Caroline Bertemes

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Research Interests

Galaxy Evolution - Stellar populations, Interstellar medium and link to galactic properties, galaxy structure and kinematics; **Active Galactic Nuclei** - Demographics, accretion, relation to host galaxy and environment

Education and Academic Experience

DLR Research Fellow: Heidelberg University, DE. *09/2025-now*

Postdoctoral Researcher: Heidelberg University, DE. Supervisor: Dr. D. Wylezalek. *11/2020-08/2025*

PhD in Astrophysics: University of Bath, UK. Supervisor: Prof. Dr. S. Wuyts. *11/2016-10/2020*
Thesis: "Weighing star-forming galaxies, component by component"

Bachelor & Master in Physics: ETH Zürich, CH. Supervisors: Dr. B. Trakhtenbrot, Prof. Dr. K. Schawinski, Dr. M. Elvis. *MSc Thesis*: "Where are the supermassive black holes hiding?: Broad line (non-)detection of ultramassive, slowly spinning black holes" *2010-2016*

First-author Publications

- Bertemes C., Wylezalek D., in prep. : *A cosmic collision in the making: JWST/NIRISS uncovers a merging and maturing protocluster at z=3 around a red quasar*
- Bertemes C., Wylezalek D., D. S. N. Rupke, N. L. Zakamska, S. Veilleux, B. Beckmann, A. Vayner, S. Sankar, Y. Ishikawa, N. Diachenko, W. Liu, Y.-C. Chen, J. Seebeck, D. Lutz, G. Liu, A& A, Volume 693, 176
  JWST ERS Program Q3D: The pitfalls of virial BH mass constraints shown in a $z \sim 3$ quasar with an ultramassive host
- Bertemes C., Wylezalek D., Albán M., Aravena M., Baker W.M., Cazzoli S., Cicone C., Martín S., Schimek A., Wagg J., Wang W., 2023, MNRAS, 518, 5500
  MASCOT: molecular gas depletion times and metallicity gradients - evidence for feedback in quenching active galaxies
- Bertemes C., Wuyts S., Lutz D., Förster Schreiber N.M., Genzel R., Minchin R.F., Mundell C.G., Rosario D., Saintonge A., Tacconi L., 2018, MNRAS, 478, 1442
  Cross-calibration of CO- vs dust-based gas masses and assessment of the dynamical mass budget in Herschel-SDSS Stripe82 galaxies
- Bertemes C., Trakhtenbrot B., Schawinski K., Done C., Elvis M., 2016, MNRAS, 463, 4041
  Testing the completeness of the SDSS colour selection for ultramassive, slowly spinning black holes

Observing proposals

- **ALMA** (Atacama Large Millimeter Array): "A starbursting red quasar, quiescent giants, mergers: Snapshot of an evolving z=3 protocluster", grade C, **PI**, **25 hours** 2025
- **NOEMA** (NOrthern Extended Millimeter Array) at Institut de radioastronomie millimétrique: "Weak outflows in quenching AGN - How does the molecular gas respond?", **PI**, **30 hours** 2023
- **James Webb Space Telescope**: "Deep grism spectroscopy of the complex environment around an extremely red quasar within an ultramassive host at z=3", **PI**, **6 hours** 2023
- **Arecibo Observatory**: "The interplay between H2, HI, dust and metals: calibrating a recipe to study the environmental impact on gas properties of galaxies", Co-I (PI: Dr. S. Wuyts), **24 hours** *2017*

Talks and Workshops (Past 3 years):

Invited talks & workshops:

- "The Multi-Faceted Nature of Galaxy Evolution: The role of molecular gas, winds, environment and star formation histories", Seminar at NCBJ, Warsaw, Poland *02/2025*

- "Galaxy transformation across space and time", Canberra, Australia *09/2023*
- "James Webb Space Telescope Community Session" at the European Astronomical Society's annual meeting, Krakow, Poland *07/2023*
- "Cosmic Dawn with the JWST – Cycle 1 lessons and plans for Cycle 2", Ringberg, Germany *10/2022*

Conferences & seminars:

- "The early and late phases of AGN feedback: a JWST and NOEMA view across redshifts out to Cosmic Noon", Heidelberg, DE *06/2025*
- "AGN Feedback and Star Formation Across Cosmic Scales and Time", Sirolo, Italy *09/2024*
- "Observing and Simulating Galaxy Evolution in the Era of JWST", Ascona, Switzerland *08/2024*
- "Winds throughout the Universe", Joint Space-Science Institute workshop, Annapolis, US *10/2023*
- Sessions "Early assembly of galaxies with JWST spatially resolved spectroscopy and photometry" & "Reconstructing the Assembly History of Galaxies", Meeting of the European Astronomical Society, Krakow, Poland *07/2023*
- "What drives the growth of black holes: a decade of reflection", Reykjavik, Iceland *09/2022*

Grants

- PI of DLR grant for the project "Zooming out of an extremely red quasar with the JWST: Formation of the largest structures in the Universe" (96'000€) *09/2025*
- Travel support for invited talk by the Australian National University (1000 AUD) *09/2023*
- Student grants: UBath Alumni Fund Travel Bursary(£250), ESA travel support by conference organisers (200€), RAS grant (£240), Santander Postgraduate Mobility Award (£950) 2017-2018

Teaching and mentoring

- Student (co)-supervision: Matthias Kuntz (BSc, Heidelberg), Savannah Russel (Internship, Rhodes College US), Simon Flesch (BSc, Heidelberg), Wenjun Chang (Summer project, USTC), Emily Hunt & Morris Stranger (MSc, Bath) 2019-now
- Teaching assistant, UBath (Intro to Astrophysics, Waves/Oscillations/Optics, Python Labs) *2017-2018*
- Peer mentor under the UBath's scheme for 1st year students *10/2017-2019*

Community Service (Selected)

- Co-chair of the Heidelberg AGN meetings (across multiple Institutes) *12/2023-now*
- Developer of the public `q3dfit` python package for deconvolution and spectral analysis *01/2019-now*
- Referee for *The Astrophysical Journal*, *Monthly Notices of the Royal Astronomical Society* *01/2019-now*
- Outreach: Workshop on black holes at Girls' Day Germany (2021-now), Talk at AMH student residence (2024), Experiments at WOMAD festival (2019) and in UK primary schools (2016-2018) 2016-now
- Organiser of the "Cake in the Lounge" meetings at ARI Heidelberg *2021-now*

Skills

- Languages: Luxembourgish (native), German (proficient), English (proficient), French (proficient)
- Programming: Python, LaTeX, bash, SQL, HTML, C++ (intermediate). Software: `q3dfit`, GILDAS-CLASS, `Prospector`, BAGPIPES, CLOUDY
- Technical experience: Bayesian statistics with MCMC, Spectral analysis (UV, optical, infrared, radio), Open-MPI parallel processing, sbatch & SLURM queued HPC computing, Collaborative coding via GitHub, Remote observing with Arizona Radio Observatory, Data reduction of single-dish CO spectra

References

Available upon request