

Andra Stroe

PERSONAL DATA

Clay Fellow

Center for Astrophysics

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RESEARCH INTERESTS

Large scale structure. Galaxy clusters and protoclusters. Galaxy evolution. Shocks and turbulence. Diffuse radio emission and emission processes. Wide optical and radio sky surveys. Radio interferometry (at low-frequency).

PUBLICATION RECORD

Refereed publications: **48**, of which **12** as first author and **11** as second or third author. First paper in mid 2012. H-index 21.

SEMINARS, TALKS AND POSTERS

Conference contributions: **7 invited talks**, 16 contributed talks and 1 poster presentation.

Seminars and colloquia: **26 invited seminars and colloquia**, 13 contributed talks.

PROFESSIONAL HISTORY

OCT 2018 | **Clay Fellow**

SEP 2023 | *Center for Astrophysics | Harvard & Smithsonian, Cambridge, MA, USA*

Independent research position.

SEP 2018 | **ESO Fellow**

OCT 2015 | *European Southern Observatory, Garching, Germany*

Independent research position.

SEP 2018 | **Fellow Astronomer**

OCT 2015 | *ESO Paranal Observatory/Very Large Telescope, Chile*

Science operation, quality assessment and support of visitors for FORS, KMOS and NACO on UT1.

SEP 2015 | **Ph.D. in Astronomy**

OCT 2011 | *Leiden Observatory, Netherlands. Advisor: Prof. Dr. Huub Röttgering*

• Thesis: *When Galaxy Clusters Collide: the impact of merger shocks on cluster gas and galaxy evolution*

EDUCATION

JUL 2011 | **MSc in Physics**

OCT 2010 | *University of Cambridge, UK. Graduated with merit*

• Thesis: *Infra-red Properties of Galaxy Clusters Selected Using the Sunyaev-Zel'dovich Effect* (Advisor: Dr. Manda Banerji)

JUN 2010 | **BSc in Physics, BSc in Earth and Space Sciences**

SEP 2007 | *Jacobs University, Bremen, Germany. GPA of 1.43 on a scale from 1 (best) to 5 (worst)*

• Physics Thesis: *Multipoint Analysis of Local Magnetohydrostatic Equilibria in the Earth's Magnetotail using Cluster II* (Advisor: Prof. Dr. Joachim Vogt)

• Astrophysics Thesis: *Assessment of the Feasibility of Proposed Observations for the Magdalena Ridge Observatory Interferometer with the visim Software* (Advisor: Prof. Dr. Marcus Brüggen)

SHORT TERM APPOINTMENTS AND INTERNSHIPS

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|-------------|---|
| SUMMER 2011 | Institute of Astronomy , University of Cambridge, UK |
| SUMMER 2009 | Cavendish Astrophysics Group , University of Cambridge, UK |
| SUMMER 2009 | Dept. of Space Plasma, MPE , Garching bei München, Germany |
| WINTER 2009 | OHB System , Bremen, Germany |

TEACHING, SUPERVISION & MENTORING

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| SEP 2018 | Summer project supervisor , Joseph Cairns, Lancaster University |
| JUN 2018 | <i>The effect of disturbed environments on the molecular gas</i> |
| PRESENT 2014 | Isaac Newton and William Herschel telescopes , La Palma Trained and mentored ~ 10 undergraduate and graduate students in operating 2 – 4 m class telescopes. |
| AUG 2014 | MSc project supervisor , Joshua Albert, Leiden University |
| SEP 2013 | <i>The Extended Radio Emission in PLCK G004.5-19.5</i> (published in A&A) |
| DEC 2013 | Teaching assistant in MSc Radio Astronomy course, Leiden Observatory |
| SEP 2013 | Developed and delivered new training material for practical radio astronomy. Organised and managed excursion to WSRT. One-to-one advising/mentoring. |
| DEC 2009 | Teaching assistant , 2nd year Analytical Mechanics course, Jacobs University |
| SEP 2009 | Designed and delivered weekly tutorials for a group of > 15 students. Provided one-to-one tailored assistance and feedback to 2nd year physics students with very diverse background. Graded weekly homework, prepared sample solutions. |
| MAY 2009 | Teaching assistant , 1st year Physics Lab, Jacobs University |
| SEP 2008 | Assisted students in weekly first year lab. Provided feedback for correct execution of experiments, explained science background, evaluated lab reports. |
| AUG 2008 | Mentor at NASA Space Centre, Houston, USA |
| JUN 2008 | 15 th International Space Settlement Design Competition: scientific and technical advice to high school students designing a space settlement on the Moon. |

HONOURS, AWARDS, GRANTS

As part of my academic activities, I have secured funding either for my own science or for organising conferences. Over the past 6 years, I have secured a total of ~ 630k €.

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|--------------|---|
| 2018-2023 | Clay fellowship, CfA Harvard & Smithsonian (PI , equiv ~ 360k € for 5 years) |
| JUN 2018 | Successful ESO Workshop proposal, <i>Spectroscopic surveys</i> (SOC member, 10k €) |
| DEC-AUG 2018 | ESO Science Support Discretionary Fund, summer student funding (PI , ~ 5k €) |
| MAR 2017 | RadioNet funding for ESO workshop (Co-PI with 1 scientist, ~ 2.5k €) |
| DEC 2016 | Funding from KAVLI for attending galaxy cluster meeting (PI , ~ 900 €) |
| APR 2016 | Successful ESO Workshop proposal, <i>Early Stages of Galaxy Cluster Formation</i> (Co-PI with 1 other scientist, 7k €) |
| APR 2016 | Funding for attending COSPAR meeting (PI , 650 €) |
| 2015-2018 | ESO fellowship, ESO Garching (PI , equiv ~ 200k € for 3 years) |
| MAY 2014 | 2nd prize, poster competition, <i>Multiwavelength-surveys</i> , Croatia (80 €) |
| 2013 | Secured 30k € as PI from the Academy of Arts and Sciences (KNAW), the Organization for Scientific Research (NWO), NOVA, ASTRON, SRON for the <i>Astronomy, Radio Sources and Society</i> Symposium |
| 2010-2011 | ‘Open Horizons’ Scholarship, Dinu Patriciu Foundation (PI , 12k €) |
| 2008 – 2010 | President’s List, academic achievement (top 5%), Jacobs University |
| 2007 | Valedictorian, ‘Mircea cel Batran’ National College, Constanta, Romania |

SERVICE

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|-------------------------------|---|
| <i>Meetings and Colloquia</i> | SOC member, Special Session, <i>High Energy Astrophysics Division Meeting</i> (2019) SOC member, ESO conference <i>Spectroscopic surveys</i> (2019) SOC co-chair and LOC co-chair , ESO Conference <i>Early Stages of Galaxy Cluster Formation</i> (2017) Founder and organiser of the weekly Galaxy Cluster Discussion Group meetings (ESO, MPA, MPE & USM, 2016 – 2018) ESO Wine & Cheese seminar organiser (2016 – 2018) Founder and organiser of the weekly Merging cluster meetings, Leiden, Netherlands (2013) LOC chair , <i>Astronomy, Radio Sources and Society</i> Symposium (2013) |
| <i>Referee</i> | ApJ, MNRAS (since 2015); Nature Astronomy (since 2019) |
| <i>Proposal Review</i> | ESO Director's Discretionary Time (technical evaluation, 2016-2018) Expert reviewer for telescope time allocation, STFC PATT (2016) |
| <i>Departmental Service</i> | ESO Garching fellowship selection committee (2017) Very Large Telescope / Unit Telescope 1 Science Operations Team ESO Observing Programmes Committee (scientific assistant, Period 97) Physics Student representative, Jacobs University (2008–2010) |
| <i>Large Collaborations</i> | LOFAR Surveys Key Science Project (galaxy clusters, since 2011) Merging cluster collaboration (since 2013) Galaxy Clusters At Vircam (VISTA public survey, since 2015) Member of the Multi-Snapshot Sky Survey Team for LOFAR (2011-2013) |
| <i>Commissioning</i> | LOFAR Commissioning Team (2011-2013) |

PRESS RELEASES AND GENERAL ASTRONOMY TALKS

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|----------|---|
| 2017 | <i>Highlighted Research</i> , awarded to 1 Garching fellow each year, ESO Annual Report |
| JUN 2017 | <i>Fellow profile</i> , ESO Messenger |
| FEB 2017 | <i>In light of the discovery announced by NASA. When will human travel be possible to other planetary systems</i> , 'Adevarul' Newspaper (in Romanian) |
| MAY 2015 | <i>Mergers of Galaxy Clusters Can Trigger Star Formation</i> , Isaac Newton Group |
| APR 2015 | <i>Giant cosmic tsunami wakes up comatose galaxies</i> , Royal Astronomical Society |
| MAY 2015 | <i>A young Romanian astrophysicist discovered the phenomenon through which inactive galaxies give birth to new stars</i> , 'Adevarul' Newspaper (in Romanian) |
| SEP 2013 | <i>The behaviour of a sausage: a recipe for cooking with long waves?</i> , Leiden Observatory Open Science Day |

SUCCESSFUL OBSERVING PROPOSALS

25 successful PI proposals: > 80 nights of optical wide field imaging and multi-object and integral-field spectroscopy (KMOS/VLT, FLAMES/VLT, XSHOOTER/VLT, VIMOS/VLT, GMOS/Gemini, WFC/INT, WYFFOS/WHT, PFIP/WHT, WFI/MPG, MegaCam/CFHT) and ~ 670 h on radio and submm interferometers and single dish instruments (VLA, GMRT, LOFAR, AMI, APEX).

24 successful proposals as Co-I: ~ 100 nights of optical/IR imaging and multi-object spectroscopy (VISTA, INT, WHT, CFHT, HST), 1800 h of broad band radio imaging (WSRT, GMRT, JVLA, ATCA, LOFAR), 60 h on sub-mm (CARMA) and 340 ks on X-ray telescopes (Chandra, Suzaku).

TECHNICAL SKILLS

Telescope experience

- **Support Astronomer**, Very Large Telescope (UT 1). Official ESO duties; 40 nights per year. Science operations, quality control, visitor support for FORS, KMOS, NACO.
- Trained in operating 2, 4 and 8-m class optical telescopes and radio interferometers.
- > 170 nights (> 80 as PI) of optical multi-object and integral field spectroscopy and imaging: 4.2-m William Herschel telescope, 2.5-m Isaac Newton telescope (La Palma), 2.5 ESO/MPG telescope (La Silla), UT3 Very Large Telescope (Paranal)

Data analysis and techniques

- Successfully proposed for and experienced in planning, reducing and analysing UV, optical and IR imaging and spectroscopic data from various telescopes (e.g. INT, WHT, Subaru, CFHT). Developed own Python-based pipeline for analysis of physical properties.
- Expert user of radio interferometers, in planning, executing and reducing data from WSRT, LOFAR, GMRT, VLA, ALMA. Received complementary training in schools and workshops. Experience with modelling of radio properties

Computer knowledge and programming

- Linux, Windows, L^AT_EX, Topcat, NRAO CASA, DS9, fv, IRAF, Gaia, SExtractor, SWarp, SCAMP, HyperZ, HyperZmass, EAZY, MS Office, Python, IDL, C++, C, HTML, Bash, Tesh.

SEMINARS, TALKS AND POSTERS

Conference contributions: **7 invited talks**, 15 contributed talks and 1 poster presentation. Seminars and colloquia: **25 invited seminars**, 13 contributed talks.

Video recordings:

[Colloquium at IAC Spain, Nov 2013](#)

[Colloquium at Leiden Observatory, Sept 2015](#)

[Talk at the ‘Pathways for Galaxy Transformation’, Aug 2016](#)

LIST OF PUBLICATIONS

Peer-reviewed publications: 48

Citations: ~1100

First author publications: 12

H-index: 21

Second and third author publications: 11

First paper in mid 2012. Papers in preparation are not listed. Full list of papers:

ui.adsabs.harvard.edu/#/public-libraries/BbUXrx0CSsuNKmYl80fcYw

First author

1. **Stroe, A.**, Sobral, D., Matthee, J., Calhau, J., Oteo, I. *A 1.4 deg² blind survey for CII], CIII] and CIV at z ~ 0.7 – 1.5 I: nature, morphologies and equivalent widths.* MNRAS, 471, 2558 (Nov 2017)
2. **Stroe, A.**, Sobral, D., Matthee, J., Calhau, J., Oteo, I. *A 1.4 deg² blind survey for CII], CIII] and CIV at z ~ 0.7 – 1.5 II: luminosity functions and cosmic ratios.* MNRAS, 471, 2575 (Nov 2017)
3. **Stroe, A.** et al. *A large H α survey of star formation in relaxed and merging galaxy cluster environments at z ~ 0.15 – 0.3.* MNRAS, 465, 2916 (Mar 2017)
4. **Stroe, A.** et al. *The widest frequency radio relic spectra: observations from 150 MHz to 30 GHz.* MNRAS, 455, 2402 (Jan 2016)
5. **Stroe, A.** & Sobral, D. *A large narrow band H α survey at z ~ 0.2: the bright end of the luminosity function, cosmic variance and clustering across cosmic time.* MNRAS, 453, 242 (Oct 2015)
6. **Stroe, A.**, Oosterloo, T., Röttgering, H.J.A., Sobral, D., van Weeren, R.J., Dawson, W. *Neutral hydrogen gas, past and future star-formation in galaxies in and around the ‘Sausage’ merging galaxy cluster.* MNRAS, 452, 2731 (Sep 2015)
7. **Stroe, A.** et al. *The rise and fall of star-formation in z ~ 0.2 merging galaxy clusters.* MNRAS, 450, 646 (Jun 2015)

8. **Stroe, A.**, Harwood, J. J., Hardcastle, M. J., Röttgering, H.J.A. *Spectral age modelling in the ‘Sausage’ radio relic*. MNRAS, 445, 1213 (Dec 2014)
9. **Stroe, A.** et al. *Highest frequency detection of a radio relic: 16 GHz AMI observations of the ‘Sausage’ cluster*. MNRAS, L59 (Jun 2014)
10. **Stroe, A.**, Sobral, D., Röttgering, H.J.A., van Weeren, R.J. *The role of cluster mergers and travelling shocks in shaping the H α luminosity function at $z \sim 0.2$: ‘Sausage’ and ‘Toothbrush’ clusters*. MNRAS 438, 1377 (Feb 2014)
11. **Stroe, A.**, van Weeren, R.J., Intema, H.T., Röttgering, H.J.A., Brüggem, M. and Hoeft, M. *Discovery of spectral curvature in the shock downstream region: CIZA J2242.8+5301*. A&A 555, A110 (Jul 2013)
12. **Stroe, A.**, Snellen, I.A.G., Röttgering, H.J.A. *A stringent upper limit to 18cm radio emission from the extrasolar planet system τ Boötis*. A&A 546, A116 (Oct 2012)

Second and third author

Students under (co-)supervision or mentorship are marked with underlines.

13. Albert, J. G., Sifon, C., **Stroe, A.**, et al. *Complex Diffuse Emission in the $z = 0.52$ Cluster PLCK G004.5-19.5*, A&A, 607, A4 (Nov 2017)
14. Hoang, D., Shimwell, T. **Stroe, A.** et al. *Deep LOFAR HBA observations of galaxy cluster CIZA J2243.8+5301*. MNRAS, 471, 1107 (Oct 2017)
15. Calhau, J., Sobral, D., **Stroe, A.**, et al. *The growth of typical star-forming galaxies and their super massive black holes across cosmic time*, MNRAS, 464, 303 (Jan 2017)
16. Donnert, J. M. F., **Stroe, A.** et al. *Magnetic Field Evolution in Giant Radio Relics using the example of CIZA J2242.8+5301*. MNRAS, 462, 2014 (Oct 2016)
17. Jee, M. J., Dawson, W., **Stroe, A.**, et al. *MC²: Mapping the Dark Matter Distribution of the “Toothbrush” Cluster*. ApJ, 817, 179 (Feb 2016)
18. Sobral, D., **Stroe, A.** et al. *The nature of H α star-forming galaxies at $z \sim 0.4$ in and around Cl0939+4713: the environment matters*. MNRAS, 458, 3443 (Jun 2016)
19. Emonts, B., Mao, M., **Stroe, A.**, et al. *A CO-rich merger shaping a powerful and hyperluminous infrared radio galaxy at $z = 2$: the Dragonfly Galaxy*. MNRAS, 451, 5544 (Jul 2015)
20. Dawson, W., Jee, M. J., **Stroe, A.**, et al. *MC²: Galaxy imaging and redshift analysis of the merging cluster CIZA J2242.8+5301*. ApJ, 805, 143 (Jun 2015)
21. Sobral, D., **Stroe, A.** et al. *MC²: Boosted AGN and star-formation activity in CIZA J2242.8+5301, a massive post-merger cluster at $z=0.19$* . MNRAS, 450, 630 (Jun 2015)
22. Jee, M. J., **Stroe, A.** et al. *MC²: Constraining the dark matter contribution of the violent merging galaxy cluster CIZA J2242.8+5301: Piercing through the Milky Way*. ApJ, 802, 46 (Mar 2015)
23. Griffin, R.F. and **Stroe, A.** *Photoelectric radial velocities, Paper XX: 45 years’ monitoring of the radial velocities of the Redman K stars*. JOAA 33, 245 (Jun 2012)

Contributing author

24. Paulino-Afonso, A. et al. (including **Stroe, A.**) *VIS³COS III: the role of environment on galaxy morphology*. A&A (submitted, Dec 2018)
25. Calhau, J. et al. (including **Stroe, A.**) *On the X-ray activity of typical and luminous Ly α emitters from $z \sim 2$ to $z \sim 6$: evidence for a bimodal, evolving population*. MNRAS (submitted, Nov 2018)
26. Paulino-Afonso, A. et al. (including **Stroe, A.**) *VIS³COS II: environmental effects on [OII], H δ , and D $_n$ 4000 and their consequence for the star formation histories at $z \sim 0.8$* . A&A (submitted, Sep 2018)
27. van Weeren, R. et al. (including **Stroe, A.**) *Diffuse Radio Emission from Galaxy Clusters*. Space Science Reviews, 215, 16 (Feb 2019)

28. Mandal, S. et al. (including **Stroe, A.**) *Ultra steep spectrum emission in merging galaxy cluster Abell 1914*. A&A, 622, A22 (Feb 2019)
29. Hoang, D. N. et al. (including **Stroe, A.**) *Radio observations of the merging galaxy cluster Abell 520*. A&A, 622, A20 (Feb 2019)
30. Hoang, D. N. et al. (including **Stroe, A.**) *Characterizing the radio emission from the binary galaxy cluster merger Abell 2146*. A&A, 622, A21 (Feb 2019)
31. Botteon, A. et al. (including **Stroe, A.**) *The spectacular cluster chain Abell 781 as observed with LOFAR, GMRT and XMM-Newton*. A&A, 622, A19 (Feb 2019)
32. Paulino-Afonso, A. et al. (including **Stroe, A.**) *VIS³COS: I. survey overview and the role of environment and stellar mass on star formation*. A&A, 620, A186 (Dec 2018)
33. Di Gennaro, G. et al. (including **Stroe, A.**) *Deep Very Large Array observations of the merging cluster CIZA J2242.8+5301: continuum and spectral imaging*. ApJ, 865, 24 (Sep 2018)
34. Hoang, D. et al. (including **Stroe, A.**) *Radio observations of the double-relic galaxy cluster Abell 1240*. MNRAS, 478, 2218 (Aug 2018)
35. Sobral, D. et al. (including **Stroe, A.**) *The nature of luminous Ly α emitters at $z \sim 2-3$: maximal dust-poor starbursts and highly ionising AGN?*. MNRAS, 477, 2817 (Jun 2018)
36. Rumsey, C. et al. (including **Stroe, A.**) *AMI SZ observation of galaxy-cluster merger CIZA J2242+5301: perpendicular flows of gas and dark matter*. MNRAS, 470, 4638 (Oct 2017)
37. Sobral, D. et al. (including **Stroe, A.**) *The CALYMHA survey: Ly α luminosity function and global escape fraction of Ly α photons at $z = 2.23$* . MNRAS, 466, 1242 (Apr 2017)
38. Darvish, B. et al. (including **Stroe, A.**) *Cosmic web of galaxies in the COSMOS field: public catalog and different quenching for centrals and satellites*. ApJ, 837, 16 (Mar 2017)
39. Shimwell, T. et al. (including **Stroe, A.**) *The LOFAR Two-metre Sky Survey. I. Survey description and preliminary data release*. A&A, 598, A104 (Feb 2017)
40. van Weeren, R.J. et al. (including **Stroe, A.**) *The case for electron re-acceleration at galaxy cluster shocks*. Nature Astronomy, 1, 0005 (Jan 2017)
41. Shimwell, T. et al. (including **Stroe, A.**) *A plethora of diffuse steep spectrum radio sources in Abell 2034 revealed by LOFAR*. MNRAS, 459, 277 (Jun 2016)
42. van Weeren, R.J. et al. (including **Stroe, A.**) *The LOFAR facet calibration*. ApJS, 223, 2 (Mar 2016)
43. van Weeren, R.J. et al. (including **Stroe, A.**) *LOFAR, VLA, and Chandra Observations of the Toothbrush galaxy cluster*. ApJ, 818, 204 (Feb 2016)
44. Heald, G. et al. (including **Stroe, A.**) *The LOFAR Multifrequency Snapshot Sky Survey (MSSS) I. Survey description and first results*. A&A, 582, A123 (Oct 2015)
45. Akamatsu, H. et al. (including **Stroe, A.**) *Suzaku X-ray study of the double radio relic galaxy cluster CIZA J2242.8+5301*. A&A, 582, A87 (Oct 2015)
46. van Weeren, R.J. et al. (including **Stroe, A.**) *A distant radio mini-halo in the Phoenix Cluster*. ApJ Letters, 786, L17 (May 2014)
47. Emonts, B. et al. (including **Stroe, A.**) *CO(1-0) survey of high- z radio galaxies: alignment of molecular halo gas with distant radio sources*. MNRAS, 438, 2898 (Mar 2014)
48. van Weeren, R.J. et al. (including **Stroe, A.**) *The discovery of a radio halo in PLCK G147.3-16.6 at $z = 0.65$* . ApJ Letters, 781, L32 (Feb 2014)