William M. Baker

ORCID: 0000-0003-0215-1104

Niels Bohr Institute
University of Copenhagen
Jagtvej 155A
DK-2200
Copenhagen
Denmark

william.baker@nbi.ku.dk

Positions

Oct 2024 - Current	**DARK Fellow (Postdoctoral)** **University of Copenhagen, DARK** Research fellowship
Apr 2024 - Sep 2024	**Research Assistant (Postdoctoral)** **University of Cambridge, Cavendish Laboratory** PIs: Prof. Roberto Maiolino, Dr Sandro Tacchella

Education

Oct 2020 - Apr 2024	**PhD Physics (Astrophysics)** **University of Cambridge, Cavendish Laboratory** Supervisors: Prof. Roberto Maiolino, Dr Sandro Tacchella
Sep 2016 - Jun 2020	**Theoretical Physics MPhys (with research placements) - University of Sussex** 1st class honours (82% grand mean).

Research interests

- Galaxy evolution
- Star-formation and Quenching
- High-redshift
- Quiescent galaxies
- Metallicities
- Scaling relations
- Morphology
- Photometry and Spectroscopy
- JWST
- SED fitting

Publication statistics

- Author of 10 first-author papers (8 fully-published, 1 in press, 1 submitted), 55+ co-author papers
- Total number of citations 7000 (282 first author). h-index 45. Updated 12/09/2025

First-author publications

Sep 2025 **Double Trouble: Two spectroscopically confirmed low-mass quiescent galaxies at $z > 5$ in overdensities**
Baker, William M., et al., 2025, submitted to A&A

June 2025 **Exploring over 700 massive quiescent galaxies at z = 2-7: Demographics and stellar mass functions**
Baker, William M., et al., 2025, Accepted for publication in A&A, Link

Jan 2025 **Zapped then Napped? A rapidly quenched, remnant leaker candidate with a steep spectroscopic β_{UV} slope at z=8.5**
Baker, William M., et al., 2025, A&A, Link

Nov 2024 **The abundance and nature of high-redshift quiescent galaxies from JADES spectroscopy and the FLAMINGO simulations**
Baker, William M., Lim, Seunghwan, D'Eugenio, Francesco, et al., 2025, MNRAS, Link

Oct 2024 **A core in a star-forming disc as evidence of inside-out growth in the early Universe**
Baker, William M., Tacchella, Sandro, et al., 2024, Nature Astronomy, Link

Oct 2024 **Different regulation of stellar metallicities between star-forming and quiescent galaxies - insights into galaxy quenching**
Baker, William M., Maiolino, Roberto, et al., 2024, MNRAS, Link

May 2023 **Stellar mass, not dynamical mass nor gravitational potential, drives the mass-metallicity relationship**
Baker, William M., Maiolino, Roberto, 2023, MNRAS, 521, 4173–4179, Link

Feb 2023 **The metallicity's fundamental dependence on both local and global quantities**
Baker, William M., Maiolino, Roberto, Belfiore, Francesco, Curti, Mirko, Bluck, Asa F. L., Lin, Lihwai, Ellison, Sara L., Thorp, Mallory, Pan, Hsi-An, 2023, MNRAS, 519, 1149–1170, Link

Jan 2023 **The Molecular-Gas Main Sequence and Schmidt-Kennicutt relation are fundamental, the Star-Forming Main Sequence is a (useful) byproduct**
Baker, William M., Maiolino, Roberto, Belfiore, Francesco, Bluck, Asa F. L., Curti, Mirko, Wylezalek, Dominika, Bertemes, Caroline, Bothwell, Matt, Lin, Lihwai, Thorp, Mallory, Pan, Hsi-An, 2023, MNRAS, 518, 4767–4781, Link

Mar 2022 **The ALMaQUEST survey IX: the nature of the resolved star forming main sequence**
Baker, William M., Maiolino, Roberto, Bluck, Asa F. L., Lin, Lihwai, Ellison, Sara L., Belfiore, Francesco, Pan, Hsi-An, Thorp, Mallory, 2022, MNRAS, 510, 3622-3628, Link

Other Important Publications

Jul 2025 **On the origins of oxygen: ALMA and JWST characterise the multi-phase, metal-enriched, star-bursting medium within a 'normal' z>11 galaxy**
Witstok, Joris, Smit, Renske, Baker, William, at al., Submitted to Open J. Astrophys., Link

Nov 2024 **JADES: The diverse population of infant black holes at 4 < z < 11: Merging, tiny, poor, but mighty**
Maiolino, Roberto, Scholtz, Jan, Curtis-Lake, Emma, Carniani, Stefano, Baker, William, at al., A&A, Link

Mar 2024 **JADES: comprehensive census of broad-line AGN from Reionization to Cosmic Noon revealed by JWST**
Juodžbalis, Ignas, Maiolino, Roberto, Baker, William, at al., Submitted to MNRAS, Link

March 2024 **A dormant, overmassive black hole in the early Universe**
Juodžbalis, Ignas, Maiolino, Roberto, Baker, William, at al., Nature, Link

Jan 2024 **The origin of the X-ray emission from the non-starburst gas-rich luminous infrared galaxies Arp 302**
Jiang, Jiachen, Baker, William, Young, Andrew, Gallo, Luigi, MNRAS, link

Sept 2023 **Carbonaceous dust grains seen in the first billion years of cosmic time**
Witstok, Joris, +20 authors, Baker, William M., +20 authors, Nature, link

July 2023 **Discovery of a quiescent galaxy at z=7.3**
Looser, Tobias, +8, Baker, William M., +35 authors, Nature link

July 2023 **A small and vigorous black hole in the early Universe**
Maiolino, Roberto, +24 authors, Baker, William M., +13 authors, Nature link

July 2023 **The ionizing photon production efficiency at z ∼ 6 for Lyman-alpha emitters using JEMS and MUSE**
Simmonds, C., Tacchella, S, Maseda, M., Williams, C. C., Baker, W. M. , +19 authors, MNRAS link

Feb 2023 **JADES Imaging of GN-z11: Revealing the Morphology and Environment of a Luminous Galaxy 430 Myr After the Big Bang**
Tacchella, Sandro, Eisenstein, Daniel, Hainline, Kevin, Johnson, Benjamin D., Baker, William M., +43 authors, ApJ, link

Additional publications

Other papers **See ORCID profile 0000-0003-0215-1104**

Awards, funding and prizes

March 2025 **RAS Michael Penston Thesis prize**
Runner-up

March 2025 **IAU travel grant**
For IAU Symposium: Massive galaxies across the Universe, Naples

March 2023 **College Senior Scholarship**
Fitzwilliam College, Cambridge

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May 2019 **Junior Research Associate Funding**
The University of Sussex

Memberships and Collaborations

Member of JWST Advanced Deep Extragalactic Survey (JADES) GTO team
Member of the ALMaQUEST collaboration
Member of the DeepDive collaboration

Fellow of the Royal Astronomical Society, FRAS
Member of the European Astronomical Society (EAS)

Talk Statistics

- Over 20 contributed talks at international conferences
- 5 invited colloquium/seminars

Talks Invited

May 2025 **Galaxies Discussion Group Talk - Cambridge**
Invited talk (1hr) on "Investigating high-redshift quenched galaxies: from low-mass to massive"

Apr 2024 **DARK Talk - Copenhagen**
Invited seminar (1hr) on "The observational evolution of galaxies probed by scaling relations and morphology"

Mar 2024 **Borthakur Group Meeting - Arizona State University**
Invited Seminar (1hr) on "The observational evolution of galaxies probed by scaling relations and morphology"

Feb 2024 **Bath Astrophysics Seminar - University of Bath**
Invited Seminar (1hr) on "The observational evolution of galaxies probed by scaling relations and morphology"

May 2023 **Sussex Astronomy Centre Colloquium - University of Sussex**
Invited colloquium (1hr) on "The cosmic chemical evolution of galaxies: scaling relations, metallicities and high-z morphologies"

Talks

June 2025	**European Astronomical Society meeting (EAS) - Cork, Ireland** Contributed talk (12 mins) on "Exploring high-redshift massive quiescent galaxies with JWST and the ELT" Contributed talk (12 mins) on "A z=8.5 rapidly quenched galaxy – evidence for stellar feedback?"
June 2025	**Massive Galaxies Across the Universe - Naples, Italy** Contributed talk (15 mins) on "Investigating the abundance and nature of high-z quiescent galaxies"
May 2025	**Annual Danish Astronomy Meeting - Vejle, Denmark** Contributed talk (15 mins) on "Investigating the abundance and nature of high-z quenched galaxies"
May 2025	**Galaxy Origins in the JWST Era - Toledo, Spain** Contributed talk (15 mins) on "Investigating the abundance and nature of high-z quiescent galaxies"
Dec 2024	**Dust and Gas throughout Cosmic Time - Hiroshima, Japan** Contributed talk (18 mins) on "Inside-out growth in the early Universe"
Jul 2024	**AGN Feedback and Star Formation Across Cosmic Scales and Time - Sirolo, Italy** Contributed talk (15 mins) on "The black hole mass metallicity relation and insights into galaxy quenching"
Jul 2024	**National astronomy Meeting - UK** Contributed talk (15 mins) on "Exploring high-z morphology and quenching within possible local galaxy progenitors"
Jun 2024	**Cosmic Dawn at High Latitudes - Stockholm** Contributed talk (15 mins) on "Inside-out growth in the early Universe"
Jun 2024	**SF2A - A new picture on Galaxy Evolution from Cosmic Dawn to Cosmic Noon** Contributed talk (15 mins) on "Inside-out growth in the early Universe - a core in a vigorously star-forming disc"
Apr 2024	**Raising the Veil on Star Formation Near and Far - Cambridge** Contributed talk (15 mins) on "What drives star formation? Scaling relations disentangled"
Dec 2023	**Resolving Galaxy Ecosystems Across All Scales - Hong Kong** Presented a talk (15 mins) on "The black hole mass metallicity relation and insights into galaxy quenching"
Dec 2023	**Kavli Focused Workshop - The Milky Way and its high-redshift progenitors in theory and observations - Cambridge** Presented a talk (20 mins) on "Inside-out growth in the early universe: a core in a vigorously star-forming disc"

Oct 2023 **Metal Production and Distribution in a Hierarchical Universe – II - ESO, Chile**
Presented a talk (12+3 mins) on "What are the galactic properties driving the metallicity scaling relations?"

Oct 2023 **Wednesday Seminar - IoA Cambridge**
Presented a talk (25 mins) on "Inside-out growth in the early universe: a core in a vigorously star-forming disc"

Sep 2023 **First Structures in the Universe - Paris**
Contributed talk (20 mins) on "Inside-out growth in the early universe: a core in a vigorously star-forming disc"

July 2023 **European Astronomical Society Meeting (EAS) - Krakow**
Contributed talk (15 mins) on "Formation of bulges in early galaxies and inside-out growth in the early universe"
Contributed talk (15 mins) on "What are the galactic properties driving the metallicity scaling relations?"

July 2023 **Shedding new light on the first billion years of the Universe - Marseille**
Contributed talk (15+5 mins) on "Formation of bulges in early galaxies and inside out growth in the early universe"

July 2023 **National Astronomy Meeting - Cardiff**
Contributed talk (12 mins) on "Formation of bulges in early galaxies and inside-out growth in the early universe"
Contributed talk (12 mins) on "The molecular gas main sequence and Schmidt-Kennicutt relation are fundamental, the star-forming main sequence is a (useful) by-product"

June 2023 **Astrostatistics and Astro-Machine Learning workshop - Cambridge**
Contributed talk (30 mins) on "Using machine learning and Bayesian inference in galaxy evolution"

Mar 2023 **Kavli Workshop - A new era in Extragalactic Astronomy: early results from the James Webb Space Telescope - Cambridge**
Contributed talk (15+5 mins) on "Core, disc and clump formation: do galaxies grow inside out in the first billion years?"

Dec 2022 **BRIDGCE Conference**
Contributed talk (15+5 mins) on "What are the galactic properties driving the metallicity of galaxies"

Nov 2022 **IoA Wednesday seminar, Cambridge**
Presented a talk (20+5 mins) on "The nature of the star-forming main sequence"

Sep 2022 **Kavli Workshop - The Epoch of Galaxy Quenching - Cambridge**
Contributed talk (20 mins) on "The Molecular-Gas Main Sequence and Schmidt-Kennicut relation are fundamental, the Star-Forming Main Sequence is a (useful) byproduct (and implications for quenching)"

Dec 2021 **Kavli Focused Workshop - Feedback in and around Galaxies - Cambridge**
Presented a talk (12+3) on "Multi-dimensional scaling relations of ALMaQUEST galaxies"

Contributions to the scientific community

Reviewer for ApJ
Reviewer for A&A
Reviewer for MNRAS

Outreach and science communication

June 2024	Outreach: IoA open day - responsible for galaxies stall explaining high-redshift galaxy spectra and photometry, including comparisons between different high-z spectra.
June 2023	Interviewed by a Journalist for New Scientist (NS) who wrote subsequent NS article Link to NS Article
June 2023	Outreach: IoA open day - responsible for galaxies stall, and for explaining gravitational lensing and JWST to visiting members of the general public

Teaching

March 2025	**Taught a week of "Gravitational Dynamics and galaxy evolution" Masters course** Lectures + designed and assessed project work on "Galaxy quenching and SED modelling"
Oct 2022-May 2023	**Co-supervised a part III student project "Finding Star Forming Clumps in Early Galaxies with JWST"** Experience of co-supervising a part III student's project (alongside Dr Sandro Tacchella and Dr Hannah Ubler)

Additional experience and positions of responsibility

Lent 2023	**Supervisions - Cambridge Part III Formation of Structure in the Universe** 1 group, 6 students, 3 supervisions
Lent 2022	**Supervisions - Cambridge Part III Formation of Structure in the Universe** 1 group, 6 students, 3 supervisions
Michaelmas 2021	**Supervisions - Cambridge Part II Relativity Course** 2 groups, 4 students, 4 supervisions per group
Michaelmas 2020	**Supervisions - Cambridge Part II Relativity Course** 3 groups, 10 students, 4 supervisions per group (online)
September 2022	**Kavli Workshop - The Epoch of Galaxy Quenching** Member of the local organising committee (LOC)
September 2022	**Kavli Workshop - Charting the Metallicity Evolution of the Universe** Member of the local organising committee (LOC)
Oct 2017 - Jun 2020	**Student Mentor - University of Sussex school of Mathematical and Physical Sciences**