DR. LOUISE BREUVAL

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CURRENT POSITION

Postdoctoral Researcher Jan 2022 - Dec 2024
Johns Hopkins University, Baltimore, MD, USA
Advisor: Adam G. Riess

RESEARCH INTERESTS

Cosmology: the Cepheid-SNIa distance ladder and the Hubble tension
Stellar physics: metallicity effects, open clusters and applications to distance measurements
Techniques: photometry (HST, JWST), light curve fitting, spectroscopy (metallicity gradients)

EDUCATION

Observatoire de Paris, LESIA, France Sept 2018 - Oct 2021
PhD in Astronomy
Thesis: The Cepheid distance scale: from the local Gaia calibration to distant galaxies (link)
Advisor: Pierre Kervella

Université Paris Saclay, France
Master's Degree in Astronomy 2018
Bachelor's Degree in Fundamental Physics 2016

COMPUTATIONAL SKILLS

Operating Systems	MacOS, Windows, Linux
Computer Languages	Python, IDL, LaTeX
Observation Software	APT (HST, JWST), Aspro2 (VLTI), TUI (APO)
Astronomical Software	DS9, DrizzlePac, DAOPHOT, DOLPHOT
Miscellaneous/Tools	MAST, CDS/VizieR

ACTIVITIES FOR THE COMMUNITY

◇ JWST Cycle 3 Time Allocation Committee Panel Member (Large Scale Structures) 2024
◇ Organizing Committee of the weekly AstroCoffee Talks, JHU 2022 - 2024
◇ Referee for ApJ, A&A, MNRAS (4+ papers) 2021 - Present
◇ Elected Student Representative at the Executive Board of Paris Observatory 2019 - 2021

COLLABORATIONS

The SH0ES Collaboration (PI: Adam Riess) 2022 - Present
The Araucaria Project (PI: Grzegorz Pietrzyński & Wolfgang Gieren; website) 2018 - 2022

PUBLICATION SUMMARY

NASA/ADS Link to All Publications
23 Refereed Publications (5 as first author)
1490 Citations (145 as first author)

HONORS/AWARDS/GRANTS

European Space Agency (ESA) Research Fellow 2025 - 2027
Space Telescope Science Institute, Baltimore, MD, USA

HST Grant as PI of program GO-17520: $81,000 May 2024
Awarded by the Space Telescope Science Institute

Nominated Young Scientist 2021 - 2024
ISSI Team on the Hubble tension (PI: Gisella Clementini; website)

Prize of the Best Poster Oct 2019
Cosmic Controversies Conference, Chicago, IL, USA

OBSERVING TIME AWARDED

HST Cycle 31, GO-17520 (PI) – 33 orbits 2024
A 1% cross-calibration of Cepheids, TRGB, and JAGB in five nearby galaxies with HST
Apache Point Observatory, ARCES (co-I) – 1 half night (PI: S. Li) 2024
Towards a Standardization of the J-region Asymptotic Giant Branch
JWST Cycle 2, GO-4087 (co-I) – 2.9 hours (PI: C. Huang) 2023
Refining the Mira Distance Ladder with NIRCam Observations of M101
JWST Cycle 2, GO-2875 (co-I) – 16 hours (PI: A. Riess) 2023
Scrutinizing the Dirtiest Cepheids, a Test of the Hubble Tension
HST Cycle 30, GO-17097 (co-I) – 15 orbits (PI: A. Riess) 2022
Reinforcing the Distance Ladder with Cepheids in the Core of the SMC
HST Cycle 30, SNAP-17098 (co-I) – 140 orbits (PI: A. Riess) 2022
HST and Gaia, with Light and Distances, a Foundational Legacy of the Distance Ladder
Apache Point Observatory, ARCES (PI) – 4 half nights (Q2, Q3) 2022
Chemical abundances of Galactic Cepheids to reduce systematics in the distance scale
HST Cycle 29, GO-16676 (co-I) – 10 orbits (PI: A. Riess) 2021
A 1% Calibration of the Distance Ladder from Cepheids Using High Precision Cluster Parallaxes to Reveal the Origin of the Hubble Tension
JWST Cycle 1, GO-1685 (co-I) – 25.5 hours (PI: A. Riess) 2021
Uncrowding the Cepheids for an Improved Determination of the Hubble Constant
ESO VLTI/PIONIER (co-I) – program 0103.D-0711 (PI: B. Trahin) 2020
IR interferometry to measure angular diameter of Cepheid variables
Cerro Armazones Observatory, Chile (co-I) – 50 nights (PI: Araucaria Project, link) 2020
IR photometry of Milky Way Cepheids and RR Lyrae variables

TEACHING EXPERIENCE

International Spring School, Konkoly Observatory, Budapest, Hungary
◇ *Modern methods of cosmic distance determination*, Lecture April 2023

Paris Doctoral School in Astrophysics (ED 127), France
◇ *The Expanding Universe*, Invited Lecture May 2022

Paris Sciences et Lettres University, France
◇ Supervision of a Master Student, Lab Insertion Unit Sept 2020 - Dec 2020
◇ Optics, 1st year of Physics Degree Sept 2019 - Jun 2021
◇ Introduction to Astronomy, 1st and 2nd year of Physics Degree Sept 2019 - Jun 2021
◇ Astronomical observations, practical sessions, 1st year of Physics Degree Sept 2019 - Jun 2020

TALKS

RRL/Cep Conference – Marrakesh, Morocco **(invited)**	23 Nov 2024
APS Meeting – Sacramento, CA, USA **(invited)**	4 Apr 2024
Seminar – Florida State University, online **(invited)**	11 Oct 2023
MIAPP Workshop – *The extragalactic distance scale*, Garching, Germany	3 July 2023
AstroCoffee Talk – Johns Hopkins University, Baltimore, MD, USA	1 June 2023
IAU Symposium 376 – Budapest, Hungary	17 Apr 2023
Seminar – Johns Hopkins University, Baltimore, MD, USA	27 Mar 2023
AAS Meeting 241 *SH0ES Special Session* – Seattle, WA, USA	8 Jan 2023
RRL/Cep Conference – La Palma, Spain	26 Sep 2022
Tensions in Cosmology Conference – Corfu Summer Institute, Greece	7 Sep 2022
Hot Science Colloquium – STScI, Baltimore, MD, USA	29 June 2022
Rencontres de Blois *Exploring the Dark Universe* – Blois, France	25 May 2022
MIAPP Workshop *The Hubble Tension* – online **(invited)**	29 Sep 2021
EAS Annual Meeting – online	29 June 2021
Hypatia Colloquium – European Southern Observatory, online	8 June 2021
Gaia EDR3 Day *Presentation of Gaia DR2 results* – Observatoire de Paris	3 Dec 2020
Seminar – Nuclear and High Energy Physics Laboratory, Paris, France **(invited)**	28 Sep 2020
Workshop MW-Gaia *Frontiers of Stellar Physics* – Zagreb, Croatia	21 Jan 2020
Dark Energy Colloquium – Institut Henri Poincaré, Paris, France	20 Nov 2019
RRL/Cep Conference *Frontiers of Classical Pulsators* – Cloudcroft, NM, USA	18 Oct 2019
Cosmic Controversies Conference – Chicago, IL, USA	8 Oct 2019
Annual Meeting of the SF2A – Nice, France	15 May 2019

OUTREACH

Educational projects with primary schools (Paris, France – 3 projects/yr)	2019 - 2021
Member of the French Association *Femmes & Sciences* that promotes science to women	2019 - 2022

MEDIA COVERAGE

"Looking Ahead as We Look Far Through the JWST", Astrobites at APS April 2024 (link)	Apr 2024
"La cosmologie en crise ?! Hubble sous tension", Science Etonnante (YouTube, link)	Feb 2022
"L'expansion qui gonfle les astrophysiciens", Sciences & Vie Junior (link)	July 2022
"Constante de Hubble: une estimation plus précise grâce à Gaia", Pour La Science (link)	Jan 2021
"Expansion de l'univers: rien ne va plus !", Sciences & Vie (link)	Dec 2020

LANGUAGES

French (native), **English** (fluent), **Spanish** (fluent), **German** (intermediate)

REFEREED PUBLICATIONS

FIRST AUTHOR

Breuval, L., Riess, A. G., Casertano, S., Yuan, W., Macri, L. M., Romaniello, M., Murakami, Y. S., Scolnic, D., Anand, G. S., Soszyński, I., *Small Magellanic Cloud Cepheids Observed with the Hubble Space Telescope Provide a New Anchor for the SH0ES Distance Ladder*, arXiv:2404.08038 (2024)

Breuval, L., Riess, A. G., Macri, L. M., Li, S., Yuan, W., Casertano, S., Konchady, T., Trahin, B., Durbin, M. J., Williams, B. F., *A 1.3% Distance to M33 from Hubble Space Telescope Cepheid Photometry*, ApJ 951, 118 (2023)

Breuval, L., Riess A. G., Kervella P., Anderson R. I., Romaniello M., *An Improved Calibration of the Wavelength Dependence of Metallicity on the Cepheid Leavitt law*, ApJ 939, 89 (2022)

Breuval, L., Kervella, P., Wielgórski, P., Gieren, W., Graczyk, D., Trahin, B., Pietrzyński, G., Arenou, F., Javanmardi, B., Zgirski, B., *The influence of metallicity on the Leavitt law from geometrical distances of Milky Way and Magellanic Cloud Cepheids*, ApJ 913, 38 (2021)

Breuval, L., Kervella, P., Anderson, R. I., Riess, A. G., Arenou, F., Trahin, B., Mérand, A., Gallenne, A., Gieren, W., Storm, J., Bono, G., Pietrzyński, G., Nardetto, N., Javanmardi, B., Hocdé, V., *The Milky Way Cepheid Leavitt law based on Gaia DR2 parallaxes of companion stars and host open cluster populations*, A&A 643, A115 (2020)

SECOND AUTHOR

Riess, A. G., **Breuval, L.**, Yuan, W., Casertano, S., Macri, L. M., Bowers, J. B., Scolnic, D., Cantat-Gaudin, T., Anderson, R. I., Cruz-Reyes, M., *Cluster Cepheids with High Precision Gaia Parallaxes, Low Zeropoint Uncertainties, and Hubble Space Telescope Photometry*, ApJ, 938, 36 (2022)

Trahin, B., **Breuval, L.**, Kervella, P., Mérand, A., Nardetto, N., Gallenne, A., Hocdé, V., Gieren, W., *Inspecting the Cepheid parallax-of-pulsation using Gaia EDR3 parallaxes*, A&A 656, A102 (2021)

CO-AUTHOR

Li, S., Riess, A. G., Casertano, S., Anand, G. S.; Scolnic, D. M.; Yuan, W.; **Breuval, L.**; Huang, C. D, *Reconnaissance with JWST of the J-region Asymptotic Giant Branch in Distance Ladder Galaxies: From Irregular Luminosity Functions to Approximation of the Hubble Constant*, ApJ 966, 20 (2024)

Riess, A. G., Anand, G. S., Yuan, W., Casertano, S., Dolphin, A., Macri, L. M., **Breuval, L.**, Scolnic, D., Perrin, M., Anderson, R. I., *JWST Observations Reject Unrecognized Crowding of Cepheid Photometry as an Explanation for the Hubble Tension at 8σ Confidence*, ApJ, 962, 17 (2024)

Anand, G. S., Riess, A. G., Yuan, W., Beaton, R., Casertano, S., Li, S., Makarov, D. I., Makarova, L. N., Tully, R. B., Anderson, R. I., **Breuval, L.**, Dolphin, A., Karachentsev, I. D., Macri, L. M., Scolnic, D., *Tip of the Red Giant Branch Distances with JWST: An Absolute Calibration in NGC 4258 and First Applications to Type Ia Supernova Hosts*, ApJ 966, 89 (2024)

Bras, G., Kervella, P., Trahin, B., Wielgórski, P., Zgirski, B., Mérand, A., Nardetto, N., Gallenne, A., Hocdé, V., **Breuval, L.**, Afanasiev, A., Pietrzyński, G., Gieren, W., *The Baade-Wesselink projection factor of RR Lyrae stars - Calibration from OHP/SOPHIE spectroscopy and Gaia DR3 parallaxes*, A&A 684, 126 (2024)

Riess, A. G., Anand, G. S., Yuan, W., Casertano, S., Dolphin, A., Macri, L. M., **Breuval, L.**, Scolnic, D., Perrin, M., Anderson, R. I., *Crowded No More: The Accuracy of the Hubble Constant Tested with High Resolution Observations of Cepheids by JWST*, ApJ 956, L18 (2023)

Evans, N. R., Engle, S., Pillitteri, I., Guinan, E., Günther, H. M., Wolk, S., Neilson, H., Marengo, M., Matthews, L. D., Moschou, S., Drake, J. J., Winston, E. M., Moe, M., Kervella, P., **Breuval, L.**, *X-rays in Cepheids: Identifying Low-Mass Companions of Intermediate-Mass Stars*, ApJ 938, 153 (2022)

Riess, A. G., Yuan, W., Macri, L. M., Scolnic, D., Brout, D., Casertano, S., Jones, D. O., Murakami, Y., Anand, G. S., **Breuval, L.**, Brink, T. G., Filippenko, A. V., Hoffmann, S., Jha, S. W., Kenworthy, D. W., Mackenty, J., Stahl, B. E., Zheng, W., *A Comprehensive Measurement of the Local Value of the Hubble Constant with 1 km s^{-1} Mpc^{-1} uncertainty from the Hubble Space Telescope and the SH0ES team*, ApJL 934, 7 (2022)

Wielgórski, P., Pietrzyński, G., Pilecki, B., Gieren, W., Zgirski, B., Górski, M., Hajdu, G., Narloch, W., Karczmarek, P., Smolec, R., Kervella, P., Storm, J., Gallenne, A., **Breuval, L.**, Lewis, M., Kaluszyński, M., Graczyk, D., Pych, W., Suchomska, K., Taormina, M., Rojas Garcia, G., Kotek, A., Chini, R., Pozo Nũnez, F., Noroozi, S., Sobrino Figaredo, C., Haas, M., Hodapp, K., Mikolajczyk, P., Kotysz, K., Moździerski, D., Kolaczek-Szymański, P., *An absolute calibration of the near-infrared Period-Luminosity Relations of Type II Cepheids in the Milky Way and in the Large Magellanic Cloud*, ApJ 927, 89 (2022)

Gallenne, A., Mérand, A., Kervella, P., Pietrzyński, G., Gieren, W., Hocdé, V., **Breuval, L.**, Nardetto, N., Lagadec, E., *Extended envelopes around Galactic Cepheids. V. Multi-wavelength and time- dependent analysis of IR excess*, A&A 651, A113 (2021)

Javanmardi, B., Mérand, A., Kervella, P., **Breuval, L.**, Gallenne, A., Nardetto, N., Gieren, W., Pietrzyński, G., Hocdé, V., Borgniet, S., *Inspecting the Cepheid distance ladder: The Hubble Space Telescope distance to SNIa host galaxy NGC 5584*, ApJ 911, 12 (2021)

Hocdé V., Nardetto, N., Matter, A., Lagadec, E., [+50 authors], **Breuval, L.**, [+99 authors], *Mid-infrared circumstellar emission of the long-period Cepheid l Carinae resolved with VLTI/ MATISSE*, A&A 651, A92 (2021)

Hocdé, V., Nardetto, N., Borgniet, S., Lagadec, E., Kervella, P., Mérand, A., Evans, N., Gillet, D., Mathias, Ph., Chiavassa, A., Gallenne, A., **Breuval, L.**, Javanmardi, B., *Pulsating chromosphere of classical Cepheids. Calcium infrared triplet and Hα profile variations*, A&A 641, A74 (2020)

Hocdé, V., Nardetto, N., Lagadec, E., Niccolini, G., Domiciano de Souza, A., Mérand, A., Kervella, P., Gallenne, A., Marengo, M., Trahin, B., Gieren, W., Pietrzyński, G., Borgniet, S., **Breuval, L.**, Javanmardi, B., *A thin shell of ionized gas as the explanation of infrared excess among classical Cepheids*, A&A 633, A47 (2020)

Borgniet, S., Kervella, P., Nardetto, N., Gallenne, A., Mérand, A., Anderson, R.I., Aufdenberg, J., **Breuval, L.**, Gieren W., Hocdé V., Javanmardi B., Lagadec E., Pietrzyński G., Trahin B., *Consistent radial velocities of classical Cepheids from the cross-correlation technique*, A&A 613, A37 (2019)

Graczyk, D., Pietrzyński, G., Gieren, W., Storm, J., Nardetto, N., Gallenne, A., Maxted, P. F. L., Kervella, P., Kołaczkowski, Z., Konorski, P., Pilecki, B., Zgirski, B., Górski, M., Suchomska, K., Karczmarek, P., Taormina, M., Wielgórski, P., Narloch, W., Smolec, R., Chini, R., **Breuval, L.**, *Testing systematics of Gaia DR2 parallaxes with empirical surface brightness: color relations applied to eclipsing binaries*, ApJ 872, 85 (2019)

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