques that arise from the non-axisymmetric patterns in the d... [▽ More](#)

Submitted 2 October, 2024; originally announced October 2024.

Comments: 19 pages, 25 figures, 4 tables

2. [arXiv:2410.01636](#) [pdf, other] [astro-ph.SR](#) [astro-ph.GA](#)

## JWST Observations of Young protoStars (JOYS). Overview of gaseous molecular emission and absorption in low-mass protostars

Authors: [M. L. van Gelder](#), [L. Francis](#), [E. F. van Dishoeck](#), [Ł. Tychoniec](#), [T. P. Ray](#), [H. Beuther](#), [A. Caratti o Garatti](#), [Y. Chen](#), [R. Devaraj](#), [C. Gieser](#), [K. Justtanont](#), [P. J. Kavanagh](#), [P. Nazari](#), [S. Reyes](#), [W. R. M. Rocha](#), [K. Slavicinska](#), [M. Güdel](#), [Th. Henning](#), [P. -O. Lagage](#), [G. Wright](#)

**Abstract:** The MIRI-MRS instrument onboard JWST allows for probing the molecular gas composition at mid-IR wavelengths at unprecedented resolution and sensitivity. It is important to study these features in low-mass embedded protostellar systems since the formation of planets is thought to start in this phase. We present JWST/MIRI-MRS data of 18 low-mass protostellar systems in the JOYS program, focusing on... [▽ More](#)

Submitted 2 October, 2024; originally announced October 2024.

Comments: 25 pages, 11 figures, accepted for publication in A&A

3. [arXiv:2410.01625](#) [pdf, other] [astro-ph.EP](#)

## A Fourth Planet in the Kepler-51 System Revealed by Transit Timing Variations

**Authors:** [Kento Masuda](#), [Jessica E. Libby-Roberts](#), [John H. Livingston](#), [Kevin B. Stevenson](#), [Peter Gao](#), [Shreyas Vissapragada](#), [Guangwei Fu](#), [Te Han](#), [Michael Greklek-McKeon](#), [Suvrath Mahadevan](#), [Eric Agol](#), [Aaron Bello-Arufe](#), [Zachory Berta-Thompson](#), [Caleb I. Canas](#), [Yayaati Chachan](#), [Leslie Hebb](#), [Renyu Hu](#), [Yui Kawashima](#), [Heather A. Knutson](#), [Caroline V. Morley](#), [Catriona A. Murray](#), [Kazumasa Ohno](#), [Armen Tokadjian](#), [Xi Zhang](#), [Luis Welbanks](#), et al. (27 additional authors not shown)

**Abstract:** Kepler-51 is a  $\lesssim 1$  Gyr-old Sun-like star hosting three transiting planets with radii  $\approx 6-9 R_{\oplus}$  and orbital periods  $\approx 45-130$  days. Transit timing variations (TTVs) measured with past Kepler and Hubble Space Telescope (HST) observations have been successfully modeled by considering gravitational interactions between the three transiting planets,... [▽ More](#)

**Submitted** 2 October, 2024; **originally announced** October 2024.

**Comments:** 48 pages, 26 figures, submitted to AJ (in revision)

4. [arXiv:2410.01621](#) [pdf, other] [astro-ph.SR](#) [astro-ph.EP](#) [doi](#) [10.3847/1538-4357/ad8132](#)

## Magnetized winds of M-type stars and star-planet magnetic interactions: uncertainties and modeling strategy

**Authors:** [Victor Réville](#), [Jamie M. Jasinski](#), [Marco Velli](#), [Antoine Strugarek](#), [Allan Sacha Brun](#), [Neil Murphy](#), [Leonardo H. Regoli](#), [Alexis Rouillard](#), [Jacobo Varela](#)

**Abstract:** M-type stars are the most common stars in the universe. They are ideal hosts for the search of exoplanets in the habitable zone (HZ), as their small size and low temperature make the HZ much closer in than their solar twins. Harboring very deep convective layers, they also usually exhibit very intense magnetic fields. Understanding their environment, in particular their coronal and wind properties... [▽ More](#)

**Submitted** 2 October, 2024; **originally announced** October 2024.

**Comments:** 15 pages, 9 figures, accepted for publication in ApJ

5. [arXiv:2410.01559](#) [pdf, other] [astro-ph.EP](#) [astro-ph.HE](#) [astro-ph.IM](#)

## Generating X-ray transit profiles with batman

**Authors:** [George W. King](#), [Lía R. Corrales](#), [Peter J. Wheatley](#), [Raven C. Cilley](#), [Mark Hollands](#)

**Abstract:** We present an adaptation of the exoplanet transit model code batman, in order to permit the generation of X-ray transits. Our underlying extended coronal model assumes an isothermal plasma that is radially symmetric. While this ignores the effect of bright, active regions, observations of transits in X-rays will require averaging across multiple epochs of data for the foreseeable future, significa... [▽ More](#)

**Submitted** 2 October, 2024; **originally announced** October 2024.

**Comments:** 16 pages, 8 figures, 2 tables. Accepted for publication in the Astronomical Journal. Code available at <https://github.com/georgewking/batmanX-rays>

6. [arXiv:2410.01513](#) [pdf, other] [astro-ph.GA](#) [astro-ph.SR](#) [gr-qc](#)

## An eccentric transit timing test of modified gravity

**Authors:** [Benjamin Monreal](#), [Xavier Moskala](#), [Sofia Splawska](#)

**Abstract:** The MOND modified gravity paradigm, best known for its agreement with galactic rotation curve data, is difficult to devise laboratory tests for. MOND's predictions differ substantially from Newtonian gravity only in the case of very small accelerations ( $a < a_0 = 1.2 \times 10^{-10} \text{ m/s}^2 = 3.8 \text{ mm/s/y}$ ). In the solar system, radio and laser measurements of test bodies do permit ac... [▽ More](#)

Submitted 2 October, 2024; originally announced October 2024.

Comments: 11 pages, 3 figures

7. [arXiv:2410.01437](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## AGN -- host galaxy photometric decomposition using a fast, accurate and precise deep learning approach

**Authors:** [Berta Margalef-Bentabol](#), [Lingyu Wang](#), [Antonio La Marca](#), [Vicente Rodriguez-Gomez](#)

**Abstract:** Identification of active galactic nuclei (AGNs) is extremely important for understanding galaxy evolution and its connection with the formation and evolution of supermassive black holes (SMBH). With the advent of deep and high angular resolution imaging surveys such as those conducted with the [James Webb Space Telescope \(JWST\)](#), it is now possible to identify galaxies with a central point sou... [▽ More](#)

Submitted 2 October, 2024; originally announced October 2024.

8. [arXiv:2410.01418](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#)

## Volatile composition of the HD 169142 disk and its embedded planet

**Authors:** [Luke Keyte](#), [Mihkel Kama](#), [Alice S. Booth](#), [Charles J. Law](#), [Margot Leemker](#)

**Abstract:** The composition of a planet's atmosphere is intricately linked to the chemical makeup of the protoplanetary disk in which it formed. Determining the elemental abundances from key volatiles within disks is therefore essential for establishing connections between the composition of disks and planets. The disk around the Herbig Ae star HD 169142 is a compelling target for such a study due to its mole... [▽ More](#)

Submitted 2 October, 2024; originally announced October 2024.

Comments: Accepted for publication in MNRAS

9. [arXiv:2410.01373](#) [[pdf](#)] [astro-ph.GA](#)

## Proposed importance of HOCO chemistry: Inefficient formation of CO<sub>2</sub> from CO and OH reactions on ice dust

**Authors:** [Atsuki Ishibashi](#), [Germán Molpeceres](#), [Hiroshi Hidaka](#), [Yasuhiro Oba](#), [Thanja Lamberts](#), [Naoki Watanabe](#)

**Abstract:** With the advent of JWST ice observations, dedicated studies on the formation reactions of detected molecules are becoming increasingly important. One of the most interesting molecules in interstellar ice is CO<sub>2</sub>. Despite its simplicity, the main formation reaction considered, CO + OH → CO<sub>2</sub> + H through the energetic HOCO\* intermediate on ice dust, is subject to uncertainty because it directly... [▽ More](#)

Submitted 2 October, 2024; originally announced October 2024.

Comments: Accepted in ApJ; 23 pages, 9 figures

10. [arXiv:2410.01318](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

## A SPectroscopic survey of biased halos In the Reionization Era (ASPIRE): JWST Supports Earlier Reionization around [OIII] Emitters

**Authors:** Xiangyu Jin, Jinyi Yang, Xiaohui Fan, Feige Wang, Koki Kakiichi, Romain A. Meyer, George D. Becker, Siwei Zou, Eduardo Bañados, Jaclyn B. Champagne, Valentina D'Odorico, Minghao Yue, Sarah E. I. Bosman, Zheng Cai, Anna-Christina Eilers, Joseph F. Hennawi, Hyunsung D. Jun, Mingyu Li, Zihao Li, Weizhe Liu, Maria Pudoka, Sindhu Satyavolu, Fengwu Sun, Wei Leong Tee, Yunjing Wu

**Abstract:** Understanding when and how reionization happened is crucial for studying the early structure formation and the properties of first galaxies in the Universe. At  $z > 5.5$ , the observed IGM optical depth shows a significant scatter, indicating an inhomogeneous reionization process. However, the nature of the inhomogeneous reionization remains debated. ASPIRE is a JWST Cycle 1 program that has spectros... [▽ More](#)

**Submitted** 2 October, 2024; **originally announced** October 2024.

**Comments:** 27 pages, 19 figures, 1 table, accepted for publication in ApJ

11. [arXiv:2410.01314](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

### Optical spectroscopy of host-galaxies of intermediate mass black holes: evolution of central black holes

**Authors:** V. Goradzhyanov, I. Chilingarian, M. Demianenko, I. Katkov, K. Grishin, V. Toptun, E. Rubtsov, D. Gasymov, I. Kuzmin

**Abstract:** Intermediate-mass black holes (IMBHs) with masses below ( $2 \times 10^5 M_{\odot}$ ) are pivotal in understanding the origin and growth mechanisms of supermassive black holes (SMBHs) in galactic nuclei. This study focuses on the search and detailed analysis of central lightweight black holes in various galaxies. An expanded sample of IMBH candidates was selected from the RCSED optical spectral cata... [▽ More](#)

**Submitted** 2 October, 2024; **originally announced** October 2024.

**Comments:** 6 pages, 3 figures. Modern astronomy: from the early universe to exoplanets and black holes. Proceedings of the VAK-2024 conference, Aug 25-31, 2024 - SAO RAS, Nizhny Arkhyz, 2024

12. [arXiv:2410.01241](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

### Exploring the central region of NGC 1365 in the ultraviolet domain

**Authors:** Kshama Sara Kurian, C. S. Stalin, Dominika Wylezalek, Mariya Lyubenova, Tek Prasad Adhikari, Ashish Devaraj, Ram Sagar, Markus-Kissler Patig, Santanu Mondal

**Abstract:** Active galactic nuclei (AGN) feedback and its impact on their host galaxies are critical to our understanding of galaxy evolution. Here, we present a combined analysis of new high resolution ultraviolet (UV) data from the Ultraviolet Imaging Telescope (UVIT) on AstroSat and archival optical spectroscopic data from VLT/MUSE, for the Seyfert galaxy, NGC 1365.

Concentrating on the central 5 kpc regio... [▽ More](#)

**Submitted** 2 October, 2024; **originally announced** October 2024.

**Comments:** 12 Pages, 7 figures, Accepted for publication in ApJ

13. [arXiv:2410.01187](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

### The Tale of Two Telescopes: How Hubble Uniquely Complements the James Webb Space Telescope: Galaxies

**Authors:** Rogier A. Windhorst, Jake Summers, Timothy Carleton, Seth H. Cohen, Kevin S. Croker,

Rolf A. Jansen, Rosalia O'Brien, Brent M. Smith, Christopher J. Conselice, Jose M. Diego, Simon P. Driver, Brenda Frye, Haojing Yan

**Abstract:** In this paper, we present a simple but compelling argument, focusing on galaxy science, for preserving the main imagers and operational modes of the Hubble Space Telescope (HST) for as long as is technically feasible. While star-formation started at redshifts  $z \gtrsim 10-13$ , when the universe was less than 300–500 Myr old, the CSFH did not peak until  $z \simeq 1.9$ , and has steadily declined si... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** White paper submitted to NASA/STScI for the HST Senior Review of 2024. The HST+JWST PDF images are too big for [astro-ph](#). Please view their full resolution PDF files on: [http://www.asu.edu/clas/hst/www/jwst2024/windhorst\\_HST\\_SeniorReview2024\\_v4.pdf](http://www.asu.edu/clas/hst/www/jwst2024/windhorst_HST_SeniorReview2024_v4.pdf)

14. [arXiv:2410.01147](#) [[pdf](#)] [astro-ph.EP](#) [doi](#) [10.3847/1538-3881/ad7366](#)

## The DECam Ecliptic Exploration Project (DEEP). VII. The Strengths of Three Superfast Rotating Main-belt Asteroids from a Preliminary Search of DEEP Data

**Authors:** [Ryder Strauss](#), [Andrew McNeill](#), [David E. Trilling](#), [Francisco Valdes](#), [Pedro H. Bernardinell](#), [Cesar Fuentes](#), [David W. Gerdes](#), [Matthew J. Holman](#), [Mario Juric](#), [Hsing Wen Lin](#), [Larissa Markwardt](#), [Michael Mommert](#), [Kevin J. Napier](#), [William J. Oldroyd](#), [Matthew J. Payne](#), [Andrew S. Rivkin](#), [Hilke E. Schlichting](#), [Scott S. Sheppard](#), [Hayden Smotherman](#), [Chadwick A Trujillo](#), [Fred C. Adams](#), [Colin Orion Chandler](#)

**Abstract:** Superfast rotators (SFRs) are small solar system objects that rotate faster than generally possible for a cohesionless rubble pile. Their rotational characteristics allow us to make inferences about their interior structure and composition. Here, we present the methods and results from a preliminary search for SFRs in the DECam Ecliptic Exploration Project (DEEP) data set. We find three SFRs from... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Journal ref:** The Astronomical Journal, Volume 168, Number 4 (2024)

15. [arXiv:2410.01136](#) [[pdf](#), [other](#)] [astro-ph.IM](#) [astro-ph.GA](#)

## synax: A Differentiable and GPU-accelerated Synchrotron Simulation Package

**Authors:** [Kangning Diao](#), [Zack Li](#), [Richard D. P. Grumitt](#), [Yi Mao](#)

**Abstract:** We introduce synax, a novel library for automatically differentiable simulation of Galactic synchrotron emission. Built on the JAX framework, synax leverages JAX's capabilities, including batch acceleration, just-in-time compilation, and hardware-specific optimizations (CPU, GPU, TPU). Crucially, synax uses JAX's automatic differentiation (AD) mechanism, enabling precise computation of derivatives... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Submitted to ApJ, 11 pages, 8 figures, comments welcome. Code at <https://github.com/dkn16/Synax>

16. [arXiv:2410.01067](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## TODDLERS: A New UV to Millimeter Emission Library for Star-Forming Regions. II. Star Formation Rate Indicators Using Auriga Zoom Simulations

**Authors:** [Anand Utsav Kapoor](#), [Maarten Baes](#), [Arjen van der Wel](#), [Andrea Gebek](#), [Peter Camps](#),

Aaron Smith, Médéric Boquien, Nick Andreadis, Sebastien Vicens

**Abstract:** Current galaxy formation simulations often approximate star-formation, necessitating models of star-forming regions to produce observables. In the first paper of the series, we introduced TODDLERS, a time-resolved model of UV-mm emission from star-forming regions implemented in the radiative transfer code SKIRT. This work uses SKIRT-TODDLERS to produce synthetic observations, demonstrating its pot... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** 23 pages, 20 figures. This version includes minor revisions requested in the first referee report for publication in Astronomy & Astrophysics

17. [arXiv:2410.01043](#) [[pdf](#)] [physics.chem-ph](#) [astro-ph.EP](#) [physics.ao-ph](#) [physics.geo-ph](#)

## Sea Foam contains Hemoglycin from Cosmic Dust

**Authors:** [Julie E. M. McGeoch](#), [Malcolm W. McGeoch](#)

**Abstract:** In-falling cosmic dust has left evidence of meteoritic polymer amide in stromatolites, both fossil and modern. In search of evidence for continued present day in-fall sea foam was collected from two beaches in Rhode Island and subjected to Folch extraction to concentrate amphiphilic components in a chloroform water-methanol interphase layer. Hemoglycin polymer amide molecules previously characteri... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** 32 pages, 11 figures, 4 Tables

18. [arXiv:2410.01002](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## The currently observed clumps cannot be the "direct" precursors of the currently observed open clusters

**Authors:** [J. W. Zhou](#), [Sami Dib](#)

**Abstract:** We categorized clumps, embedded clusters, and open clusters, and conducted a comparative analysis of their physical properties. Overall, the radii of open clusters are significantly larger than those of embedded clusters and clumps. The radii of embedded clusters are larger than those of clumps, which may be due to the expansion of embedded clusters. The open clusters have significantly larger mas... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Accepted for publication in A&A, 8 pages, 6 figures. arXiv admin note: text overlap with arXiv:2409.20271

19. [arXiv:2410.00981](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Discovery and Spectroscopic Confirmation of Aquarius III: A Low-Mass Milky Way Satellite Galaxy

**Authors:** [W. Cerny](#), [A. Chiti](#), [M. Geha](#), [B. Mutlu-Pakdil](#), [A. Drlica-Wagner](#), [C. Y. Tan](#), [M. Adamów](#), [A. B. Pace](#), [J. D. Simon](#), [D. J. Sand](#), [A. P. Ji](#), [T. S. Li](#), [A. K. Vivas](#), [E. F. Bell](#), [J. L. Carlin](#), [J. A. Carballo-Bello](#), [A. Chaturvedi](#), [Y. Choi](#), [A. Doliva-Dolinsky](#), [O. Y. Gnedin](#), [G. Limberg](#), [C. E. Martínez-Vázquez](#), [S. Mau](#), [G. E. Medina](#), [M. Navabi](#), et al. (15 additional authors not shown)

**Abstract:** We present the discovery of Aquarius III, an ultra-faint Milky Way satellite galaxy identified in the second data release of the DECam Local Volume Exploration (DELVE) survey. Based on deeper follow-up imaging with DECam, we find that Aquarius III is a low-luminosity ( $M_V = -2.5_{-0.5}^{+0.3}$ ;  $L_V = 850_{-260}^{+380} L_\odot$ ), extended ( $r_{1/2} = 41_{-8}^{+9}$  pc) stellar system located i...

[▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 25 pages, 7 figures. Submitted to AAS Journals

Report number: FERMILAB-PUB-24-0359-LDRD-PPD

20. [arXiv:2410.00974](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## A candidate quadruple AGN system at $z \sim 3$

**Authors:** [Eileen Herwig](#), [Fabrizio Arrigoni Battaia](#), [Eduardo Bañados](#), [Emanuele Paolo Farina](#)

**Abstract:** Multiple galaxies hosting active galactic nuclei (AGNs) at kpc separation from each other are exceedingly rare, and in fact, only one quadruple AGN is known so far. These extreme density peaks are expected to pinpoint protocluster environments and therefore be surrounded by large galaxy overdensities. In this letter, we present another quadruple AGN candidate at  $z \sim 3$  including two SDSS quasa... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 9 pages, 6 figures, 4 appendices, submitted to A&A Letters

21. [arXiv:2410.00965](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## A Data-driven Discovery of the Causal Connection between Galaxy and Black Hole Evolution

**Authors:** [Zehao Jin](#), [Mario Pasquato](#), [Benjamin L. Davis](#), [Tristan Deleu](#), [Yu Luo](#), [Changhyun Cho](#), [Pablo Lemos](#), [Laurence Perreault-Levasseur](#), [Yoshua Bengio](#), [Xi Kang](#), [Andrea Valerio Maccio](#), [Yashar Hezaveh](#)

**Abstract:** Correlations between galaxies and their supermassive black holes (SMBHs) have been observed, but the causal mechanisms remained unclear. The emerging field of causal inference now enables examining these relationships using observational data. This study, using advanced causal discovery techniques and a state-of-the-art dataset, reveals a causal link between galaxy properties and SMBH masses. In e... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 34 pages, 20 figures, submitted for peer-review

22. [arXiv:2410.00959](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## The effect of local and large scale environment on the star formation histories of galaxies

**Authors:** [G. Torres-Ríos](#), [I. Pérez](#), [S. Verley](#), [J. Domínguez-Gómez](#), [M. Argudo-Fernández](#), [S. Duarte Puertas](#), [A. Jiménez](#), [T. Ruiz-Lara](#), [A. Zurita](#), [B. Bidaran](#), [A. Conrado](#), [D. Espada](#), [R. García-Benito](#), [R. M. González Delgado](#), [J. Falcón-Barroso](#), [E. Florido](#), [P. Sánchez-Blázquez](#), [L. Sánchez-Menguiano](#)

**Abstract:** We aim to investigate how the local environment influences the star formation history (SFH) of galaxies residing in various large-scale environments. We categorise a sample of 9384 galaxies into the three primary large scale structures (voids, walls & filaments, and clusters) and further classify them based on their local environment (as either "singlets" or group members), through a search of co... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 7 pages, 4 figures. Accepted for publication in A&A

23. [arXiv:2410.00949](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Strong rest-UV emission lines in a "little red dot" AGN at $z = 7$ : Early SMBH growth alongside compact massive star formation?

**Authors:** [Hollis B. Akins](#), [Caitlin M. Casey](#), [Danielle A. Berg](#), [John Chisholm](#), [Maximilien Franco](#), [Steven L. Finkelstein](#), [Seiji Fujimoto](#), [Vasily Kokorev](#), [Erini Lambrides](#), [Brant E. Robertson](#), [Anthony J. Taylor](#), [David A. Coulter](#), [Ori Fox](#), [Mitchell Karmen](#)

**Abstract:** JWST has now revealed a population of broad-line AGN at  $z > 4$  characterized by a distinctive SED shape, with very red rest-frame optical and very blue rest-frame UV continuum. While the optical continuum is thought to originate from the accretion disk, the origin of the UV continuum has been largely unclear. We report the detection of the strong rest-frame UV emission lines of CIII] $\lambda\lambda$ 1907,1909 a... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** 14 pages, 6 figures; submitted to ApJL

24. [arXiv:2410.00856](#) [[pdf](#)] [astro-ph.EP](#) [doi](#) [10.1093/mnras/stae2134](#)

## Exploring the catastrophic regime: thermodynamics and disintegration in head-on planetary collisions

**Authors:** [Jingyao Dou](#), [Philip J Carter](#), [Simon Lock](#), [Zoë M Leinhardt](#)

**Abstract:** Head-on giant impacts (collisions between planet-size bodies) are frequently used to study the planet formation process as they present an extreme configuration where the two colliding bodies are greatly disturbed. With limited computing resources, focusing on these extreme impacts eases the burden of exploring a large parameter space. Results from head-on impacts are often then extended to study... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Published in MNRAS, 25 pages, 21 figures

**Journal ref:** Monthly Notices of the Royal Astronomical Society, Volume 534, Issue 1, October 2024

25. [arXiv:2410.00832](#) [[pdf](#)] [physics.space-ph](#) [astro-ph.EP](#)

## On Energization and Loss of the Ionized Heavy Atom and Molecule in Mars' Atmosphere

**Authors:** [J. -T. Zhao](#), [Q. -G. Zong](#), [Z. -Y. Liu](#), [X. -Z. Zhou](#), [S. Wang](#), [W. -H. Ip](#), [C. Yue](#), [J. -H. Li](#), [Y. -X. Hao](#), [R. Rankin](#), [A. Degeling](#), [S. -Y. Fu](#), [H. Zou](#), [Y. -F. Wang](#)

**Abstract:** The absence of global magnetic fields is often cited to explain why Mars lacks a dense atmosphere. This line of thought is based on a prevailing theory that magnetic fields can shield the atmosphere from solar wind erosion. However, we present observations here to demonstrate a counterintuitive understanding: unlike the global intrinsic magnetic field, the remnant crustal magnetic fields can enhan... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** 16 pages & 5 figures & Supplementary Material

26. [arXiv:2410.00804](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#) [astro-ph.SR](#)

## Constraints on the Hubble and matter density parameters with and without modelling the CMB anisotropies

**Authors:** [Indranil Banik](#), [Nick Samaras](#)

**Abstract:** We consider constraints on the Hubble parameter  $H_0$  and the matter density



parameter  $\Omega_M$  from: (i) the age of the Universe based on old stars and stellar populations in the Galactic disc and halo (Cimatti & Moresco 2023); (ii) the turnover scale in the matter power spectrum, which tells us the cosmological horizon at the epoch of matter-radiation equality (Philcox et al. 2022); and... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 5 pages, 1 figure, no tables. Submitted to The Open Journal of Astrophysics

27. [arXiv:2410.00800](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## The obliquity and atmosphere of the hot Jupiter WASP-122b (KELT-14b) with ESPRESSO: An aligned orbit and no sign of atomic or molecular absorption

**Authors:** [M. Stangret](#), [E. Palle](#), [E. Esparza-Borges](#), [J. Orell Miquel](#), [N. Casasayas-Barris](#), [M. R. Zapatero Osorio](#), [E. Cristo](#), [R. Allart](#), [Y. Alibert](#), [F. Borsa](#), [O. D. S. Demangeon](#), [P. Di Marcantonio](#), [D. Ehrenreich](#), [P. Figueira](#), [J. I. Gonzalez Hernandez](#), [E. Herrero-Cisneros](#), [C. J. A. P. Martins](#), [N. C. Santos](#), [J. V. Seidel](#), [T. Azevedo Silva](#), [A. Sozzetti](#), [M. Steiner](#), [A. Suarez Mascareno](#), [S. Udry](#)

**Abstract:** Thanks to their short orbital periods and hot extended atmospheres, hot Jupiters are ideal candidates for atmosphere studies with high-resolution spectroscopy. New stable spectrographs help improve our understanding of the evolution and composition of those types of planets. By analyzing two nights of observations using the ESPRESSO high-resolution spectrograph, we studied the architecture and atm... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: Accepted for publication in A&A, 19 pages, 17 figures, 5 tables

28. [arXiv:2410.00795](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Reconstructing galaxy star formation histories from COSMOS2020 photometry using simulation-based inference

**Authors:** [G. Aufort](#), [C. Laigle](#), [H. J. McCracken](#), [D. Le Borgne](#), [R. Arango-Toro](#), [L. Ciesla](#), [O. Ilbert](#), [L. Tresse](#), [Y. Dubois](#)

**Abstract:** We propose a novel method to reconstruct the full posterior distribution of the star formation histories (SFHs) of galaxies from broad-band photometry. Our method combines simulation-based inference (SBI) using a neural network trained with SFHs and photometry from the `{sc Horizon-AGN}` hydrodynamical cosmological simulation. We apply it to reconstruct SFHs using COSMOS2020 photometry at redshift... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

29. [arXiv:2410.00739](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [physics.ao-ph](#)

doi [10.1051/0004-6361/202348450](https://doi.org/10.1051/0004-6361/202348450)

## Tidal evolution of Earth-like planets in the habitable zone of low-mass stars

**Authors:** [E. F. S. Valente](#), [A. C. M. Correia](#), [P. Auclair-Desrotour](#), [M. Farhat](#), [J. Laskar](#)

**Abstract:** Earth-like planets in the habitable zone of low-mass stars undergo strong tidal effects that modify their spin states. These planets are expected to host dense atmospheres that can also play an important role in the spin evolution. On one hand, gravitational tides tend to synchronise the rotation with the orbital mean motion, but on the other hand, thermal atmospheric tides push the rotation away... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 15 pages, 11 figures, 2 tables

Journal ref: Astronomy and Astrophysics, vol. 687, A47 (2024)

30. [arXiv:2410.00730](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#)

## Astraeus X: Indications of a top-heavy initial mass function in highly star-forming galaxies from JWST observations at $z > 10$

Authors: [Anne Hutter](#), [Elie R Cueto](#), [Pratika Dayal](#), [Stefan Gottlöber](#), [Maxime Trebitsch](#), [Gustavo Yepes](#)

**Abstract:** The James Webb Space Telescope (JWST) has uncovered an abundance of  $z > 10$  galaxies bright in the ultraviolet (UV) that has challenged traditional theoretical models at high redshifts. Recently, various new models have emerged to address this discrepancy by refining their description of star formation. Here we investigate whether modifications to the stellar initial mass function (IMF) alone can r... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: submitted to A&A, 12 pages, 8 figures, comments welcome

31. [arXiv:2410.00685](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Energy equipartition in Globular Clusters through the eyes of dynamical models

Authors: [M. Teodori](#), [O. Straniero](#), [M. Merafina](#)

**Abstract:** Gravitational encounters drive globular clusters toward energy equipartition, mass segregation and evaporation altering structural, spatial and kinematic features. We determine the dynamical state of a few globular clusters by means of a multi-mass King-like dynamical model, focusing on the energy equipartition degree and its relation with model parameters. We fit the observed velocity dispersion,... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

32. [arXiv:2410.00670](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Detections of interstellar 2-cyanopyrene and 4-cyanopyrene in TMC-1

Authors: [Gabi Wenzel](#), [Thomas H. Speak](#), [P. Bryan Changala](#), [Reace H. J. Willis](#), [Andrew M. Burkhardt](#), [Shuo Zhang](#), [Edwin A. Bergin](#), [Alex N. Byrne](#), [Steven B. Charnley](#), [Zachary T. P. Fried](#), [Harshal Gupta](#), [Eric Herbst](#), [Martin S. Holdren](#), [Andrew Lipnicky](#), [Ryan A. Loomis](#), [Christopher N. Shingledecker](#), [Ci Xue](#), [Anthony J. Remijan](#), [Alison E. Wendlandt](#), [Michael C. McCarthy](#), [Ilsa R. Cooke](#), [Brett A. McGuire](#)

**Abstract:** Polycyclic aromatic hydrocarbons (PAHs) are among the most ubiquitous compounds in the universe, accounting for up to ~25% of all interstellar carbon. Since most unsubstituted PAHs do not possess permanent dipole moments, they are invisible to radio astronomy. Constraining their abundances relies on the detection of polar chemical proxies, such as aromatic nitriles. We report the detection of 2- a... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: Accepted in Nature Astronomy; version is prior to editorial revisions

33. [arXiv:2410.00657](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Discovery of interstellar 1-cyanopyrene: a four-ring polycyclic aromatic

## hydrocarbon in TMC-1

**Authors:** Gabi Wenzel, Ilsa R. Cooke, P. Bryan Changala, Edwin A. Bergin, Shuo Zhang, Andrew M. Burkhardt, Alex N. Byrne, Steven B. Charnley, Martin A. Cordiner, Miya Duffy, Zachary T. P. Fried, Harshal Gupta, Martin S. Holdren, Andrew Lipnicky, Ryan A. Loomis, Hannah Toru Shay, Christopher N. Shingledecker, Mark A. Siebert, D. Archie Stewart, Reace H. J. Willis, Ci Xue, Anthony J. Remijan, Alison E. Wendlandt, Michael C. McCarthy, Brett A. McGuire

**Abstract:** Polycyclic aromatic hydrocarbons (PAHs) are thought to be the most abundant class of molecules in space, yet their interstellar lifecycle is poorly understood due to difficulties detecting individual PAHs. Here, we present the discovery of 1-cyanopyrene, a 4-ring PAH, in the dense cloud TMC-1 using the 100-m Green Bank Telescope. We derive an abundance of  $\sim 1.52 \times 10^{12} \text{ cm}^{-2}$ , estimating th... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Accepted in Science; article content is version accepted after peer review but prior to editorial markup

34. [arXiv:2410.00641](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

### The Dynamical History of HIP-41378 f -- Oblique Exorings Masquerading as a Puffy Planet

**Authors:** Tiger Lu, Gongjie Li, Ben Cassese, Doug Lin

**Abstract:** The super-puff HIP-41378 f represents a fascinating puzzle due to its anomalously low density on a far-out orbit in contrast with other known super-puffs. In this work, we explore the hypothesis that HIP-41378 f is not in fact a low-density planet, but rather hosts an opaque ring system. We analyze the dynamical history of the system, and show that convergent migration is necessary to explain the... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Submitted to ApJ

35. [arXiv:2410.00615](#) [[pdf](#), [other](#)] [astro-ph.SR](#) [astro-ph.EP](#) [physics.space-ph](#)

### Deriving the interaction point between a Coronal Mass Ejection and High Speed Stream: A case study

**Authors:** Akshay Kumar Remeshan, Mateja Dumbovic, Manuela Temmer

**Abstract:** We analyze the interaction between an Interplanetary Coronal Mass Ejection (ICME) detected in situ at the L1 Lagrange point on 2016 October 12 with a trailing High-Speed Stream (HSS). We aim to estimate the region in the interplanetary (IP) space where the interaction happened/started using a combined observational-modeling approach. We use Minimum Variance Analysis and the Walen test to analyze p... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** 14 pages, 8 Figures, Accepted for publication in the Astrophysical Journal  
**Report number:** AAS54973R2

36. [arXiv:2410.00577](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#)

### A sub-Earth-mass planet orbiting Barnard's star: No evidence of transits in TESS photometry

**Authors:** A. K. Stefanov, J. I. González Hernández, A. Suárez Mascareño, N. Nari, R. Rebolo, M. Damasso, A. Castro-González, M. -R. Zapatero Osorio, C. Allende Prieto, A. M. Silva, C. J. A. P.

[Martins](#)

**Abstract:** A sub-Earth-mass planet orbiting Barnard's star, designated as Barnard b, has been recently announced. At a similar time, the first photometric data of Barnard's star by the Transit Exoplanet Survey Satellite (TESS) was released in Sector 80. We explore the possibility of emergent transits of Barnard b in TESS photometry. The detrended 2 min light curve appears to be flat, with a flux root-mean-sq... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Submitted to A&A. 7 pages, 4 figures, 3 tables

37. [arXiv:2410.00569](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#) [doi](#) [10.1051/0004-6361/202451311](#)

## A sub-Earth-mass planet orbiting Barnard's star

**Authors:** [J. I. Gonzalez Hernandez](#), [A. Suarez Mascareno](#), [A. M. Silva](#), [A. K. Stefanov](#), [J. P. Faria](#), [H. M. Taberero](#), [A. Sozzetti](#), [R. Rebolo](#), [F. Pepe](#), [N. C. Santos](#), [S. Cristiani](#), [C. Lovis](#), [X. Dumusque](#), [P. Figueira](#), [J. Lillo-Box](#), [N. Nari](#), [S. Benatti](#), [M. J. Hobson](#), [A. Castro-Gonz'alez](#), [R. Allart](#), [V. M. Passegger](#), [M. -R. Zapatero Osorio](#), [V. Adibekyan](#), [Y. Alibert](#), [C. Allende Prieto](#), et al. (15 additional authors not shown)

**Abstract:** Barnard's star is a primary target within the ESPRESSO guaranteed time observations (GTO) as it is the second closest neighbour to our Sun after the  $\alpha$  Centauri stellar system. We present here a large set of 156 ESPRESSO observations of Barnard's star carried out over four years with the goal of exploring periods of shorter than 50 days, thus including the habitable zone (HZ). Our analysis of ESP... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** Accepted for publication in Astronomy and Astrophysics

**Journal ref:** A&A, 690, A79 (2024)

38. [arXiv:2410.00561](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## Physical properties of trans-Neptunian object (143707) 2003 UY117 derived from stellar occultation and photometric observations

**Authors:** [M. Kretlow](#), [J. L. Ortiz](#), [J. Desmars](#), [N. Morales](#), [F. L. Rommel](#), [P. Santos-Sanz](#), [M. Vara-Lubiano](#), [E. Fernández-Valenzuela](#), [A. Alvarez-Candal](#), [R. Duffard](#), [F. Braga-Ribas](#), [B. Sicardy](#), [A. Castro-Tirado](#), [E. J. Fernández-García](#), [M. Sánchez](#), [A. Sota](#), [M. Assafin](#), [G. Benedetti-Rossi](#), [R. Boufleur](#), [J. I. B. Camargo](#), [S. Cikota](#), [A. Gomes-Junior](#), [J. M. Gómez-Limón](#), [Y. Kilic](#), [J. Lecacheux](#), et al. (27 additional authors not shown)

**Abstract:** Trans-Neptunian objects (TNOs) are considered to be among the most primitive objects in our Solar System. Knowledge of their primary physical properties is essential for understanding their origin and the evolution of the outer Solar System. We predicted a stellar occultation by this TNO for 2020 October 23 UT and ran a specific campaign to investigate this event. We derived the projected profil... [▽ More](#)

**Submitted** 1 October, 2024; **originally announced** October 2024.

**Comments:** 9 pages, 7 figures, accepted for publication in Astronomy and Astrophysics on Sept 13, 2024

39. [arXiv:2410.00450](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

## Cosmic Ly $\alpha$ Emission from Diffuse Gas

**Authors:** [Sung-Han Tsai](#), [Ke-Jung Chen](#), [Aaron Smith](#), [Yi-Kuan Chiang](#)

**Abstract:** The Ly $\alpha$  emission has emerged as a powerful tool for probing diffuse gas within the

large-scale structure of the universe. In this paper, we investigate cosmic Ly $\alpha$  emission by post-processing cosmological simulations from \texttt{IllustrisTNG} and \texttt{THESAN} project. Specifically, we calculate the Ly $\alpha$  emission from galaxies, circum-galactic medium (CGM) and inter-galactic medium (IGM) ac... [▽ More](#)

Submitted 1 October, 2024; v1 submitted 1 October, 2024; originally announced October 2024.

40. [arXiv:2410.00417](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#) [astro-ph.HE](#)

## X-Ray Weak AGNs from Super-Eddington Accretion onto Infant Black Holes

Authors: [Piero Madau](#), [Francesco Haardt](#)

**Abstract:** A simple model for the X-ray weakness of JWST-selected broad-line AGNs is proposed under the assumption that the majority of these sources are fed at super-Eddington accretion rates. In these conditions, the hot inner corona above the geometrically thin disk that is responsible for the emission of X-rays in "normal" AGNs will be embedded instead in a funnel-like reflection geometry. The coronal pl... [▽ More](#)

Submitted 1 October, 2024; originally announced October 2024.

Comments: 7 pages, 4 figures, submitted to ApJ. Comments are welcome

41. [arXiv:2410.00374](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## Planet-disk interaction and evolution

Authors: [Pablo Benítez-Llambay](#)

**Abstract:** Following the groundbreaking discovery of the first extrasolar planet orbiting a sun-like star, 51 Pegasi b in 1995, the field of planet formation has become a cornerstone of modern astrophysics. This is in part due to the revelation of an astonishing diversity of planetary types and architectures, inferred from detailed astronomical observations. This diversity is driven by the interplay between... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: Preprint of a chapter for the 'Encyclopedia of Astrophysics' (Editor-in-Chief Ilya Mandel, Section Editor Dimitri Veras) to be published by Elsevier as a Reference Module

42. [arXiv:2410.00326](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## Resonant amplitude distribution of the Hilda asteroids and the free-floating planet flyby scenario

Authors: [Jian Li](#), [Zhihong Jeff Xia](#), [Hanlun Lei](#), [Nikolaos Georgakarakos](#), [Fumi Yoshida](#), [Xin Li](#)

**Abstract:** In some recent work, we provided a quantitative explanation for the number asymmetry of Jupiter Trojans by hypothesizing a free-floating planet (FFP) flyby into the Solar System. In support of that explanation, this paper examines the influence of the same FFP flyby on the Hilda asteroids, which orbit stably in the 3:2 mean motion resonance with Jupiter. The observed Hilda population exhibits two... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 22 pages, 10 figures, accepted for publication in Icarus

43. [arXiv:2410.00304](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.HE](#)

## Galactic center G objects as dust-enshrouded stars near the supermassive black hole

Authors: [Michal Zajaček](#), [Monika Pikhartová](#), [Florian Peissker](#)

**Abstract:** In this contribution, we revisit the model of a dust-enshrouded star orbiting a low-luminosity galactic nucleus (Zajacek et al. 2014, 2016, 2017). Although it is quite challenging for dust to survive in hot X-ray-emitting plasma surrounding supermassive black holes (SMBHs), we now have an observational evidence that compact dusty objects or "G" objects can approach the SMBH in the Galactic cente... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 13 pages, 2 figures; a proceeding contribution for the 17th Marcel Grossmann Meeting (invited talk at the session 'Latest results from Galactic center observations')

44. [arXiv:2410.00252](#) [[pdf](#), [ps](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

[doi](#) [10.5281/zenodo.13352296](https://doi.org/10.5281/zenodo.13352296)

## SPIRE HeRS/HeLMS Combined SHIM Maps

**Authors:** [Michael Zemcov](#), [Richard Feder](#), [Ryan Wills](#)

**Abstract:** We have regenerated Herschel-SPIRE maps covering 360 square degrees near the celestial equator. These are the largest extragalactic surveys designed to overlap with cosmic microwave background legacy fields mapped at sub-mm wavelengths. We provide documentation detailing their construction and use. The maps are available on zenodo as <https://doi.org/10.5281/zenodo.13352296>.

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 3 page technical note

45. [arXiv:2410.00243](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Does the HCN/CO ratio trace the fraction of gravitationally-bound gas? II. Variations in CO and HCN Emissivity

**Authors:** [Ashley R. Bemis](#), [Christine D. Wilson](#), [Piyush Sharda](#), [Ian D. Roberts](#), [Hao He](#)

**Abstract:** We model emissivities of the HCN and CO  $J = 1 - 0$  transitions using measured properties of clouds found in normal star forming galaxies and more extreme systems. These models are compared with observations of HCN and CO  $J = 1 - 0$  transitions. We combine these model emissivities with predictions of gravoturbulent models of star formation, explore the impact of excitation and optical depth on CO and HCN... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** Accepted for publication in A&A

46. [arXiv:2410.00237](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Discovering Large-Scale Structure at $2 < z < 5$ in the C3VO Survey

**Authors:** [Denise Hung](#), [Brian C. Lemaux](#), [Olga Cucciati](#), [Ben Forrest](#), [Ekta A. Shah](#), [Roy R. Gal](#), [Finn Giddings](#), [Derek Sikorski](#), [Emmet Golden-Marx](#), [Lori M. Lubin](#), [Nimish Hathi](#), [Giovanni Zamorani](#), [Sandro Bardelli](#), [Letizia P. Cassara](#), [Gabriella De Lucia](#), [Fabio Fontanot](#), [Bianca Garilli](#), [Lucia Guaita](#), [Michaela Monika Hirschmann](#), [Kyoung-Soo Lee](#), [Andrew B. Newman](#), [Vandana Ramakrishnan](#), [Daniela Vergani](#), [Lizhi Xie](#), [Elena Zucca](#)

**Abstract:** The Charting Cluster Construction with VUDS and ORELSE (C3VO) survey is an ongoing imaging and spectroscopic campaign aiming to map out the growth of structure up to  $z \sim 5$  and was born from the combination of the VIMOS Ultra Deep Survey (VUDS) and the Observations of Redshift Evolution in Large-Scale Environments (ORELSE) survey. As we previously accomplished with the ORELSE survey, we apply ou... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 36 pages, 16 figures, 5 tables, submitted to ApJ

47. [arXiv:2410.00236](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## CLASSY XI: Tracing Neutral Gas Properties using UV Absorption Lines and 21-cm Observations

**Authors:** [Kaelee S. Parker](#), [Danielle A. Berg](#), [Simon Gazagnes](#), [John Chisholm](#), [Bethan L. James](#), [Matthew Hayes](#), [Timothy Heckman](#), [Alaina Henry](#), [Michelle A. Berg](#), [Karla Z. Arellano-Cordova](#), [Xinfeng Xu](#), [Dawn K. Erb](#), [Crystal L. Martin](#), [Weida Hu](#), [Evan D. Skillman](#), [Kristen B. W. McQuinn](#), [Zuyi Chen](#), [Dan P. Stark](#)

**Abstract:** Rest-frame far-ultraviolet (FUV) observations from JWST are revolutionizing our understanding of the high- $z$  galaxies that drove reionization and the mechanisms by which they accomplished it. To fully interpret these observations, we must be able to diagnose how properties of the interstellar medium (ISM; e.g., column density, covering fraction, outflow velocity) directly relate to the absorption f... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 25 pages with 16 figures and 2 tables. Long appendix with figure sets and tables. Accepted to ApJ

48. [arXiv:2410.00213](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#)

## The Compositions of Rocky Planets in Close-in Orbits Tend to be Earth-Like

**Authors:** [Casey L. Brinkman](#), [Lauren M. Weiss](#), [Daniel Huber](#), [Rena A. Lee](#), [Jared Kolecki](#), [Gwyneth Tenn](#), [Jingwen Zhang](#), [Suchitra Narayanan](#), [Alex S. Polanski](#), [Fei Dai](#), [Jacob L. Bean](#), [Corey Beard](#), [Madison Brady](#), [Max Brodheim](#), [Matt Brown](#), [William Deich](#), [Jerry Edelstein](#), [Benjamin J. Fulton](#), [Steven Giacalone](#), [Steven R. Gibson](#), [Gregory J. Gilbert](#), [Samuel Halverson](#), [Luke Handley](#), [Grant M. Hill](#), [Rae Holcomb](#), et al. (32 additional authors not shown)

**Abstract:** Hundreds of exoplanets between 1-1.8 times the size of the Earth have been discovered on close in orbits. However, these planets show such a diversity in densities that some appear to be made entirely of iron, while others appear to host gaseous envelopes. To test this diversity in composition, we update the masses of 5 rocky exoplanets (HD 93963 A b, Kepler-10 b, Kepler-100 b, Kepler-407 b, and T... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: Submitted to AJ 09/30/2024

49. [arXiv:2410.00195](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

## Inner structure of cold and warm dark matter halos from particle dynamics

**Authors:** [Yohsuke Enomoto](#), [Atsushi Taruya](#), [Satoshi Tanaka](#), [Takahiro Nishimichi](#)

**Abstract:** Using the number of apocenter passages  $p$  and the radial action  $J_r$  of each particle, we characterize the phase-space structure within the multi-stream regions of cold and warm dark matter halos in cosmological  $N$ -body simulations. Building on previous work by Enomoto et al. (2024), we analyze the radial density profiles of particles classified by  $p$  and  $J_r$ . We find that the profiles consi... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 17 pages, 15 figures. Comments are welcome. Submitted to PASJ

Report number: YITP-24-123

50. [arXiv:2410.00180](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Compact and High Excitation Molecular Clumps in the Extended Ultraviolet Disk of M83

**Authors:** [Jin Koda](#), [Francoise Combes](#), [Monica Rubio](#), [Morten Andersen](#), [Frank Bigiel](#), [Armando Gil de Paz](#), [Junais](#), [Amanda M Lee](#), [Jennifer Donovan Meyer](#), [Kana Morokuma-Matsui](#), [Masafumi Yagi](#), [Annie Zavagno](#)

**Abstract:** The extended ultraviolet (XUV) disks of nearby galaxies show ongoing massive star formation, but their parental molecular clouds remain mostly undetected despite searches in CO(1-0) and CO(2-1). The recent detection of 23 clouds in the higher excitation transition CO(3-2) within the XUV disk of M83 requires an explanation. We test the hypothesis: the clouds in XUV disks have a clump-envelope struc... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** A&A accepted; 15 pages, 8 figures

51. [arXiv:2410.00156](#) [[pdf](#), [other](#)] [astro-ph.SR](#) [astro-ph.EP](#)

## JWST imaging of edge-on protoplanetary disks. III. Drastic morphological transformation across the mid-infrared in Oph163131

**Authors:** [Marion Villenave](#), [Karl R. Stapelfeldt](#), [Gaspard Duchene](#), [Francois Menard](#), [Marshall D. Perrin](#), [Christophe Pinte](#), [Schuyler G. Wolff](#), [Ryo Tazaki](#), [Deborah L. Padgett](#)

**Abstract:** We present JWST broadband images of the highly inclined protoplanetary disk SSTc2d J163131.2-242627 (Oph163131) from 2.0 to 21  $\mu\text{m}$ . The images show a remarkable evolution in disk structure with wavelength, quite different from previous JWST observations of other edge-on disks. At 2.0 and 4.4  $\mu\text{m}$ , Oph163131 shows two scattering surfaces separated by a dark lane, typical of highly inclined disks. St... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** Accepted for publication in the Astrophysical Journal. 11 pages, 7 figures

52. [arXiv:2410.00148](#) [[pdf](#), [other](#)] [astro-ph.SR](#) [astro-ph.GA](#) [astro-ph.HE](#)

## Magnetic Field Amplification during Stellar Collisions between Low-Mass Stars

**Authors:** [Taeho Ryu](#), [Alison Sills](#), [Ruediger Pakmor](#), [Selma de Mink](#), [Robert Mathieu](#)

**Abstract:** Blue straggler stars in stellar clusters are a subset of stars that are bluer and appear younger than other cluster members, seemingly straggling behind in their evolution. They offer a unique opportunity to understand the stellar dynamics and populations within their hosts. In the collisional formation scenario, a persistent challenge is the excessive angular momentum in the collision product. Th... [▽ More](#)

**Submitted** 2 October, 2024; **v1 submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 27 pages, 10 figures, 1 table. Comments welcome! Videos: <https://www.youtube.com/watch?v=lkpTEJT11Ew&list=PLxLK3qI02cQef6wX5wi-QMSFyxBGK4tGL>

53. [arXiv:2410.00136](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#)

## JWST captures a sudden stellar outburst and inner disk wall destruction

**Authors:** [Chengyan Xie](#), [Ilaria Pascucci](#), [Dingshan Deng](#), [Naman S. Bajaj](#), [Richard Alexander](#), [Andrew Sellek](#), [Agnes Kospal](#), [Giulia Ballabio](#), [Uma Gorti](#)



**Abstract:** We present JWST/MIRI observations of T~Cha, a highly variable ( $\Delta V \sim 3\text{--}5\text{ mag}$ ) accreting Sun-like star surrounded by a disk with a large ( $\sim 15\text{ au}$ ) dust gap. We find that the JWST mid-infrared spectrum is significantly different from the *Spitzer* spectrum obtained 17 years before, where the emission at short wavelengths ( $5 - 10\mu\text{m}$ ) has decreased by  $\sim 2/3$  while at longer wavelengt... [▽ More](#)

Submitted 2 October, 2024; v1 submitted 30 September, 2024; originally announced October 2024.

Comments: 16 pages, 7 figures, submitted to ApJ

54. [arXiv:2410.00124](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## SILCC -- VIII: The impact of far-ultraviolet radiation on star formation and the interstellar medium

**Authors:** [Tim-Eric Rathjen](#), [Stefanie Walch](#), [Thorsten Naab](#), [Pierre Nürnberg](#), [Richard Wünsch](#), [Daniel Seifried](#), [Simon C. O. Glover](#)

**Abstract:** We present magnetohydrodynamic simulations of star formation in the multiphase interstellar medium to quantify the impact of non-ionising far-ultraviolet (FUV) radiation. This study is carried out within the framework of the *Silcc Project*. It incorporates the radiative transfer of ionising radiation and self-consistent modelling of variable FUV radiation from star clusters. Near young sta... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: submitted to MNRAS

55. [arXiv:2410.00114](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## The distant Milky Way halo from the Southern hemisphere: Characterization of the LMC-induced dynamical-friction wake

**Authors:** [Manuel Cavieres](#), [Julio Chanamé](#), [Camila Navarrete](#), [Yasna Ordenes-Briceño](#), [Nicolás Garavito-Camargo](#), [Gurtina Besla](#), [Maren Hempel](#), [Katherina Vivas](#), [Facundo Gómez](#)

**Abstract:** The infall of the LMC into the Milky Way's halo impacts the distribution of stars and dark matter in our Galaxy. Mapping the observational consequences of this encounter can inform us about the properties of both galaxies, details of their interaction, and possibly even distinguish between different dark matter models. N-body simulations predict large-scale density asymmetries in the Galactic halo... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 21 pages, 10 figures, submitted to ApJ, comments are welcome!

56. [arXiv:2410.00113](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Increased Burstiness at High Redshift in Multi-Physics Models Combining Supernova Feedback, Radiative Transfer and Cosmic Rays

**Authors:** [Tibor Dome](#), [Sergio Martin-Alvarez](#), [Sandro Tacchella](#), [Yuxuan Yuan](#), [Debora Sijacki](#)

**Abstract:** We study star formation variability, or burstiness, as a method to constrain and compare different galaxy formation models at high redshift using the Azahar simulation suite. The models range from magneto-hydrodynamics with a magneto-thermo-turbulent prescription for star formation (iMHD) to more sophisticated setups incorporating radiative transfer (RTiMHD) and cosmic ray physics (RTnsCRiMHD). An... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 10 pages, 4 figures, 1 table, comments welcome

57. [arXiv:2410.00110](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## The AURORA Survey: An Extraordinarily Mature, Star-forming Galaxy at $z \sim 7$

**Authors:** [Alice E. Shapley](#), [Ryan L. Sanders](#), [Michael W. Topping](#), [Naveen A. Reddy](#), [Anthony J. Pahl](#), [Pascal A. Oesch](#), [Danielle A. Berg](#), [Rychard J. Bouwens](#), [Gabriel Brammer](#), [Adam C. Carnall](#), [Fergus Cullen](#), [Romeel Davé](#), [James S. Dunlop](#), [Richard S. Ellis](#), [N. M. Förster Schreiber](#), [Steven R. Furlanetto](#), [Karl Glazebrook](#), [Garth D. Illingworth](#), [Tucker Jones](#), [Mariska Kriek](#), [Derek J. McLeod](#), [Ross J. McLure](#), [Desika Narayanan](#), [Max Pettini](#), [Daniel Schaerer](#), et al. (6 additional authors not shown)

**Abstract:** We present the properties of a massive, large, dusty, metal-rich, star-forming galaxy at  $z_{\text{spec}}=6.73$ . GOODS-N-100182 was observed with JWST/NIRSpec as part of the AURORA survey, and is also covered by public multi-wavelength HST and JWST imaging. While the large mass of GOODS-N-100182 ( $\sim 10^{10} M_{\odot}$ ) was indicated prior to JWST, NIRC2 rest-optical imaging now reveals the presence of an extended disk... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 16 pages, 13 figures, submitted to ApJ

58. [arXiv:2410.00108](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.IM](#) [doi](#) [10.3847/1538-3881/ad7fed](#)

## New Moons of Uranus and Neptune from Ultra-Deep Pencil Beam Surveys

**Authors:** [Scott Sheppard](#), [David Tholen](#), [Marina Brozovic](#), [Robert Jacobson](#), [Chadwick Trujillo](#), [Patryk Sofia Lykawka](#), [Mike Alexandersen](#)

**Abstract:** We have conducted extremely ultra-deep pencil beam observations for new satellites around both Uranus and Neptune. Tens of images on several different nights in 2021, 2022 and 2023 were obtained and shifted and added together to reach as faint as 26.9 and 27.2 magnitudes in the r-band around Uranus and Neptune, respectively. One new moon of Uranus, S/2023 U1, and two new moons of Neptune, S/2021 N... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** Accepted Astronomical Journal

59. [arXiv:2410.00106](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Metallicity calibrations based on auroral lines from PHANGS-MUSE data

**Authors:** [Matilde Brazzini](#), [Francesco Belfiore](#), [Michele Ginolfi](#), [Brent Groves](#), [Kathryn Kreckel](#), [Ryan J. Rickards Vaught](#), [Dalya Baron](#), [Frank Bigiel](#), [Guillermo A. Blanc](#), [Daniel A. Dale](#), [Kathryn Grasha](#), [Eric Habjan](#), [Ralf S. Klessen](#), [J. Eduardo Méndez-Delgado](#), [Karin Sandstrom](#), [Thomas G. Williams](#)

**Abstract:** We present a chemical analysis of selected HII regions from the PHANGS-MUSE nebular catalogue. Our intent is to empirically re-calibrate strong-line diagnostics of gas-phase metallicity, applicable across a wide range of metallicities within nearby star-forming galaxies. To ensure reliable measurements of auroral line fluxes, we carried out a new spectral fitting procedure whereby only restricted... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 20 pages, 14 figures, 6 tables; accepted for publication in Astronomy & Astrophysics

60. [arXiv:2410.00105](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

# Untangling Stellar Components of Galaxies: Evaluation of Dynamical Decomposition Methods in Simulated Galaxies with GalaxyChop

**Authors:** Valeria A. Cristiani, Mario G. Abadi, Antonela Taverna, Juan Cabral, Federico Benelli, Bruno Sánchez

**Abstract:** Galaxy formation is intrinsically connected to the distinct evolutionary processes of disk and spheroidal systems, which are the fundamental stellar components of galaxies. Understanding the mutual dynamical interplay and co-evolution of these components requires a detailed dynamical analysis to allow for a disentanglement between them. We introduce JEHistogram, a new method for the dynamical deco... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 16 pages, 18 figures, accepted in A&A

61. [arXiv:2410.00104](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Crimson Behemoth: a Massive Clumpy Structure Hosting a Dusty AGN at $z = 4.91$

**Authors:** Takumi S. Tanaka, John D. Silverman, Yurina Nakazato, Masafusa Onoue, Kazuhiro Shimasaku, Yoshinobu Fudamoto, Seiji Fujimoto, Xuheng Ding, Andreas L. Faisst, Francesco Valentino, Shuowen Jin, Christopher C. Hayward, Vasily Kokorev, Daniel Ceverino, Boris S. Kalita, Caitlin M. Casey, Zhaoxuan Liu, Aidan Kaminsky, Qinyue Fei, Irham T. Andika, Erini Lambrides, Hollis B. Akins, Jeyhan S. Kartaltepe, Anton M. Koekemoer, Henry Joy McCracken, et al. (18 additional authors not shown)

**Abstract:** The current paradigm for the co-evolution of galaxies and their supermassive black holes postulates that dust-obscured active galactic nuclei (AGNs) represent a transitional phase towards a more luminous and unobscured state. However, our understanding of dusty AGNs and their host galaxies at early cosmic times is inadequate due to observational limitations. Here, we present JWST observations of C... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 13 pages, 10 figures, submitted to PASJ

62. [arXiv:2410.00103](#) [[pdf](#), [other](#)] [astro-ph.IM](#) [astro-ph.GA](#)

## Improved Empirical Backgrounds for JWST NIRISS Image/WFSS Data Reduction

**Authors:** Raphael E. Hviding, Ivelina G. Momcheva, Leonardo Clarke

**Abstract:** The Near Infrared Imager and Slitless Spectrograph (NIRISS) on the James Webb Space Telescope (JWST) is a versatile instrument for collecting imaging and wide-field slitless spectroscopy (WFSS) data for surveys of galaxy clusters, emission-line galaxies, stellar populations, and more. Dispersed zodiacal light imprints distinct structures on space-based near-infrared imaging and WFSS observations,... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** October 2024.

**Comments:** 12 pages, 7 figures, re-submitted to AAS Journals for final approval. Empirical Backgrounds described in this work can be found at: <https://zenodo.org/records/13838016>

63. [arXiv:2410.00100](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## An Investigation Into The Selection and Colors of Little Red Dots and Active Galactic Nuclei

**Authors:** Kevin N. Hainline, Roberto Maiolino, Ignas Juodzbalius, Jan Scholtz, Hannah Ubler, Francesco D'Eugenio, Jakob M. Helton, Yang Sun, Fengwu Sun, Brant Robertson, Sandro Tacchella, Andrew J. Bunker, Stefano Carniani, Stephane Charlot, Emma Curtis-Lake, Eiichi Egami, Benjamin D. Johnson, Xiaojing Lin, Jianwei Lyu, Pablo G. Perez-Gonzalez, Pierluigi Rinaldi, Maddie S. Silcock, Christina C. Williams, Christopher N. A. Willmer, Chris Willott, et al. (2 additional authors not shown)

**Abstract:** Recently, a large number of compact sources at  $z > 4$  with blue UV slopes and extremely red rest-frame optical slopes have been found in James Webb Space Telescope (JWST) extragalactic surveys. As a subsample of these sources, commonly called "little red dots" (LRDs), have been spectroscopically observed to host a broad-line active galactic nucleus (AGN), they have been the focus of multiple re... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 18 pages, 6 figures, submitted to AAS Journals

64. [arXiv:2410.00099](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Reconstructing the Assembly of Massive Galaxies. III: Quiescent Galaxies Loose Angular Momentum as They Evolve in a Mass-dependent Fashion

**Authors:** Zhiyuan Ji, Mauro Giavalisco

**Abstract:** We study the evolution of stellar kinematics of a sample of 952 massive quiescent galaxies with  $M_* > 10^{10.5} M_\odot$  at  $0.6 < z < 1$ . Utilizing spatially integrated spectroscopy from the LEGA-C survey, we focus on the relationship between the observed integrated stellar velocity dispersion ( $\sigma'_{star}$ ) and the morphological axial ratio ( $q$ ), and its variation with the stellar age and mass o... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 12 pages, 7 figures, submitted to ApJ

65. [arXiv:2410.00098](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

## Improving Precision in Kinematic Weak Lensing with MIroRS: Model-Independent Restoration of Reflection Symmetries

**Authors:** Christopher Hopp, David Wittman

**Abstract:** We present a novel, model-independent technique for fitting the cross-component of weak lensing shear,  $\gamma_\times$ , along a line of sight by combining kinematic and photometric measurements of a single lensed galaxy. Rather than relying on parametric models, we fit for the shear parameter that best transforms the velocity field to restore its underlying symmetries, while also incorporating photomet... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 17 pages, submitted to ApJ

66. [arXiv:2410.00095](#) [[pdf](#), [other](#)] [astro-ph.HE](#) [astro-ph.GA](#)

## Where has all the $r$ -process gone? Timescales for GRB-Kilonovae to Enrich their Host Galaxies

**Authors:** Anya E. Nugent, Alexander P. Ji, Wen-fai Fong, Hilay Shah, Freeke van de Voort

**Abstract:** Neutron star (NS) mergers are currently the only observed source of  $r$ -process production in the Universe. Yet, it is unclear how much  $r$ -process mass from these mergers is

incorporated into star-forming gas to enrich stars. This is crucial to consider as all other r-process mass estimates in the Universe beyond Earth are based on stellar r-process abundances. Here, we explore the extent to which me... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: 16 pages, 6 figures, 2 tables, submitted to ApJ

67. [arXiv:2410.00093](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## Planetary population synthesis

Authors: [Remo Burn](#), [Christoph Mordasini](#)

**Abstract:** The planetary population synthesis method aims at comprehensively testing planet formation theories against observational evidence and providing theoretical sets of planets to help interpret observations and inform instrument development. Recent developments on the theoretical and observational sides are reviewed: First, observational constraints are summarized, then, the work flow of population s... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: To be published in: Handbook of Exoplanets, 2nd Edition, Hans Deeg and Juan Antonio Belmonte (Eds. in Chief), Springer International Publishing AG, part of Springer Nature. 59 pages, 8 figures. This is an update of arXiv:1804.01532

68. [arXiv:2410.00066](#) [[pdf](#), [other](#)] [astro-ph.IM](#) [astro-ph.EP](#) [eess.SY](#)

## Seasonal Performance Evaluation of a Hybrid PV-Wind-Battery Power System for a Mars Base

Authors: [Abdollah Masoud Darya](#), [Ramesh C. Bansal](#), [Omaima Anwar Jarndal](#)

**Abstract:** This work investigates a hybrid photovoltaic-wind-battery power system designed to sustain a Mars base under varying seasonal and climatic conditions. The Mars Climate Database was utilized to simulate the effects of seasonal changes, diurnal cycles, and dust storms on the system's power generation. The seasonal performance was analyzed across the Martian surface and at potential habitation sites... [▽ More](#)

Submitted 30 September, 2024; originally announced October 2024.

Comments: The peer-reviewed paper will be presented at The 2024 International Conference on Electric Power and Energy Conversion Systems (EPECS). The data used in this work are available from <https://github.com/AbdollahMasoud/EPECS-2024>

69. [arXiv:2410.00043](#) [[pdf](#), [ps](#), [other](#)] [math.DS](#) [astro-ph.EP](#) [q-bio.PE](#)

## Rate-induced biosphere collapse in the Daisyworld model

Authors: [Constantin W. Arnscheidt](#), [Hassan Alkhayuon](#)

**Abstract:** There is much interest in the phenomenon of rate-induced tipping, where a system changes abruptly when forcings change faster than some critical rate. Here, we demonstrate and analyse rate-induced tipping in the classic "Daisyworld" model. The Daisyworld model considers a hypothetical planet inhabited only by two species of daisies with different reflectivities, and is notable because the daisies... [▽ More](#)

Submitted 27 September, 2024; originally announced October 2024.

70. [arXiv:2409.20549](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Detection of [OIII]88 $\mu$ m in JADES-GS-z14-0 at z=14.1793

**Authors:** [Sander Schouws](#), [Rychard J. Bouwens](#), [Katherine Ormerod](#), [Renske Smit](#), [Hiddo Algera](#), [Laura Sommovigo](#), [Jacqueline Hodge](#), [Andrea Ferrara](#), [Pascal A. Oesch](#), [Lucie E. Rowland](#), [Ivana van Leeuwen](#), [Mauro Stefanon](#), [Thomas Herard-Demanche](#), [Yoshinobu Fudamoto](#), [Huub Röttgering](#), [Paul van der Werf](#)

**Abstract:** We report the first successful ALMA follow-up observations of a secure  $z > 10$  JWST-selected galaxy, by robustly detecting ( $6.6\sigma$ ) the  $[\text{OIII}]_{88\mu\text{m}}$  line in JADES-GS-z14-0 (hereafter GS-z14). The ALMA detection yields a spectroscopic redshift of  $z = 14.1793 \pm 0.0007$ , and increases the precision on the prior redshift measurement of  $z = 14.32^{+0.08}_{-0.20}$  from NIRSpect by  $\gtrsim 180\%$ . [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

**Comments:** 11 Pages, 6 Figures, 1 Table. Submitted to The Astrophysical Journal

71. [arXiv:2409.20540](#) [[pdf](#), [other](#)] [astro-ph.SR](#) [astro-ph.EP](#)

## Statistical view of orbital circularisation with 14 000 characterised TESS eclipsing binaries

**Authors:** [L. W. Ijspeert](#), [A. Tkachenko](#), [C. Johnston](#), [C. Aerts](#)

**Abstract:** Eclipsing binaries are crucial for understanding stellar physics, allowing detailed studies of stellar masses, radii, and orbital dynamics. Recent space missions like the Transiting Exoplanet Survey Satellite (TESS) have significantly expanded the catalogue of observed eclipsing binaries with uninterrupted time series photometry, providing an opportunity for large-scale ensemble studies. This stud... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

**Comments:** 15 pages, 10 figures, 4 appendices (15 pages, 26 figures). Accepted for publication in A&A

72. [arXiv:2409.20533](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#)

## The eventful life of a luminous galaxy at $z = 14$ : metal enrichment, feedback, and low gas fraction?

**Authors:** [Stefano Carniani](#), [Francesco D'Eugenio](#), [Xihan Ji](#), [Eleonora Parlanti](#), [Jan Scholtz](#), [Fengwu Sun](#), [Giacomo Venturi](#), [Tom J. L. C. Bakx](#), [Mirko Curti](#), [Roberto Maiolino](#), [Sandro Tacchella](#), [Jorge A. Zavala](#), [Kevin Hainline](#), [Joris Witstok](#), [Benjamin D. Johnson](#), [Stacey Alberts](#), [Andrew J. Bunker](#), [Stéphane Charlot](#), [Daniel J. Eisenstein](#), [Jakob M. Helton](#), [Peter Jakobsen](#), [Nimisha Kumari](#), [Brant Robertson](#), [Aayush Saxena](#), [Hannah Übler](#), et al. (3 additional authors not shown)

**Abstract:** JADES-GS-z14-0 is the most distant spectroscopically confirmed galaxy so far, at  $z > 14$ . With a UV magnitude of -20.81, it is one of the most luminous galaxies at cosmic dawn and its half-light radius of 260 pc means that stars dominate the observed UV emission. We report the ALMA detection of  $[\text{OIII}]_{88\mu\text{m}}$  line emission with a significance of  $6.67\sigma$  and at a frequency of 223.524 GHz, correspondin... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

**Comments:** 12 pages, 7 figure

73. [arXiv:2409.20519](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## A physically-motivated template set for high- $z$ galaxy SED fitting

**Authors:** [Judah Luberto](#), [Steven Furlanetto](#), [Jordan Mirocha](#)

**Abstract:** We introduce a new physically-motivated spectral template set for fitting the spectral energy distributions (SEDs) of high- $z$  galaxies. We use the public galaxy formation code ARES to

generate star formation histories of thirteen representative galaxies with diverse masses and generate their predicted spectra across a set of redshifts at  $z > 6$ . The model parameters are calibrated to reproduce the p... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 31 pages, 14 figures

74. [arXiv:2409.20465](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Spatially-resolved gas-phase metallicity in Seyfert galaxies

**Authors:** [Mark Armah](#), [Rogério Riffel](#), [L. G. Dahmer-Hahn](#), [R. I. Davies](#), [O. L. Dors](#), [Darshan Kakkad](#), [Rogemar A. Riffel](#), [A. Rodríguez-Ardila](#), [D. Ruschel-Dutra](#), [T. Storchi-Bergmann](#)

**Abstract:** We explore the relations between the gas-phase metallicity radial profiles (few hundred inner parsec) and multiple galaxy properties for 15 Seyfert galaxies from the AGNIFS (Active Galactic Nuclei Integral Field Spectroscopy) sample using optical Integral Field Unit (IFU) observations from Gemini Multi-Object Spectrographs (GMOS) and Multi Unit Spectroscopic Explorer (MUSE) processed archival data... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: Accepted for publication in MNRAS; doi: 10.1093/mnras/stae2263

75. [arXiv:2409.20443](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

## A holistic exploration of the potentially recoverable redshift information of Stage IV galaxy surveys

**Authors:** [Bryan R Scott](#), [Alex I Malz](#), [Robert Sorba](#)

**Abstract:** Extragalactic science and cosmology with Stage IV galaxy surveys will rely almost exclusively on redshift measurements derived solely from photometry, which are subject to systematic and statistical uncertainties with numerous analysis choices, such as that of an estimator and prior information and no universal solution. Single-survey photometric redshift estimates ought to be improved by combinin... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 13 pages, 8 figures, to be submitted to ApJ; comments welcome

76. [arXiv:2409.20352](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Merging Signatures in an Offset Lyman Continuum Emitter at Redshift 3.8

**Authors:** [Fang-Ting Yuan](#), [Zhen-Ya Zheng](#), [Chunyan Jiang](#), [Shuairu Zhu](#), [Ruqiu Lin](#), [Cheng Cheng](#)

**Abstract:** Lyman continuum (LyC) emitters at  $z > 3$  provide critical samples for studying the contribution of galaxies to the ionizing background in the Epoch of Reionization. We collect a sample of  $z > 3$  LyC emitters, a dominant fraction ( $\sim 60\%$ - $70\%$ ) of which shows spatial offsets between LyC emission and the non-ionizing continuum. From this sample, especially, we find a case of an offset LyC emitter, CD... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 15 pages, 4 figures, ApJ, in press

77. [arXiv:2409.20350](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [doi](#) [10.1007/s11433-024-2412-3](#)

## Intermediate-Mass Black Holes in Green Pea Galaxies (IMBH-GP) I: a Candidate Sample from LAMOST and SDSS

**Authors:** [Ruqiu Lin](#), [Zhen-Ya Zheng](#), [Fang-Ting Yuan](#), [Jun-Xian Wang](#), [Chunyan Jiang](#), [Ning Jiang](#),

Lingzhi Wang, Linhua Jiang, Xiang Ji, Shuairu Zhu, Xiaodan Fu

**Abstract:** The scaling relation of central massive black holes (MBHs) and their host galaxies is well-studied for supermassive BHs (SMBHs,  $M_{\text{BH}} \geq 10^6 M_{\odot}$ ). However, this relation has large uncertainties in the mass range of the intermediate-mass BHs (IMBHs,  $M_{\text{BH}} \sim 10^3 - 10^6 M_{\odot}$ ). Since Green Pea (GP) galaxies are luminous compact dwarf galaxies, which may be l... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 17 pages, 8 figures, 2 tables; Accepted for publication in SCPMA

Journal ref: 2024SCPMA..6709811L

78. [arXiv:2409.20349](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Lyman Continuum Leakers at $z > 3$ in the GOODS-S Field: Starburst or Not?

**Authors:** [Shuairu Zhu](#), [Fang-Ting Yuan](#), [Chunyan Jiang](#), [Zhen-Ya Zheng](#), [Ruqiu Lin](#)

**Abstract:** We investigate the star-forming properties of 23 Lyman Continuum (LyC) leakers at  $z > 3$  in the Great Observatories' Deep Survey-South (GOODS-S) field based on a systematic review of LyC observations from the literature. Using data from the Hubble Space Telescope (HST) and the James Webb Space Telescope (JWST), we construct the spectral energy distributions (SEDs) for these LyC leakers, covering th... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 12 pages, 3 figures, 2 tables, accepted by ApJL

79. [arXiv:2409.20316](#) [[pdf](#), [ps](#), [other](#)] [astro-ph.SR](#) [astro-ph.GA](#)

[doi](#) [10.3847/1538-4357/ad6dfa](https://doi.org/10.3847/1538-4357/ad6dfa)

## The Dustiest Galactic S Stars: Mid-Infrared Spectra from SOFIA/FORCAST

**Authors:** [Kathleen E. Kraemer](#), [G. C. Sloan](#), [Ramses M. Ramirez](#)

**Abstract:** We present spectra of 12 of the reddest, and hence dustiest, S stars in the Milky Way, observed with the FORCAST grisms on SOFIA. S stars are asymptotic giant branch (AGB) stars with  $C/O \sim 1$ , so their molecular and dust chemistries are dominated by neither O nor C, often leading to atypical spectral features from their molecules and dust grains. All of the stars in our sample have strong dust e... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Journal ref: The Astrophysical Journal, 973:158 (9pp), 2024 October 1

80. [arXiv:2409.20311](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Local HI Absorption towards the Magellanic Cloud foreground using ASKAP

**Authors:** [Hiep Nguyen](#), [N. M. McClure-Griffiths](#), [James Dempsey](#), [John M. Dickey](#), [Min-Young Lee](#), [Callum Lynn](#), [Claire E. Murray](#), [Snežana Stanimirović](#), [Michael P. Busch](#), [Susan E. Clark](#), [J. R. Dawson](#), [Helga Dénes](#), [Steven Gibson](#), [Katherine Jameson](#), [Gilles Joncas](#), [Ian Kemp](#), [Denis Leahy](#), [Yik Ki Ma](#), [Antoine Marchal](#), [Marc-Antoine Miville-Deschênes](#), [Nickolas M. Pingel](#), [Amit Seta](#), [Juan D. Soler](#), [Jacco Th. van Loon](#)

**Abstract:** We present the largest Galactic neutral hydrogen HI absorption survey to date, utilizing the Australian SKA Pathfinder Telescope at an unprecedented spatial resolution of 30". This survey, GASKAP-HI, unbiasedly targets 2,714 continuum background sources over 250



square degrees in the direction of the Magellanic Clouds, a significant increase compared to a total of 373 sources observed by previous... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

**Comments:** Largest Galactic HI Absorption Survey To Date (GASKAP-HI): Cold Atomic Gas in the Magellanic Cloud foreground using Australian SKA Pathfinder. This paper has 19 pages, 17 figures. This paper has been accepted for publication in Monthly Notices of the Royal Astronomical Society Main Journal

**Journal ref:** MNRAS 2024

81. [arXiv:2409.20309](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Finding massive double-exponential disk galaxies with extended low surface brightness stellar disk -- an IllustrisTNG exploration

**Authors:** [Suchira Sarkar](#), [Kanak Saha](#)

**Abstract:** We study massive disk galaxies (stellar mass  $\geq 10^{11} M_{\odot}$ ) at  $z = 0$  from IllustrisTNG simulation to detect galaxies that contain two exponential stellar disks - a central high surface brightness (HSB) disk surrounded by an extended low surface brightness (LSB) envelope. This is motivated by observation of several giant LSB galaxies, reported in literature, showing such complex layer... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

**Comments:** 15 pages, 7 figures, 2 tables, Submitted to ApJ, Comments welcome

82. [arXiv:2409.20272](#) [[pdf](#), [other](#)] [astro-ph.IM](#) [astro-ph.EP](#)

## KISS: instrument description and performance

**Authors:** [J. F. Macías-Pérez](#), [M. Fernández-Torreiro](#), [A. Catalano](#), [A. Fasano](#), [M. Aguiar](#), [A. Beelen](#), [A. Benoit](#), [A. Bideaud](#), [J. Bounmy](#), [O. Bourrion](#), [M. Calvo](#), [J. A. Castro-Almazán](#), [P. de Bernardis](#), [M. de Petris](#), [A. P. de Taoro](#), [G. Garde](#), [R. T. Génova-Santos](#), [A. Gomez](#), [M. F. Gómez-Renasco](#), [J. Goupy](#), [C. Hoarau](#), [R. Hoyland](#), [G. Lagache](#), [J. Marpaud](#), [M. Marton](#), et al. (13 additional authors not shown)

**Abstract:** Kinetic inductance detectors (KIDs) have been proven as reliable systems for astrophysical observations, especially in the millimetre range. Their compact size enables to optimally fill the focal plane, thus boosting sensitivity. The KISS (KIDs Interferometric Spectral Surveyor) instrument is a millimetre camera that consists of two KID arrays of 316 pixels each coupled to a Martin-Puplett interfe... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

**Comments:** 23 pages, 15 figures. Accepted for publication in Publications of the Astronomical Society of the Pacific

83. [arXiv:2409.20271](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## The evolution of the mass--radius relation of expanding very young star clusters

**Authors:** [Jian-Wen Zhou](#), [Pavel Kroupa](#), [Wenjie Wu](#)

**Abstract:** The initial mass--radius relation of embedded star clusters is an essentially important boundary condition for understanding the evolution of embedded clusters in which stars form to their release into the galactic field via an open star cluster phase. The initial mass--radius relation of embedded clusters deduced by Marks & Kroupa is significantly different from the relation suggested by Pfalzne... [▽ More](#)

**Submitted** 30 September, 2024; **originally announced** September 2024.

84. [arXiv:2409.20236](#) [[pdf](#), [other](#)] [hep-ph](#) [astro-ph.GA](#)

## Vortex Lines in Ultralight Bosonic Dark Matter around Rotating Supermassive Black Holes

**Authors:** [K. Korshynska](#), [O. O. Prykhodko](#), [E. V. Gorbar](#), [Junji Jia](#), [A. I. Yakimenko](#)

**Abstract:** Theoretical analysis of the interaction between superfluid dark matter and rotating supermassive black holes offers a promising framework for probing quantum effects in ultralight dark matter and its role in galactic structure. We study how black hole rotation influences the state of ultralight bosonic dark matter, focusing on the stability and dynamics of vortex lines. The gravitational effects o... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

85. [arXiv:2409.20235](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [cond-mat.mtrl-sci](#) [cs.LG](#)

## A general machine learning model of aluminosilicate melt viscosity and its application to the surface properties of dry lava planets

**Authors:** [Charles Le Losq](#), [Clément Ferraina](#), [Paolo A. Sossi](#), [Charles-Édouard Boukaré](#)

**Abstract:** Ultra-short-period exoplanets like K2-141 b likely have magma oceans on their dayside, which play a critical role in redistributing heat within the planet. This could lead to a warm nightside surface, measurable by the James Webb Space Telescope, offering insights into the planet's structure. Accurate models of properties like viscosity, which can vary by orders of magnitude, are essential for suc... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 21 pages, 9 figures, 2 tables

86. [arXiv:2409.20150](#) [[pdf](#), [other](#)] [gr-qc](#) [astro-ph.GA](#) [physics.comp-ph](#)

## Deep Learning solutions to singular problems: from special functions to spherical accretion

**Authors:** [R. Cayuso](#), [M. Herrero-Valea](#), [E. Barausse](#)

**Abstract:** Singular regular points often arise in differential equations describing physical phenomena such as fluid dynamics, electromagnetism, and gravitation. Traditional numerical techniques often fail or become unstable near these points, requiring the use of semi-analytical tools, such as series expansions and perturbative methods, in combination with numerical algorithms; or to invoke more sophisticat... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 20 pages, 10 figures

87. [arXiv:2409.20109](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## New HI observations Toward the NGC 5055 Galaxy Group with FAST

**Authors:** [Xiao-Lan Liu](#), [Ming Zhu](#), [Jin-Long Xu](#), [Peng Jiang](#), [Chuan-Peng Zhang](#), [Nai-Ping Yu](#), [Jun-Jie Wang](#), [Yan-Bin Yang](#)

**Abstract:** We report a new high-sensitivity HI mapping observation of the NGC 5055 galaxy group over an area of  $1.^\circ 5 \times 0.^\circ 75$  with the Five-hundred-meter Aperture Spherical radio Telescope (FAST). Our observation reveals that the warped  $H_{\text{I}}$  disk of NGC~5055 is more

extended than what previously observed by WSRT, out to  $23.^{\circ}9$  (61.7 kpc). The total HI mass of NGC 5055 is determined to b... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 10 pages, 6 figures

88. [arXiv:2409.20076](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [physics.plasm-ph](#) [physics.space-ph](#)

## Three-dimensional Simulation of Surface Charging in Meteorite Craters on Rotating Asteroids

Authors: [Zhiying Song](#), [Zhigui Liu](#), [Ronghui Quan](#)

**Abstract:** Meteorite craters on the asteroid surface obstruct the horizontal flow of solar wind, forming a plasma wake that modulates the particle fluxes and the electrostatic environment far downstream. In this study, surface charging properties of asteroids with nontrivial terrain are simulated based on neural network and the finite element method. Key factors such as the location, size and depth-to-width... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

89. [arXiv:2409.20074](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Toward robust physical and chemical characterization of heterogeneous lines of sight: The case of the Horsehead nebula

Authors: [Léontine Ségal](#), [Antoine Roueff](#), [Jérôme Pety](#), [Maryvonne Gerin](#), [Evelyne Roueff](#), [R. Javier Goicoechea](#), [Ivana Bešlić](#), [Simon Coud'e](#), [Lucas Einig](#), [Helena Mazurek](#), [H. Jan Orkisz](#), [Pierre Palud](#), [G. Miriam Santa-Maria](#), [Antoine Zakardjian](#), [S'ebastien Bardeau](#), [Emeric Bron](#), [Pierre Chainais](#), [Karine Demyk](#), [Victor de Souza Magalhaes](#), [Pierre Gratier](#), [V. Viviana Guzman](#), [Annie Hughes](#), [David Languignon](#), [François Levrier](#), [Jacques Le Bourlot](#), et al. (6 additional authors not shown)

**Abstract:** Dense cold molecular cores/filaments are surrounded by an envelope of translucent gas. Some of the low-J emission lines of CO and HCO<sup>+</sup> isotopologues are more sensitive to the conditions either in the translucent environment or in the dense cold one. We propose a cloud model composed of three homogeneous slabs of gas along each LoS, representing an envelope and a shielded inner layer. IRAM-30m d... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

90. [arXiv:2409.20015](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#)

## Towards a complete census of luminous Compton-thick Active Galactic Nuclei in the local Universe

Authors: [A. Akylas](#), [I. Georgantopoulos](#), [P. Gandhi](#), [P. Boorman](#), [C. L. Greenwell](#)

**Abstract:** X-ray surveys provide the most efficient means for the detection of Active Galactic Nuclei (AGN). However, they face difficulties in detecting the most heavily obscured Compton-thick AGN. The BAT detector on board the Gehrels/Swift mission, operating in the very hard 14-195 keV band, has provided the largest samples of Compton-thick AGN in the local Universe. However, even these flux limited sampl... [▽ More](#)

Submitted 30 September, 2024; originally announced September 2024.

Comments: 16 pages, 9 Figures

91. [arXiv:2409.19914](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## MAGICS II. Seed black holes stripped of their surrounding stars do not sink

**Authors:** [Yihao Zhou](#), [Diptajyoti Mukherjee](#), [Nianyi Chen](#), [Tiziana Di Matteo](#), [Peter H. Johansson](#), [Antti Rantala](#), [Christian Partmann](#), [Ugo NiccolDi Carlo](#), [Simeon Bird](#), [Yueying Ni](#)

**Abstract:** MBH seed mergers are expected to be among the loudest sources of gravitational waves detected by the Laser Interferometer Space Antenna (LISA), providing a unique window into the birth and early growth of SMBH. We present the MAGICS-II simulation suite, consisting of 6 galaxy mergers that result in MBH seeds mergers identified in the cosmological simulation ASTRID. With the enhanced resolution (ma... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

**Comments:** 26 pages, 20 figures. Submitted to ApJ. Comments are welcome!

92. [arXiv:2409.19858](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.SR](#)

## The GALAH Survey: Data Release 4

**Authors:** [S. Buder](#), [J. Kos](#), [E. X. Wang](#), [M. McKenzie](#), [M. Howell](#), [S. L. Martell](#), [M. R. Hayden](#), [D. B. Zucker](#), [T. Nordlander](#), [B. T. Montet](#), [G. Traven](#), [J. Bland-Hawthorn](#), [G. M. De Silva](#), [K. C. Freeman](#), [G. F. Lewis](#), [K. Lind](#), [S. Sharma](#), [J. D. Simpson](#), [D. Stello](#), [T. Zwitter](#), [A. M. Amarsi](#), [J. J. Armstrong](#), [K. Banks](#), [M. A. Beavis](#), [K. Beeson](#), et al. (14 additional authors not shown)

**Abstract:** The stars of the Milky Way carry the chemical history of our Galaxy in their atmospheres as they journey through its vast expanse. Like barcodes, we can extract the chemical fingerprints of stars from high-resolution spectroscopy. The fourth data release (DR4) of the Galactic Archaeology with HERMES (GALAH) Survey, based on a decade of observations, provides the chemical abundances of up to 32 ele... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

**Comments:** 43 pages, 38 figures to be submitted to PASA. Accompanying the GALAH Data Release 4, see <https://www.galah-survey.org> and [https://cloud.datacentral.org.au/teamdata/GALAH/public/GALAH\\_DR4/](https://cloud.datacentral.org.au/teamdata/GALAH/public/GALAH_DR4/). All code available on [http://github.com/svenbuder/GALAH\\_DR4/](http://github.com/svenbuder/GALAH_DR4/) and [https://github.com/svenbuder/galah\\_dr4\\_paper](https://github.com/svenbuder/galah_dr4_paper). Comments welcome

93. [arXiv:2409.19844](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## Redshifted Sodium Transient near Exoplanet Transit

**Authors:** [Apurva V. Oza](#), [Julia V. Seidel](#), [H. Jens Hoeijmakers](#), [Athira Unni](#), [Aurora Y. Kesseli](#), [Carl A. Schmidt](#), [Sivarani Thirupathi](#), [Aaron Bello-Arufe](#), [Andrea Gebek](#), [Moritz Meyer zu Westram](#), [Sérgio G. Sousa](#), [Rosaly M. C. Lopes](#), [Renyu Hu](#), [Katherine de Kleer](#), [Chloe Fisher](#), [Sébastien Charnoz](#), [Ashley D. Baker](#), [Samuel P. Halverson](#), [Nicholas M. Schneider](#), [Angelica Psaridi](#), [Aurélien Wyttenbach](#), [Santiago Torres](#), [Ishita Bhatnagar](#), [Robert E. Johnson](#)

**Abstract:** Neutral sodium (Na I) is an alkali metal with a favorable absorption cross section such that tenuous gases are easily illuminated at select transiting exoplanet systems. We examine both the time-averaged and time-series alkali spectral flux individually, over 4 nights at a hot Saturn system on a  $\sim 2.8$  day orbit about a Sun-like star WASP-49 A. Very Large Telescope/ESPRESSO observations are an... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

**Comments:** Accepted to ApJ Letters (2024 August 2)

94. [arXiv:2409.19781](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Ruling out unitary Fermi gas of neutrinos as galactic dark matter

**Authors:** [Andrés Aceña](#)

**Abstract:** We investigate the possibility that galactic dark matter could be interacting fermions in the neutrino mass range. Assuming that galactic halos behave like a fluid in hydrostatic and thermal equilibrium, we employ the equation of state for a unitary Fermi gas to establish constraints on the mass of the fermion. Our findings effectively exclude neutrinos as candidates for galactic dark matter, and... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

**Comments:** 7 pages, 4 figures

95. [arXiv:2409.19776](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Shining a Light on the Connections between Galactic Outflows Seen in Absorption and Emission Lines

**Authors:** [Xinfeng Xu](#), [Alaina Henry](#), [Timothy Heckman](#), [Cody Carr](#), [Allison L. Strom](#), [Tucker Jones](#), [Danielle A. Berg](#), [John Chisholm](#), [Dawn Erb](#), [Bethan L. James](#), [Anne Jaskot](#), [Crystal L. Martin](#), [Matilde Mingozi](#), [Peter Senchyna](#), [Namrata Roy](#), [Claudia Scarlata](#), [Daniel P. Stark](#)

**Abstract:** Galactic outflows provide important feedback effects to regulate the evolution of the host galaxies. Two primary diagnostics of galactic outflows are broad and/or blueshifted emission and absorption lines. Even though well-established methods exist to analyze these outflow signatures, connections between them are rarely studied and largely unknown. In this paper, we present the first detailed comp... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

**Comments:** 3 tables, 17 figures, 30 pages, submitted to ApJ

96. [arXiv:2409.19725](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## 2019 UO<sub>14</sub>: A Transient Trojan of Saturn

**Authors:** [Man-To Hui](#), [Paul A. Wiegert](#), [Robert Weryk](#), [Marco Micheli](#), [David J. Tholen](#), [Sam Deen](#), [Andrew J. Walker](#), [Richard Wainscoat](#)

**Abstract:** Saturn has long been the only giant planet in our solar system without any known Trojan members. In this paper, with serendipitous archival observations and refined orbit determination, we report that 2019 UO<sub>14</sub> is a Trojan of the gas giant. However, the object is only a transient Trojan currently librating around the leading Lagrange point  $L_4$  of the Sun-Saturn system in a period of... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

97. [arXiv:2409.19665](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#) [astro-ph.HE](#) [gr-qc](#)

## Gravitational Wave Astronomy With TianQin

**Authors:** [En-Kun Li](#), [Shuai Liu](#), [Alejandro Torres-Orjuela](#), [Xian Chen](#), [Kohei Inayoshi](#), [Long Wang](#), [Yi-Ming Hu](#), [Pau Amaro-Seoane](#), [Abbas Askar](#), [Cosimo Bambi](#), [Pedro R. Capelo](#), [Hong-Yu Chen](#), [Alvin J. K. Chua](#), [Enrique Condés-Breña](#), [Lixin Dai](#), [Debroy Das](#), [Andrea Derdzinski](#), [Hui-Min Fan](#), [Michiko Fujii](#), [Jie Gao](#), [Mudit Garg](#), [Hongwei Ge](#), [Mirek Giersz](#), [Shun-Jia Huang](#), [Arkadiusz Hypki](#), et al. (27 additional authors not shown)

**Abstract:** The opening of the gravitational wave window has significantly enhanced our capacity to explore the universe's most extreme and dynamic sector. In the mHz frequency range, a diverse range of compact objects, from the most massive black holes at the farthest reaches of

the Universe to the lightest white dwarfs in our cosmic backyard, generate a complex and dynamic symphony of gravitational wave sig... [▽ More](#)

Submitted 29 September, 2024; originally announced September 2024.

Comments: TianQin Gravitational Wave Whitepaper, 72 pages, 30 figures

98. [arXiv:2409.19664](#) [[pdf](#), [other](#)] [gr-qc](#) [astro-ph.CO](#) [astro-ph.GA](#) [astro-ph.HE](#)

## Gravitational Wave Astrophysics with TianQin: A brief progress review

Authors: [Yi-Ming Hu](#)

**Abstract:** As a space-borne gravitational wave observatory, TianQin can observe a large variety of gravitational wave sources. The rich signals can be composed by different types of astronomical systems, like Galactic compact binaries, inspiral of stellar mass black holes, merger of massive black holes, and extreme mass ratio inspirals. The incoherent summation of these signals can also form a stochastic gra... [▽ More](#)

Submitted 29 September, 2024; originally announced September 2024.

Comments: Prepared for the proceeding of the 7th International Workshop on the TianQin Science Mission. 12 pages, 2 figures

99. [arXiv:2409.19612](#) [[pdf](#), [other](#)]

[astro-ph.SR](#) [astro-ph.EP](#) [astro-ph.IM](#) [hep-ph](#) [physics.space-ph](#)

## On the simultaneity of Forbush decreases: the simultaneous effects of interplanetary parameters and geomagnetic activity indices

Authors: [I. O. Eya](#), [E. U. Iyida](#), [O. Okike](#), [R. E. Ugwoke](#), [F. M. Menteso](#), [C. J. Ugwu](#), [P. Simpemba](#), [J. Simfukwe](#), [D. Silungwe](#), [S. P. Phiri](#), [G. F Abbey](#), [J. A. Alhassan](#), [A. E. Chukwude](#)

**Abstract:** Forbush decreases (Fd) are transient, short-term reductions in the intensity of galactic cosmic rays that reach the Earth's surface. When this reduction is observed at multiple locations at the same time, it is referred to as simultaneous Forbush decreases (SFd). Identifying Fd events in daily averaged Cosmic ray (CR) raw data is always tedious, but the task has gone minimal through an algorithm (... [▽ More](#)

Submitted 29 September, 2024; originally announced September 2024.

Comments: 15 pages, 7 figures. To be published in J. Astrophys. Astr

100. [arXiv:2409.19604](#) [[pdf](#), [ps](#), [other](#)] [astro-ph.SR](#) [astro-ph.GA](#)

## The impact of third dredge-up on the mass loss of Mira variables

Authors: [S. Uttenthaler](#), [S. Shetye](#), [A. Nanni](#), [B. Aringer](#), [K. Eriksson](#), [I. McDonald](#), [D. Gobrecht](#), [S. Höfner](#), [U. Wolter](#), [S. Cristallo](#), [K. Bernhard](#)

**Abstract:** Context: The details of the mass-loss process in the late stages of low- and intermediate-mass stellar evolution are not well understood, in particular its dependence on stellar parameters. Mira variables are highly suitable targets for studying this mass-loss process. Aims: We follow up on our earlier finding that a near-to-mid-infrared colour vs. pulsation period diagram shows two sequences of M... [▽ More](#)

Submitted 29 September, 2024; originally announced September 2024.

Comments: 16 pages, 10 figures, accepted for publication in Astronomy & Astrophysics

101. [arXiv:2409.19570](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [math.OC](#) [physics.space-ph](#)

## Long-Term Earth Magnetosphere Science Orbit via Earth-Moon Resonance

## Orbit

**Authors:** [Jinsung Lee](#), [Jaeyoung Kwak](#), [Jaemyung Ahn](#)

**Abstract:** This article investigates long-term orbits within the Earth's magnetosphere, specifically focusing on orbits where the argument of periapsis is synchronized with changes induced by lunar gravity assists and the Earth's argument of latitude over a complete orbital period in Earth-Moon resonance. In the Earth-Moon rotating frame, resonance orbits appear repetitive; however, the argument of periapsis... [▽ More](#)

**Submitted** 29 September, 2024; **originally announced** September 2024.

**Comments:** 20 pages, Preliminary results shared in 2024 AIAA SCITECH Conference Conference paper: Sun-Earth Harmonic Orbit via Earth-Moon Resonance Orbit

102. [arXiv:2409.19539](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.SR](#)

### Measuring the Diffuse Interstellar Bands at 5780, 5797 and 6614 Å in Low-Resolution Spectra of Cool Stars from LAMOST

**Authors:** [Xiao-Xiao Ma](#), [Jian-Jun Chen](#), [A-Li Luo](#), [He Zhao](#), [Ji-Wei Shi](#), [Jing Chen](#), [Jun-Chao Liang](#), [Shu-Guo Ma](#), [Cai-Xia Qu](#), [Bi-Wei Jiang](#)

**Abstract:** We attempt to measure the DIBs  $\lambda 5780$ ,  $\lambda 5797$  and  $\lambda 6614$  in over two million low-resolution spectra of cool stars from LAMOST. Based on the DIB measurements, the correlation between DIBs and extinction, the kinematics of DIBs, and the Galactic distribution of DIBs are reviewed and investigated from the perspective of statistics. A pipeline is developed to measure the DIBs  $\lambda 5780$ ,  $\lambda 5797$  and... [▽ More](#)

**Submitted** 28 September, 2024; **originally announced** September 2024.

**Comments:** 20 pages, 5 tables, 13 figures, 1 appendix, accepted for publication in A&A

**Report number:** aa51408-24

103. [arXiv:2409.19537](#) [[pdf](#)] [astro-ph.EP](#) [astro-ph.IM](#) [physics.geo-ph](#) [doi](#) [10.3390/rs16193628](#)

### Perspectives and challenges in bolide infrasound processing and interpretation: A focused review with case studies

**Authors:** [Elizabeth A. Silber](#)

**Abstract:** Infrasound sensing plays a critical role in the detection and analysis of bolides, offering passive, cost-effective global monitoring capabilities. Key objectives include determining the timing, location, and yield of these events. Achieving these goals requires a robust approach to detect, analyze, and interpret rapidly moving elevated sources such as bolides (also re-entry and space debris). In... [▽ More](#)

**Submitted** 28 September, 2024; **originally announced** September 2024.

**Comments:** 42 pages, 13 figures

**Report number:** SAND2024-126990

**Journal ref:** Remote Sensing. 2024; 16(19):3628

104. [arXiv:2409.19503](#) [[pdf](#), [other](#)] [astro-ph.IM](#) [astro-ph.EP](#)

### A Multi-station Meteor Monitoring ( $M^3$ ) System. I. Design and Testing

**Authors:** [Z. Li](#), [H. Zou](#), [J. Liu](#), [J. Ma](#), [X. Zhao](#), [X. Li](#), [Z. Tu](#), [B. Zhang](#), [R. Wang](#), [S. Wang](#), [Marco Xue](#)

**Abstract:** Meteors carry important and indispensable information about the interplanetary environment, which can be used to understand the origin and evolution of our solar system. We have developed a Multi-station Meteor Monitoring ( $M^3$ ) system that can observe almost the

entire sky and detect meteors automatically, and it determines their trajectories. They are highly extensible to construct a large-... [▽ More](#)

Submitted 28 September, 2024; originally announced September 2024.

Comments: 38 pages, 12 figures, Accepted for publication in the Journal of Astronomical Telescopes, Instruments, and Systems (JATIS)

105. [arXiv:2409.19493](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [hep-ph](#)

## The GD-1 stellar stream perturber as a core-collapsed self-interacting dark matter halo

Authors: [Xingyu Zhang](#), [Hai-Bo Yu](#), [Daneng Yang](#), [Ethan O. Nadler](#)

**Abstract:** The GD-1 stellar stream exhibits spur and gap structures that may result from a close encounter with a dense substructure. When interpreted as a dark matter subhalo, the perturber is denser than predicted in the standard cold dark matter (CDM) model. In self-interacting dark matter (SIDM), however, a halo could evolve into a phase of gravothermal collapse, resulting in a higher central density tha... [▽ More](#)

Submitted 28 September, 2024; originally announced September 2024.

Comments: 10 pages, 4 figures

106. [arXiv:2409.19447](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#) [physics.chem-ph](#)

[doi](#) [10.1093/mnras/stae2201](#)

## ExoMol line lists -- LIX. High-temperature line list for N<sub>2</sub>O

Authors: [Sergei N. Yurchenko](#), [Thomas M. Mellor](#), [Jonathan Tennyson](#)

**Abstract:** New hot line lists for five isotopologues of N<sub>2</sub>O are presented, for the parent <sup>14</sup>N<sub>2</sub><sup>16</sup>O and 4 singly substituted species <sup>14</sup>N<sub>2</sub><sup>17</sup>O, <sup>14</sup>N<sub>2</sub><sup>18</sup>O, <sup>14</sup>N<sup>15</sup>N<sup>16</sup>O and <sup>15</sup>N<sup>14</sup>N<sup>16</sup>O. The line lists have been computed with the variational program TROVE using a new empirical potential energy surface (PES) and an accurate ab initio dipole moment surface o... [▽ More](#)

Submitted 28 September, 2024; originally announced September 2024.

107. [arXiv:2409.19399](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#)

## Testing the framework of the halo occupation distribution with assembly bias modeling

Authors: [Zhongxu Zhai](#), [Will Percival](#)

**Abstract:** We investigate theoretical systematics caused by the application of the halo occupation distribution (HOD) to the study of galaxy clustering at non-linear scales. To do this, we repeat recent cosmological analyses using extended HOD models based on both the Aemulus and Aemulus  $\nu$  simulation suites, allowing for variations in the dark matter halo shape, incompleteness, baryonic effects and positio... [▽ More](#)

Submitted 28 September, 2024; originally announced September 2024.

Comments: 13 pages, 10 figures, comments welcome

108. [arXiv:2409.19333](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

## Promise and Peril: Stellar Contamination and Strict Limits on the Atmosphere Composition of TRAPPIST-1c from JWST NIRISS Transmission Spectra



**Authors:** [Michael Radica](#), [Caroline Piaulet-Ghorayeb](#), [Jake Taylor](#), [Louis-Philippe Coulombe](#), [Loïc Albert](#), [Étienne Artigau](#), [Björn Benneke](#), [Nicolas B. Cowan](#), [René Doyon](#), [David Lafrenière](#), [Alexandrine L'Heureux](#), [Olivia Lim](#)

**Abstract:** Attempts to probe the atmospheres of rocky planets around M dwarfs present both promise and peril. While their favorable planet-to-star radius ratios enable searches for even thin secondary atmospheres, their high activity levels and high-energy outputs threaten atmosphere survival. Here, we present the 0.6--2.85 $\mu\text{m}$  transmission spectrum of the 1.1 Earth-radius, ~340K rocky planet TRAPPIST-1c obt... [▽ More](#)

**Submitted** 1 October, 2024; **v1 submitted** 28 September, 2024; **originally announced** September 2024.

**Comments:** Minor typo corrections and figure axis adjustments compared to previous version

109. [arXiv:2409.19324](#) [[pdf](#), [ps](#), [other](#)] [astro-ph.GA](#)

## Variable Modified Newtonian Mechanics IV: Non Rotating Galaxies

**Authors:** [James C. C. Wong](#)

**Abstract:** Recently we find in Einstein Gravity a single-metric solution for a point mass residing in an expanding universe [\cite{wong}](#), which apart from the Newtonian acceleration, gives rise to an additional MOND-like acceleration in which the MOND acceleration  $a_0$  is replaced by the cosmological acceleration  $\frac{1}{2}H^2(z)r$ . We study a protogalactic cloud in this acceleration such that an overdensi... [▽ More](#)

**Submitted** 28 September, 2024; **originally announced** September 2024.

**Comments:** 12 pages, 0 figure

110. [arXiv:2409.19311](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [doi](#) [10.1051/0004-6361/202452196](#)

## Discovery of two cyano derivatives of acenaphthylene (C<sub>12</sub>H<sub>8</sub>) in TMC-1 with the QUIJOTE line survey

**Authors:** [J. Cernicharo](#), [C. Cabezas](#), [R. Fuentetaja](#), [M. Agúndez](#), [B. Tercero](#), [J. Janeiro](#), [M. Juanes](#), [R. I. Kaiser](#), [Y. Endo](#), [A. L. Steber](#), [D. Pérez](#), [C. Pérez](#), [A. Lesarri](#), [N. Marcelino](#), [P. de Vicente](#)

**Abstract:** We report the discovery in TMC-1 of two cyano derivatives of the PAH acenaphthylene (C<sub>12</sub>H<sub>8</sub>). We have found two series of lines with the QUIJOTE line survey that we assign to 1-C<sub>12</sub>H<sub>7</sub>CN and 5-C<sub>12</sub>H<sub>7</sub>CN. For the 1-isomer, we have detected and assigned 173 rotational transitions with  $J$  up to 46 and  $K_a$  up to 9, corresponding to 107 independent frequencies. For the 5-isomer, t... [▽ More](#)

**Submitted** 28 September, 2024; **originally announced** September 2024.

**Comments:** Accepted as a Letter to the Editor in Astronomy and Astrophysics on 18th September 2024

111. [arXiv:2409.19288](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#) [physics.atom-ph](#)

## Lyman- $\alpha$ feedback prevails at Cosmic Dawn: Implications for the first galaxies, stars, and star clusters

**Authors:** [Olof Nebrin](#), [Aaron Smith](#), [Kevin Lorinc](#), [Johan Hörnquist](#), [Åsa Larson](#), [Garrelt Mellema](#), [Sambit K. Giri](#)

**Abstract:** Radiation pressure from Lyman- $\alpha$  (Ly $\alpha$ ) scattering is a potentially dominant form of early stellar feedback, capable of injecting up to  $\sim 100 \times$  more momentum into the interstellar medium (ISM) than UV continuum radiation pressure and stellar winds. Ly $\alpha$  feedback is particularly strong in dust-poor environments and is thus especially important during the

formation of the first stars... [▽ More](#)

Submitted 28 September, 2024; originally announced September 2024.

Comments: Comments welcome! 42 pages (31 pages main text, the rest an extensive Appendix + references), 20 figures

112. [arXiv:2409.19205](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## A Search for $z = 5$ $H\alpha$ and $H\beta+[O III]$ Dual-Line Emitting Galaxies in the JWST CEERS Field: Implications for the AGN Abundance

Authors: [Jingsong Guo](#), [Masafusa Onoue](#), [Kohei Inayoshi](#), [Dale D. Kocevski](#), [Steven L. Finkelstein](#), [Micaela B. Bagley](#), [Elizabeth J. McGrath](#)

**Abstract:** The James Webb Space Telescope (JWST) has enabled us to uncover faint galaxies and active galactic nuclei (AGNs) in the early universe. Taking advantage of the unique filter combination used in the Cosmic Evolution Early Release Science Survey (CEERS) program, we perform an extensive photometric search of galaxies emitting strong  $H\beta+[O III]$  and  $H\alpha$  lines. The redshift range of the galaxies is l... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 24 pages, 16 figures, 5 tables. submitted to ApJ

113. [arXiv:2409.19204](#) [[pdf](#), [ps](#), [other](#)] [astro-ph.GA](#) [astro-ph.SR](#)

## ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions — XVII. High-mass star-formation through a large-scale collapse in IRAS 15394— 5358

Authors: [Swagat R. Das](#), [Manuel Merello](#), [Leonardo Bronfman](#), [Tie Liu](#), [Guido Garay](#), [Amelia Stutz](#), [Diego Mardones](#), [Jian-Wen Zhou](#), [Patricio Sanhueza](#), [Hong-Li Liu](#), [Enrique Vázquez-Semadeni](#), [Gilberto C. Gómez](#), [Aina Palau](#), [Anandmayee Tej](#), [Feng-Wei Xu](#), [Tapas Baug](#), [Lokesh K. Dewangan](#), [Jinhua He](#), [Lei Zhu](#), [Shanghuo Li](#)<sup>1</sup>, [Mika Juvela](#), [Anindya Saha](#), [Namitha Issac](#), [Jihye Hwang](#), [Hafiz Nazeer](#), et al. (1 additional authors not shown)

**Abstract:** Hub-filament systems are considered as natural sites for high-mass star formation. Kinematic analysis of the surroundings of hub-filaments is essential to better understand high-mass star formation within such systems. In this work, we present a detailed study of the massive Galactic protocluster IRAS 15394— 5358, using continuum and molecular line data from the ALMA Three-millimeter Observations... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 23 pages, 19 figures, accepted for publication in MNRAS

114. [arXiv:2409.19191](#) [[pdf](#), [other](#)] [astro-ph.SR](#) [astro-ph.EP](#)

## Physical Parameters and Properties of 20 Cold Brown Dwarfs in JWST

Authors: [Zhijun Tu](#), [Shu Wang](#), [Jifeng Liu](#)

**Abstract:** We present a comprehensive analysis of 20 T and Y dwarfs using spectroscopy from the NIRSpec CLEAR/PRISM and MIRI LRS instruments on the James Webb Space Telescope. To characterize the atmospheric parameters, we utilize two atmospheric model grids: the Sonora Elf Owl and ATMO2020++. The effective temperatures derived from the two models are relatively consistent, and metallicities are both close t... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 31 pages, 14 figures, accepted for publication in ApJ

115. [arXiv:2409.19183](#) [[pdf](#), [ps](#), [other](#)] [astro-ph.GA](#)
- ### The discovery and evolution of a radio continuum and excited-OH spectral-line outburst in the nearby galaxy NGC 660
- Authors:** [C. J. Salter](#), [T. Ghosh](#), [R. F. Minchin](#), [E. Momjian](#), [B. Catinella](#), [M. Lebron](#), [M. S. Lerner](#)
- Abstract:** Arecibo 305-m Telescope observations between 2008 and 2018 detected a radio continuum and spectral-line outburst in the nearby galaxy, NGC 660. Excited-OH maser emission/absorption lines near 4.7 GHz, and H<sub>2</sub>CO absorption at 4.83 GHz varied on time-scales of months. Simultaneously, a continuum outburst occurred in which a new compact component appeared, with a GHz-peaked spectrum and a 5-GHz flu... [▽ More](#)
- Submitted** 27 September, 2024; **originally announced** September 2024.
- Comments:** 18 pages, 7 figures, accepted for publication in The Astronomical Journal
116. [arXiv:2409.19095](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.HE](#)
- ### MAGICS III. Seeds sink swiftly: nuclear star clusters dramatically accelerate seed black hole mergers
- Authors:** [Diptajyoti Mukherjee](#), [Yihao Zhou](#), [Nianyi Chen](#), [Ugo Niccolo Di Carlo](#), [Tiziana Di Matteo](#)
- Abstract:** Merger rate predictions of Massive Black Hole (MBH) seeds from large-scale cosmological simulations differ widely, with recent studies highlighting the challenge of low-mass MBH seeds failing to reach the galactic center, a phenomenon known as the seed sinking problem. In this work, we tackle this issue by integrating cosmological simulations and galaxy merger simulations from the MAGICS-I and MAG... [▽ More](#)
- Submitted** 27 September, 2024; **originally announced** September 2024.
- Comments:** 26 pages, 13 figures. Submitted to ApJ. Comments welcome!
117. [arXiv:2409.19073](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.IM](#) [astro-ph.SR](#)
- [doi](#) [10.3847/2515-5172/ad8129](#)
- ### HZ\_evolution: A Package to Calculate Habitable Histories
- Authors:** [Noah W. Tuchow](#), [Jason T. Wright](#)
- Abstract:** We present HZ\_evolution, a Python package to characterize the habitable histories of exoplanets. Given inputs of a planet's current effective flux and host star properties, HZ\_evolution calculates its instellation history, the evolution of the star's Habitable Zone, and the duration the planet spends inside or outside the Habitable Zone.
- Submitted** 27 September, 2024; **originally announced** September 2024.
- Comments:** Accepted for publication in Research Notes of the AAS
118. [arXiv:2409.19072](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.GA](#) [astro-ph.SR](#)
- ### The origin of free-floating objects in the Galaxy
- Authors:** [Simon F. Portegies Zwart](#)
- Abstract:** The Milky way Galaxy is brimming with free-floating objects, including stars, planets and planetesimals. For the purpose of this chapter, we define a free-floating object as a solid body that is not orbited by a considerably more massive body. A planet then is considered free floating if it is not orbiting a star but it may be orbiting another planet. A binary planet, or planet-moon pair that is n... [▽ More](#)
- Submitted** 27 September, 2024; **originally announced** September 2024.

119. [arXiv:2409.19066](#) [pdf, other] [astro-ph.GA](#)
- ### Value Added Catalog of physical properties of more than 1.3 million galaxies from the DESI Survey
- Authors:** M. Siudek, R. Pucha, M. Mezcua, S. Juneau, J. Aguilar, S. Ahlen, D. Brooks, C. Circosta, T. Claybaugh, S. Cole, K. Dawson, A. de la Macorra, Arjun Dey, Biprateep Dey, P. Doel, A. Font-Ribera, J. E. Forero-Romero, E. Gaztañaga, S. Gontcho A Gontcho, G. Gutierrez, K. Honscheid, C. Howlett, M. Ishak, R. Kehoe, D. Kirkby, et al. (28 additional authors not shown)
- Abstract:** Aims. We present an extensive catalog of the physical properties of more than a million galaxies within the Dark Energy Spectroscopic Instrument (DESI), one of the largest spectroscopic surveys to date. Spanning over a full variety of target types, including emission line galaxies and luminous red galaxies as well as quasars, our survey encompasses an unprecedented range of spectroscopic redshifts... [▽ More](#)
- Submitted** 27 September, 2024; **originally announced** September 2024.  
**Comments:** resubmitted after addressing minor referee comments
120. [arXiv:2409.19054](#) [pdf, other] [astro-ph.GA](#) [astro-ph.CO](#)
- ### Inhomogeneous Dust Biases Photometric Redshifts and Stellar Masses for LSST
- Authors:** ChangHoon Hahn, Peter Melchior
- Abstract:** Spectral energy distribution (SED) modeling is one of the main methods to estimate galaxy properties, such as photometric redshifts,  $z$ , and stellar masses,  $M_*$ , for extragalactic imaging surveys. SEDs are currently modeled as light from a composite stellar population attenuated by a uniform foreground dust screen, despite evidence from simulations and observations that find large spatial varia... [▽ More](#)
- Submitted** 27 September, 2024; **originally announced** September 2024.  
**Comments:** 10 pages, 3 figures; submitted to ApJL; comments welcome
121. [arXiv:2409.19053](#) [pdf, other] [astro-ph.EP](#)
- ### A search for water vapor plumes on Europa by spatially resolved spectroscopic observation using Subaru/IRCS
- Authors:** Jun Kimura, Taro Matsuo, Hitomi Kobayashi, Yuji Ikeda, Kazuo Yoshioka, Seiko Takagi, Shigeru Ida
- Abstract:** We present near-infrared high-dispersion spectroscopic observations of Europa using the Infrared Camera and Spectrograph (IRCS) onboard the Subaru Telescope, seeking direct evidence of water plumes on Europa and exploring spatial variations in plume activity. Using high spectral/spatial resolution and sensitivity of Subaru/IRCS, our observations have enabled a spatially resolved search for water p... [▽ More](#)
- Submitted** 27 September, 2024; **originally announced** September 2024.  
**Comments:** 8 pages, 7 figures. Accepted for publication in PASJ
122. [arXiv:2409.19050](#) [pdf, other] [astro-ph.GA](#)
- ### The Ancient Star Formation History of the Extremely Low-Mass Galaxy Leo

## P: An Emerging Trend of a Post-Reionization Pause in Star Formation

**Authors:** [Kristen B. W. McQuinn](#), [Max J. B. Newman](#), [Evan D. Skillman](#), [O. Grace Telford](#), [Alyson Brooks](#), [Elizabeth A. K. Adams](#), [Danielle A. Berg](#), [Martha L. Boyer](#), [John M. Cannon](#), [Andrew E. Dolphin](#), [Anthony Pahl](#), [Katherine L. Rhode](#), [John J. Salzer](#), [Roger E. Cohen](#), [Steve R. Goldman](#)

**Abstract:** Isolated, low-mass galaxies provide the opportunity to assess the impact of reionization on their star formation histories (SFHs) without the ambiguity of environmental processes associated with massive host galaxies. There are very few isolated, low-mass galaxies that are close enough to determine their SFHs from resolved star photometry reaching below the oldest main sequence turnoff. JWST has i... [▽ More](#)

**Submitted** 27 September, 2024; **originally announced** September 2024.

**Comments:** 24 pages, 9 figures, 3 tables

123. [arXiv:2409.19047](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [astro-ph.CO](#)

## Introducing cosmoTNG: simulating galaxy formation with constrained realizations of the COSMOS field

**Authors:** [Chris Byrohl](#), [Dylan Nelson](#), [Benjamin Horowitz](#), [Khee-Gan Lee](#), [Annalisa Pillepich](#)

**Abstract:** We introduce the new cosmological simulation project cosmoTNG, a first-of-its-kind suite of constrained galaxy formation simulations for the universe at Cosmic Noon ( $z \sim 2$ ). cosmoTNG simulates a  $0.2 \text{ deg}^2$  patch of the COSMOS field at  $z \simeq 2.0 - 2.2$  using an initial density field inferred from galaxy redshift surveys and the CLAMATO Lyman-alpha forest tomography survey, reconstructed... [▽ More](#)

**Submitted** 27 September, 2024; **originally announced** September 2024.

124. [arXiv:2409.18940](#) [[pdf](#)] [astro-ph.EP](#) [doi](#) [10.1038/s41467-024-52642-6](#)

## The erosion of large primary atmospheres typically leaves behind substantial secondary atmospheres on temperate rocky planets

**Authors:** [Joshua Krissansen-Totton](#), [Nicholas Wogan](#), [Maggie Thompson](#), [Jonathan J. Fortney](#)

**Abstract:** Exoplanet exploration has revealed that many—perhaps most—terrestrial exoplanets formed with substantial  $\text{H}_2$ -rich envelopes, seemingly in contrast to solar system terrestrials, for which there is scant evidence of long-lived primary atmospheres. It is not known how a long-lived primary atmosphere might affect the subsequent habitability prospects of terrestrial ex... [▽ More](#)

**Submitted** 27 September, 2024; **originally announced** September 2024.

**Comments:** Published in Nature Communications. 16 pages, 5 figures

**Journal ref:** Nature Communications 15, 8374 (2024)

125. [arXiv:2409.18917](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [astro-ph.GA](#) [hep-ph](#)

## Mixed Warm Dark Matter Constraints using Milky Way Satellite Galaxy Counts

**Authors:** [Chin Yi Tan](#), [Ariane Dekker](#), [Alex Drlica-Wagner](#)

**Abstract:** Warm dark matter has been strongly constrained in recent years as the sole component of dark matter. However, a less-explored alternative is that dark matter consists of a mixture of warm and cold dark matter (MWDM). In this work, we use observations of Milky Way satellite galaxies to constrain MWDM scenarios where the formation of small-scale structure is

suppressed either by generic thermal reli... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 10 pages, 4 figures

Report number: FERMILAB-PUB-24-0586-PPD

126. [arXiv:2409.18904](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [physics.comp-ph](#)

## A multi-ion non-equilibrium solver for ionised astrophysical plasmas with arbitrary elemental abundances

Authors: [Arun Mathew](#), [Jonathan Mackey](#), [Maggie Celeste](#), [Thomas J. Haworth](#), [Garreht Mellema](#)

**Abstract:** While many astrophysical plasmas can be modelled successfully assuming ionisation and thermal equilibrium, in some cases this is not appropriate and a non-equilibrium approach is required. In nebulae around evolved stars the local elemental abundances may also strongly vary in space and time. Here we present a non-equilibrium multi-ion module developed for the fluid-dynamics code `\textsc{pion}`, de... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

127. [arXiv:2409.18854](#) [[pdf](#), [other](#)] [astro-ph.HE](#) [astro-ph.GA](#) [hep-ph](#) [nucl-ex](#) [nucl-th](#)

## New Insights into Supradense Matter from Dissecting Scaled Stellar Structure Equations

Authors: [Bao-Jun Cai](#), [Bao-An Li](#)

**Abstract:** The strong-field gravity in General Relativity (GR) realized in neutron stars (NSs) renders the Equation of State (EOS)  $P(\varepsilon)$  of supradense neutron star (NS) matter to be essentially nonlinear and refines the upper bound for  $\varphi \equiv P/\varepsilon$  to be much smaller than the Special Relativity (SR) requirement with linear EOSs, where  $P$  and  $\varepsilon$  are respectively the pressure... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 27 pages with 10 figures. Review Article for the Research Topic "Strong and Weak Interactions in Compact Stars" hosted by Mark Alford, David Blaschke, Ignazio Bombaci, James Lattimer, and Armen Sedrakian in Frontiers in Astronomy and Space Sciences

128. [arXiv:2409.18825](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

## Photometry and kinematics of dwarf galaxies from the Apertif HI survey

Authors: [Barbara Šiljeg](#), [Elizabeth A. K. Adams](#), [Filippo Fraternali](#), [Kelley M. Hess](#), [Tom A. Oosterloo](#), [Antonino Marasco](#), [Björn Adebahr](#), [Helga Dénes](#), [Danielle M. Lucero](#), [Pavel E. Mancera Piña](#), [Vanessa A. Moss](#), [Anastasia A. Ponomareva](#), [J. M. van der Hulst](#)

**Abstract:** Context. Understanding the dwarf galaxy population in low density environments is crucial for testing the  $\Lambda$ CDM cosmological model. The increase in diversity towards low mass galaxies is seen as an increase in the scatter of scaling relations such as the stellar mass-size and the baryonic Tully-Fisher relation (BTFR), and is also demonstrated by recent in-depth studies of an extreme subclass of dwa... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 22 pages, 11 figures, 5 tables. Accepted for publication in A&A

129. [arXiv:2409.18793](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#)

## Giant planets population around B stars from the first part of the BEAST

## survey

**Authors:** P. Delorme, A. Chomez, V. Squicciarini, M. Janson, O. Flasseur, O. Schib, R. Gratton, A-M. Lagrange, M. Langlois, L. Mayer, R. Helled, S Reiffert, F. Kiefer, B. Biller, G. Chauvin, C. Fontanive, Th. Henning, M. Kenworthy, G-D. Marleau, D. Mesa, M. R. Meyer, C. Mordasini, S. C. Ringqvist, M. Samland, A. Vigan , et al. (1 additional authors not shown)

**Abstract:** Exoplanets form from circumstellar protoplanetary discs whose fundamental properties (notably their extent, composition, mass, temperature and lifetime) depend on the host star properties, such as their mass and luminosity. B-stars are among the most massive stars and their protoplanetary discs test extreme conditions for exoplanet formation. This paper investigates the frequency of giant planet c... [▽ More](#)

**Submitted** 27 September, 2024; **originally announced** September 2024.

**Comments:** Accepted in A&A

130. [arXiv:2409.18761](#) [[pdf](#), [other](#)] [astro-ph.GA](#) [cs.LG](#)

### Geometric deep learning for galaxy-halo connection: a case study for galaxy intrinsic alignments

**Authors:** Yesukhei Jagvaral, Francois Lanusse, Rachel Mandelbaum

**Abstract:** Forthcoming cosmological imaging surveys, such as the Rubin Observatory LSST, require large-scale simulations encompassing realistic galaxy populations for a variety of scientific applications. Of particular concern is the phenomenon of intrinsic alignments (IA), whereby galaxies orient themselves towards overdensities, potentially introducing significant systematic biases in weak gravitational le... [▽ More](#)

**Submitted** 27 September, 2024; **originally announced** September 2024.

**Comments:** 12 pages, 5 figures. submitted to MNRAS

131. [arXiv:2409.18610](#) [[pdf](#), [other](#)] [astro-ph.EP](#)

### Terrestrial planet formation during giant planet formation and giant planet migration I: The first 5 million years

**Authors:** R. Brasser

**Abstract:** Terrestrial planet formation (TPF) is a difficult problem that has vexed researchers for decades. Numerical models are only partially successful at reproducing the orbital architecture of the inner planets, but have generally not considered the effect of the growth of the giant planets. I dynamically model TPF as the gas giants Jupiter and Saturn are growing using GENGA. The evolution of the masse... [▽ More](#)

**Submitted** 30 September, 2024; **v1** submitted 27 September, 2024; **originally announced** September 2024.

**Comments:** Submitted to Astronomy and Astrophysics; changes are expected

132. [arXiv:2409.18605](#) [[pdf](#), [other](#)] [astro-ph.GA](#)

### Growth of Massive Black-Holes in FFB Galaxies at Cosmic Dawn

**Authors:** Avishai Dekel, Nicholas C. Stone, Dhruba Dutta Chowdhury, Shmuel Gilbaum, Zhaozhou Li, Nir Mandelker, Frank C. van den Bosch

**Abstract:** The scenario of feedback-free starbursts (FFB), which predicts excessively bright galaxies at cosmic dawn as observed using JWST, may provide a natural setting for black hole (BH) growth. This involves the formation of intermediate-mass seed BHs and their runaway

mergers into super-massive BHs with high BH-to-stellar mass ratios and low AGN luminosities. We present a scenario of merger-driven BH g... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 24 pages, 14 figures

133. [arXiv:2409.18507](#) [[pdf](#), [other](#)] [astro-ph.EP](#) [astro-ph.SR](#)

## uGMRT Survey of EXoplanets Around M-dwarfs (GS-EXAM): Radio observations of GJ 1151

**Authors:** [Mayank Narang](#), [Manoj Puravankara](#), [H. K. Vedantham](#), [C. H. Ishwara Chandra](#), [Ayanabha De](#), [Himanshu Tyagi](#), [Bihan Banerjee](#), [Prasanta K. Nayak](#), [Arun Surya](#), [B. Shridharan](#), [Vinod C. Pathak](#), [Mihir Tripathi](#)

**Abstract:** Coherent radio emission with properties similar to planetary auroral signals has been reported from GJ 1151, a quiescent, slow-rotating mid-M star, by the LOFAR Two-metre (120-170 MHz) Sky Survey (LoTSS). The observed {LOFAR} emission is fairly bright at 0.89 mJy with 64% circular polarization, and the emission characteristics are consistent with the interaction between an Earth-sized planet with... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: Accepted at AJ, 8 pages, 2 figures

134. [arXiv:2409.18466](#) [[pdf](#), [other](#)] [astro-ph.SR](#) [astro-ph.GA](#)

## Demography of stellar radio population within 500 pc: A VLASS-Gaia DR3 study

**Authors:** [Ayanabha De](#), [Mayank Narang](#), [Manoj Puravankara](#), [Shridharan Baskaran](#), [Himanshu Tyagi](#), [Bihan Banerjee](#), [Prasanta Kumar Nayak](#), [Arun Surya](#)

**Abstract:** In this work, we have carried out a systematic analysis of the VLASS quick look catalogs together with \textit{Gaia DR3} to identify the optical counterparts of 3-GHz radio emitters within 500~pc to obtain a homogeneous statistical sample of stellar radio sources. We have identified distinct populations of 3 GHz emitters across the \textit{Gaia DR3} color-magnitude diagram. We also present candida... [▽ More](#)

Submitted 27 September, 2024; originally announced September 2024.

Comments: 19 pages, 10 figures, 1 table. Accepted to the Astronomical Journal

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