Dr Rebecca **McElroy**

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Scientific interests & Achievements

- Research interests: **active galactic nuclei, merging galaxies, galaxy evolution.**
- Experience with MUSE integral field spectroscopic data at all levels, from preparation of observations to data reduction to in-depth data analysis.
- I am passionate about **teaching** and **outreach.**

Academic history

University of Sydney *Sydney, Australia*

Postdoctoral research associate *2020 - present*

- Group leader : Prof. Scott Croom
- Working on MUSE integral field spectroscopic data from local active galaxies and galaxy pair merger simulations with the FIRE simulations team.

Max Planck Institute for Astronomy *Heidelberg, Germany*

Postdoctoral researcher *2017 - 2020*

- Group leader : Prof. Eva Schinnerer
- Led the observation preparation and data reduction effort for the PHANGS Survey MUSE-VLT large programme.

University of Sydney *Sydney, Australia*

PhD in Astrophysics (Awarded 2018) *2014 - 2017*

- Ph.D Supervisors : Prof. Scott Croom & Dr. Michael Pracy
- Thesis: *Investigating the host galaxies of luminous AGN in the local universe with integral field spectroscopy*

University of Sydney

BSc and Graduate Diploma of Science *2010 - 2013*

- Received 1st class honours
- Major in Physics, minors in Mathematics and Ancient History
- Honours Supervisors: Dr. Scott Croom & Dr. Michael Pracy
- Honours Thesis: *The Host Galaxies of Active Galactic Nuclei: Winds, Morphology, and Star Formation.*

Honours & Awards

2018	**Best PhD thesis**, School of Physics, University of Sydney	
2016	**Best student poster**, The Changing Face of Galaxies Conference	*Tasmania, Australia*
2016	**Best student talk**, Annual meeting of the Astronomical Society of Australia	*Sydney, Australia*
2015	**Australian Postgraduate Award (APA) Scholarship**, University of Sydney	
2014	**Best poster prize**, CAASTRO annual retreat	*Mooloolaba, Australia*

Skills

Computing and programming

- Experienced in a range of programming languages and computer systems.
  - Python, IDL, SQL, Bash/C-shell scripting
  - Mac OS, Linux, Windows
  - HTML, CSS, PHP
  - Cluster-computing and parallel programming
- Trained at a graduate level in frequentist and Bayesian statistical methods.

Languages

- Native English speaker, proficient in German and French.

Other roles

I am a dynamic, valued, and engaged member of my professional communities. I am particularly passionate about diversity and equity and improving the culture of our workplaces. This year I have been working to re-vamp our departmental meetings to improve engagement and increase the value, particularly students, get from these meetings.

Equity and diversity

University of Sydney

Active member of the Physics Equity and Access Committee which aims to improve the culture and diversity of the School of Physics. I, along with other committee members, design ways to increase equity in the school.

Max Planck Institute for Astronomy

I served as an equal opportunity officer – an advocate for minority groups, particularly women, in the work environment. This involves:

- Participating in all hiring committees
- Organising diversity seminars and workshops
- Devising diversity initiatives and strategies
- Provide assistance in cases of unequal treatment

Seminar and moring tea coordination

Sydney Institute for Astronomy

- Coordination weekly departmental morning tea meetings. This includes scheduling speakers, hosting the meetings, and facilitating discussions.
- Organised department seminars, introduced and hosted the speakers.

Conference organisation

I have been part of local organising committees, including several workshops and was the primary organiser of a large collaboration meeting for PHANGs.

- Programme design and logistical organisation.
- Venue booking, catering, dinner organisation
- Chairing conference sessions.

Observation and data analysis

- **Experienced user of integral field spectroscopic data**
  - MUSE, SAMI, SPIRAL, WiFeS, VIMOS integral field spectrographs.
  - Written software to study complex emission lines, using frequentist and Bayesian methods (MCMC, Nested Sampling).
  - Used various tools to study absorption line properties (e.g.PPXF), such as stellar populations and kinematics.
- **Experienced user of ALMA sub-mm data**
  - Written analysis software for CO emission lines.
  - Used various tools to study the properties of CO emission including CASA, SCOUSE, and Glue.
- Experience **reducing integral field spectroscopic data**.
- **Capable observer**. I have spent many nights performing primarily optical observations, including both spectroscopy and photometry.
  - 19 nights on the Anglo-Australian Telescope.
  - 4 nights on the DuPont telescope at Las Campanas Observatory.
  - 16 hours on the Australian Telescope Compact Array.
- Co-investigator on many accepted proposals as part of the CARS and PHANGs teams (including HST, Chandra, VLA, ALMA, and VLT telescopes).
- Familiar with the use of **galaxy simulations** and how to compare them to observations.

Teaching & Outreach

Undergraduate astronomy and physics

- **I have considerable teaching experience in the School of Physics at the University of Sydney both at a lower level when I was a PhD student, and at a coordinating level as a postdoc.** As a postdoc I have been responsible for one of the first year astronomy units. While as a student I taught both first year physics and astronomy tutorials, at a variety of levels.
- My responsibilities over the years have included:
  - Designing and presenting lectures.
  - Tutorials, in both a managerial and subordinate role.
  - Designing tutorials.
  - Running telescope nights for astronomy courses.
  - Designing and marking exams.

Outreach activities

- Appeared on the **ABC Australia's national televised news** (16/09/2016) and ABC 702 (16/09/2016) and 744 (19/09/2016) **radio** to discuss the discovery of a 'starving' supermassive black hole.
- Contributed significantly to CAASTRO and ESO press releases which resulted in over 15 online news articles.
- Participated in the **CAASTRO Centre of Excellence Astronomer in Residence** program. This role involved assisting with night tours, telescope operation, giving public talks, and public Q&A sessions.
- Worked with school teachers to help explain astrophysical concepts to children.
- Managed the official SAMI Galaxy Survey twitter account.

Professional affiliations

- **PHANGS collaboration** - Physics at High Angular resolution in Nearby Galaxies, aims to understand how physics at small scales affects galaxies as a whole using combined large programmes from MUSE and ALMA.
- **The SAMI Galaxy Survey** - the first massively multiplexed spatially resolved survey of galaxies, based at the Anglo-Australian Telescope.
- **The Close AGN Reference Survey** - a multi-wavelength survey of nearby type 1 active galaxies based on MUSE, Chandra, VLA, and SOFIA data.
- **The Astronomical Society of Australia** - full member.

Talks

I am an **experienced public speaker.** I have presented talks at **seven international conferences**, given colloquia at **many institutions across the world**, and presented **several outreach talks.** Below is an abbreviated list of talks I have given.

1. *'Why I work on galaxy simulations'*, **morning tea talk**, University of Queensland, Brisbane, 2021
2. *'PHANGs: star formation and quenching across galaxy disks seen by MUSE and ALMA '*, Life and death of star-forming galaxies, **conference talk**, Perth, 2019
3. *'A MUSE-ALMA view of the physics of star formation and feedback at high angular resolution in nearby galaxies'*, ESO-Australia conference, **conference talk**, Sydney, 2019
4. *'Physics at High Angular resolution in Nearby Galaxies: A MUSE and ALMA view of the outflow in NGC1672'*, **colloquium**
   – European Southern Observatory, Santiago, 2018
   – Pontificia Universidad Católica de Chile, Santiago, 2018
   – Universidad Diego Portales, Santiago, 2018
5. *'Physics at High Angular resolution in Nearby Galaxies: A MUSE and ALMA view of the outflow in NGC1672'*, AIP Thinkshop, **conference talk**, Potsdam, 2018
6. *'Active galaxies in the local universe'*, ASTRON, **invited colloquium**, Groningen, 2018
7. *'Ongoing monitoring of changing look AGN Mrk1018'*, **colloquium**, European Southern Observatory, Garching, 2018
8. *'The Close AGN Reference Survey: Mrk 1018 returns to the shadows'*, **colloquium**
   – CSIRO Astronomy and Space Science, Sydney, 2016
   – Northwestern University, Chicago, 2016
9. *'Mrk 1018 returns to the shadows'*, **workshop talk**, Gas Accretion onto Galaxies, Sydney, 2016

10. *'QSO returns to the shadows after 30 years as a Seyfert 1'*, **conference talk**, Annual Meeting of the Astronomical Society of Australia, Sydney, 2016
11. *'Kinematics of type II AGN: Winds, Shocks, and Mergers'*, **colloquium**, European Southern Observatory, 2016
12. *'SAMI Galaxy Survey: Kinematics, Outflows, and AGN'*, **colloquium**
    – European Southern Observatory, Garching, 2016
    – Durham University, 2016
13. *'Host galaxies of luminous type II AGN'*, **conference talk**, 227th Meeting of the American Astronomical Society, Florida, 2016
14. *'SAMI Galaxy Survey: Kinematics, Outflows, and AGN'*, **colloquium**
    – Ohio State University, 2015
    – University of Wisconsin, 2015
    – University of Illinois, 2015
15. *'Accreting super-massive black holes: The monsters at the centres of galaxies'*, **outreach talk**, Uluru, 2015
16. *'Winds and shocks in luminous type II AGN'*, **conference talk**, Black Hole Accretion and AGN Feedback, Shanghai, 2015
17. *'Feedback in luminous type II AGN: winds, star formation, and morphology'*, **conference talk**, Powerful AGN and their Host Galaxies, Port Douglas, 2014

Referees

Professor Scott Croom

Current supervisor, Sydney Institute for Astronomy, University of Sydney

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Professor Joss Bland-Hawthorn

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Publications

1. ***The SAMI Galaxy Survey: the third and final data release***,
   Monthly Notices of the Royal Astronomical Society, 02/2021, Croom, S.M., Owers, M.S., Scott, N., Poetrodjojo, H., Groves, B., van de Sande, J., Barone, T.M., Cortese, L., D'Eugenio, F., Bland-Hawthorn, J., Bryant, J., Oh, S., Brough, S., Agostino, J., Casura, S., Catinella, B., Colless, M., Cecil, G., Davies, R.L., Drinkwater, M.J., Driver, S.P., Ferreras, I., Foster, C., Fraser-McKelvie, A., Lawrence, J., Leslie, S.K., Liske, J., López-Sánchez, Á.R., Lorente, N.P.F., **McElroy, R.**, Medling, A.M., Obreschkow, D., Richards, S.N., Sharp, R., Sweet, S.M., Taranu, D.S., Taylor, E.N., Tescari, E., Thomas, A.D., Tocknell, J., and Vaughan, S.P.,
   Citations - 1
2. ***Measuring the mixing scale of the ISM within nearby spiral galaxies***,
   Monthly Notices of the Royal Astronomical Society, 11/2020, Kreckel, K., Ho, I.-T., Blanc, G.A., Glover, S.C.O., Groves, B., Rosolowsky, E., Bigiel, F., Boquíen, M., Chevance, M., Dale, D.A., Deger, S., Emsellem, E., Grasha, K., Kim, J.J., Klessen, R.S., Kruijssen, J.M.D., Lee, J.C., Leroy, A.K., Liu, D., **McElroy, R.**, Meidt, S.E., Pessa, I., Sanchez-Blazquez, P., Sandstrom, K., Santoro, F., Scheuermann, F., Schinnerer, E., Schruba, A., Utomo, D., Watkins, E.J., and Williams, T.G.,
   Citations - 5
3. ***Mapping Metallicity Variations across Nearby Galaxy Disks***,
   The Astrophysical Journal, 12/2019, Kreckel, K., Ho, I.-T., Blanc, G.A., Groves, B., Santoro, F., Schinnerer, E., Bigiel, F., Chevance, M., Congiu, E., Emsellem, E., Faesi, C., Glover, S.C.O., Grasha, K., Kruijssen, J.M.D., Lang, P., Leroy, A.K., Meidt, S.E., **McElroy, R.**, Pety, J., Rosolowsky, E., Saito, T., Sandstrom, K., Sanchez-Blazquez, P., and Schruba, A.,
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3. ***Mapping Electron Temperature Variations across a Spiral Arm in NGC 1672***,
   The Astrophysical Journal, 11/2019, Ho, I.-T., Kreckel, K., Meidt, S.E., Groves, B., Blanc, G.A., Bigiel, F., Dale, D.A., Emsellem, E., Glover, S.C.O., Grasha, K., Kewley, L.J., Kruijssen, J.M.D., Lang, P., **McElroy, R.**, Kudritzki, R.-P., Sanchez-Blazquez, P., Sandstrom, K., Santoro, F., Schinnerer, E., and Schruba, A.,
   Citations - 9
4. ***Calibrating Star Formation Rate Prescriptions at Different Scales (10 pc-1 kpc) in M31***,
   The Astrophysical Journal, 03/2019, Tomičić, N., Ho, I.-T., Kreckel, K., Schinnerer, E., Leroy, A., Groves, B., Sandstrom, K., Blanc, G.A., Jarrett, T., Thilker, D., Kapala, M., and **McElroy, R.**,
   Citations - 10
5. ***The SAMI Galaxy Survey: observing the environmental quenching of star formation in GAMA groups***,
   Monthly Notices of the Royal Astronomical Society, 03/2019, Schaefer, A.L., Croom, S.M., Scott, N., Brough, S., Allen, J.T., Bekki, K., Bland-Hawthorn, J., Bloom, J.V., Bryant, J.J., Cortese, L., Davies, L.J.M., Federrath, C., Fogarty, L.M.R., Green, A.W., Groves, B., Hopkins, A.M., Konstantopoulos, I.S., López-Sánchez, A.R., Lawrence, J.S., **McElroy, R.**, Medling, A.M., Owers, M.S., Pracy, M.B., Richards, S.N., Robotham, A.S.G., van de Sande, J., Tonini, C., and Yi, S.K.,
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6. ***The Close AGN Reference Survey (CARS): SOFIA Detects Spatially Resolved [C II] Emission in the Luminous AGN HE 0433-1028***,
   The Astrophysical Journal, 10/2018, Busch, G., Husemann, B., Smirnova-Pinchukova, I., Eckart, A., Baum, S.A., Combes, F., Croom, S.M., Davis, T.A., Fazeli, N., Fischer, C., Gaspari, M., Klein, R., Krumpe, M., **McElroy, R.**, O'Dea, C.P., Perez-Torres, M.A., Powell, M.C., Sánchez-Monge, Á., Scharwächter, J., Tremblay, G.R., and Urrutia, T.,
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7. ***A 50 pc Scale View of Star Formation Efficiency across NGC 628***,
   The Astrophysical Journal, 08/2018, Kreckel, K., Faesi, C., Kruijssen, J.M.D., Schruba, A., Groves, B., Leroy, A.K., Bigiel, F., Blanc, G.A., Chevance, M., Herrera, C., Hughes, A., **McElroy, R.**, Pety, J., Querejeta, M., Rosolowsky, E., Schinnerer, E., Sun, J., Usero, A., and Utomo, D.,
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8. ***The SAMI Galaxy Survey: the low-redshift stellar mass Tully-Fisher relation***,
   Monthly Notices of the Royal Astronomical Society, 12/2017, Bloom, J.V., Croom, S.M., Bryant, J.J., Callingham, J.R., Schaefer, A.L., Cortese, L., Hopkins, A.M., D'Eugenio, F., Scott, N., Glazebrook, K., Tonini, C., **McElroy, R.**, Clark, H.A., Catinella, B., Allen, J.T., Bland-Hawthorn, J., Goodwin, M., Green, A.W., Konstantopoulos, I.S., Lawrence, J., Lorente, N., Medling, A.M., Owers, M.S., Richards, S.N., and Sharp, R.,
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9. ***The Close AGN Reference Survey (CARS). Mrk 1018 halts dimming and experiences strong short-term variability***,
   Astronomy and Astrophysics, 11/2017, Krumpe, M., Husemann, B., Tremblay, G.R., Urrutia, T., Powell, M., Davis, T.A., Scharwächter, J., Dexter, J., Busch, G., Combes, F., Croom, S.M., Eckart, A., **McElroy, R.**, Perez-Torres, M., and Leung, G.,
   Citations - 7
10. ***Using an artificial neural network to classify multicomponent emission lines with integral field spectroscopy from SAMI and S7***,
    Monthly Notices of the Royal Astronomical Society, 09/2017, Hampton, E.J., Medling, A.M., Groves, B., Kewley, L., Dopita, M., Davies, R., Ho, I.-T., Kaasinen, M., Leslie, S., Sharp, R., Sweet, S.M., Thomas, A.D., Allen, J., Bland-Hawthorn, J., Brough, S., Bryant, J.J., Croom, S., Goodwin, M., Green, A., Konstantantopoulos, I.S., Lawrence, J., López-Sánchez, Á.R., Lorente, N.P.F., **McElroy, R.**, Owers, M.S., Richards, S.N., and Shastri, P.,
    Citations - 15
11. ***The SAMI Galaxy Survey: Revisiting Galaxy Classification through High-order Stellar Kinematics***,
    The Astrophysical Journal, 01/2017, van de Sande, J., Bland-Hawthorn, J., Fogarty, L.M.R., Cortese, L., d'Eugenio, F., Croom, S.M., Scott, N., Allen, J.T., Brough, S., Bryant, J.J., Cecil, G., Colless, M., Couch, W.J., Davies, R., Elahi, P.J., Foster, C., Goldstein, G., Goodwin, M., Groves, B., Ho, I.-T., Jeong, H., Jones, D.H., Konstantopoulos, I.S., Lawrence, J.S., Leslie, S.K., López-Sánchez, Á.R., McDermid, R.M., **McElroy, R.**, Medling, A.M., Oh, S., Owers, M.S., Richards, S.N., Schaefer, A.L., Sharp, R., Sweet, S.M., Taranu, D., Tonini, C., Walcher, C.J., and Yi, S.K.,
    Citations - 75
12. ***The Close AGN Reference Survey (CARS). What is causing Mrk 1018's return to the shadows after 30 years?***,
    Astronomy and Astrophysics, 09/2016, Husemann, B., Urrutia, T., Tremblay, G.R., Krumpe, M., Dexter, J., Busch, G., Combes, F., Croom, S.M., Davis, T.A., Eckart, A., **McElroy, R.**, Perez-Torres, M., Powell, M., and Scharwächter, J.,
    Citations - 35

15. ***The Close AGN Reference Survey (CARS). Mrk 1018 returns to the shadows after 30 years as a Seyfert 1***, Astronomy and Astrophysics, 09/2016, **McElroy, R.**, Husemann, B., Croom, S.M., Davis, T.A., Bennert, V.N., Busch, G., Combes, F., Eckart, A., Perez-Torres, M., Powell, M., Scharwächter, J., Tremblay, G, and Urrutia, T.,
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16. ***The SAMI Galaxy Survey: instrument specification and target selection***,
Monthly Notices of the Royal Astronomical Society, 03/2015, Bryant, J.J., Owers, M.S., Robotham, A.S.G., Croom, S.M., Driver, S.P., Drinkwater, M.J., Lorente, N.P.F., Cortese, L., Scott, N., Colless, M., Schaefer, A., Taylor, E.N., Konstantopoulos, I.S., Allen, J.T., Baldry, I., Barnes, L., Bauer, A.E., Bland-Hawthorn, J., Bloom, J.V., Brooks, A.M., Brough, S., Cecil, G., Couch, W., Croton, D., Davies, R., Ellis, S., Fogarty, L.M.R., Foster, C., Glazebrook, K., Goodwin, M., Green, A., Gunawardhana, M.L., Hampton, E., Ho, I.-T., Hopkins, A.M., Kewley, L., Lawrence, J.S., Leon-Saval, S.G., Leslie, S., **McElroy, R.**, Lewis, G., Liske, J., López-Sánchez, Á.R., Mahajan, S., Medling, A.M., Metcalfe, N., Meyer, M., Mould, J., Obreschkow, D., O'Toole, S., Pracy, M., Richards, S.N., Shanks, T., Sharp, R., Sweet, S.M., Thomas, A.D., Tonini, C., and Walcher, C.J.,
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17. ***The SAMI Galaxy Survey: cubism and covariance, putting round pegs into square holes***,
Monthly Notices of the Royal Astronomical Society, 01/2015, Sharp, R., Allen, J.T., Fogarty, L.M.R., Croom, S.M., Cortese, L., Green, A.W., Nielsen, J., Richards, S.N., Scott, N., Taylor, E.N., Barnes, L.A., Bauer, A.E., Birchall, M., Bland-Hawthorn, J., Bloom, J.V., Brough, S., Bryant, J.J., Cecil, G.N., Colless, M., Couch, W.J., Drinkwater, M.J., Driver, S., Foster, C., Goodwin, M., Gunawardhana, M.L.P., Ho, I.-T., Hampton, E.J., Hopkins, A.M., Jones, H., Konstantopoulos, I.S., Lawrence, J.S., Leslie, S.K., Lewis, G.F., Liske, J., López-Sánchez, Á.R., Lorente, N.P.F., **McElroy, R.**, Medling, A.M., Mahajan, S., Mould, J., Parker, Q., Pracy, M.B., Obreschkow, D., Owers, M.S., Schaefer, A.L., Sweet, S.M., Thomas, A.D., Tonini, C., and Walcher, C.J.,
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18. ***The SAMI Galaxy Survey: Early Data Release***,
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19. ***IFU observations of luminous type II AGN - I. Evidence for ubiquitous winds***,
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