

# LEAH K. MORABITO

Hintze Fellow, Christ Church, Oxford  
Millard & Lee Alexander Postdoctoral Fellow

## PERSONAL DETAILS

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## EMPLOYMENT HISTORY

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Oct 2016 - Present	Hintze Fellow & PDRA in Galaxy Evolution, <i>University of Oxford</i>
Apr 2005 - Aug 2011	Air Battle Manager (highest rank: Captain), <i>United States Air Force</i>

## EDUCATION

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Sep 2012 - Sep 2016	<b>Leiden University</b> , Astronomy PhD Researcher Thesis: 'Radio Galaxies at Low Frequencies' <i>Supervisor: Huub Röttgering</i>
Sep 2009 - Apr 2012	<b>University of Oklahoma</b> , M.Sc. Astronomy Thesis: 'AGN: From Supermassive Black Holes to Rare FeLoBALs' <i>Supervisor: Xinyu Dai</i>
Sep 2001 - Apr 2005	<b>University of Michigan</b> , B.Sc. Physics & B.Sc. Astrophysics

## SCIENCE HIGHLIGHTS

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- First spatially resolved maps of high redshift radio galaxies, 1" resolution at 55 MHz
- First extragalactic detection of low frequency carbon radio recombination lines, in M82
- Widest, deepest survey field map to date with low band Low Frequency Array (LOFAR) data
- Determined intrinsic X-ray properties of broad absorption line quasars with new method

## RESEARCH GOALS

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My main research goal is to answer fundamental questions on how super-massive black holes co-evolve with the galaxies in which they reside. I do this by using low frequency radio observations coupled with multi-wavelength data. I aim to provide new insight using high-resolution radio imaging to clearly distinguish two main components in galaxy evolution: star formation, and high-energy processes associated with super-massive black holes that are actively accumulating material.

## PROFESSIONAL EXPERIENCE

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Mar 2018	<b>Lorentz Centre Workshop: High Resolution Surveying with LOFAR.</b> Main organiser: including writing proposal and securing funding.
Aug 2015, Jan 2017	<b>LOFAR Long Baseline Workshops.</b> Helped with commissioning/developing the LOFAR long baseline (LB) data reduction pipeline, and training of new users.
Mar 2016	<b>LOFAR Low Band Antenna Busy Week.</b> Organised and led first busy week exclusively devoted to working on challenges for the LOFAR Low Band Antenna.
Jul 2012 - present	<b>LOFAR Commissioning Busy Weeks.</b> Participated in 10 busy weeks to commission software for low-frequency, wide-field imaging.
Apr 2015	<b>Resident Shared Risk Observing, JVLA.</b> Assessed P-band spectroscopy feasibility on-site with staff at National Radio Astronomy Observatory in New Mexico.
Jan 2013	<b>Chair of Local Organising Committee, LOFAR Busy Week 21.</b> Workshop with 40+ global participants, including specialized talks and training for new users.
May 2012 - Aug 2012	<b>Research Experience for Graduate Students.</b> 3-month program working with radio data to detect ammonia transitions in nearby starburst galaxies.
May 2012	<b>12th Synthesis Imaging Workshop.</b> 2 weeks of radio interferometry classes at New Mexico Tech, with hands-on data reduction sessions.

Aug 2011	<b>X-ray Astronomy and CIAO Workshops, CXC.</b> Week-long workshops on specialized X-ray data reduction techniques, focussed on hands-on data reduction.
Aug 2008 - Aug 2011	<b>Evaluator/Instructor Electronic Combat Officer (ECO), USAF, Capt.</b> Operated Passive Detection System on E-3 Airborne Warning And Control System (AWACS). Culminated experience as Chief Evaluator and subject matter expert.
Jun 2005 – Aug 2008	<b>Air Weapons Officer, USAF, 1Lt.</b> Controlled tactical aircraft from AWACS. Deployed in support of combat missions in Afghanistan and Iraq.

## FUNDING AWARDS

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Mar 2018	Lorentz Center workshop: High-Resolution Imaging with LOFAR (logistics, workspace, coffee)
Feb 2018	RadioNet funding for Lorentz Center workshop to support early-career researchers (2,000 Euro)
Dec 2017	Grant for 100 TB disk for working on data, Christ Church Research Centre (8,580 GBP)
Oct 2017	Millard & Lee Alexander Post-Doctoral Fellowship, Christ Church, 2 year room & board
Jul 2017	Funding from ASTRON & ERC grant to support Lorentz Center workshop (3,900 Euro)
Jun 2014	Leids Kerkhoven-Bosscha Fonds grant for travel to international conference, 1 000 Euro
Nov 2013	Award for contribution to successful NWO-TOP1 grant, total grant 4 million Euro
Sep 2001	Reserve Officer Training Corps Scholarship, value approximately 120 000 USD
May 2001	University of Michigan Regents Merit Scholarship, 3000 USD

## HONOURS

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Apr 2017	Top 5% of applicants for L'Oréal-UNSECO For Women in Science Awards
Feb 2010	Distinguished Graduate, Instructor Electronic Combat Officer Training
Sep 2009	Air Force Achievement Medal, for leadership of Deployed Electronic Support Team
May 2008	Air Medal, for flying combat hours
May 2007	Distinguished Graduate, Initial Air Weapons Officer Qualification Training
Jul 2006	Top Scope Award, Undergraduate Air Battle Management Training
Apr 2005	College of Literature, Science & the Arts 'Angell Scholar'

## PROFESSIONAL SOCIETY MEMBERSHIPS

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Aug 2018 – present	Junior member of International Astronomical Union
Jan 2018 – present	Oxford Society of Women in Physics, President
Feb 2017 – present	Member of Royal Astronomical Society, by election
Oct 2016 – Jan 2018	Oxford Society of Women in Physics, Outreach Officer
Sep 2011 – Dec 2015	Member of American Astronomical Society
Apr 2005 – present	Member of Sigma Pi Sigma, National Physics Honors Society, by election
2004 - 2005	Co-President, co-founder of Society for Women in Physics, University of Michigan

## SUCCESSFUL OBSERVING PROPOSALS: PI/SELECTED CO-I

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- 'Deep LOFAR observations in the best-studied extragalactic fields' – Co-I, LOFAR ongoing, 578 hrs
- 'Exploring the Hubble Frontier Fields with LOFAR' – PI, LOFAR Cycle 6, 9 hrs
- 'Long Baseline Studies of High Redshift Radio Galaxies' – PI, LOFAR Cycle 4/5/6, 92 hrs
- 'Radio Recombination Lines in M82 with P-band' – PI, JVLA Semester 2015B, 17 hrs

- ‘Commissioning LBA Long Baselines using the HBA’ – PI, Commissioning, 9.75 hrs
- ‘Long Baseline Studies of High Redshift Radio Galaxies’ – Co-I, LOFAR Cycles 2/3, 51 hrs
- ‘The LOFAR LBA Exploratory Survey’ – Co-I LOFAR Cycle 7, 64 hrs
- ‘A large, perfectly matched, Lya-Ha dual narrow-band survey at  $z=2.23$ ’ – Co-I, INT 2013A

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## OBSERVING EXPERIENCE

- GMRT radio telescope, Pune, India, 5 nights
- INT 2.5 m optical telescope, Roque de los Muchachos, La Palma, 18 nights
- MDM 2.4 m Hiltner optical telescope, Tucson, AZ, USA, 7+ nights

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## COMPUTING SKILLS

- **Operating systems:** Linux, Mac, Windows, and standard packages therein
- **Programming Languages:** R, Python, IDL, Bash, FORTRAN
- **High Performance Computing:** TORQUE and slurm queuing systems, PBS scripting
- **Data pipelines:** Written end-to-end pipelines for LOFAR data, both low band antenna data and for high-resolution imaging
- **Astronomical Software:** LOFAR software, AIPS, CASA, ParselTongue, HEASOFT, PIMMS, XSELECT, IRAF, CIAO, SHERPA, XSPEC, FTOOLS, STILTS

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## TEACHING AND OUTREACH

Sep 2013 – present	<b>Supervision of students.</b> Supervised 3 MSc / 3 summer students to successful completion of research projects involving low frequency radio astronomy.
Apr – Jun 2018	<b>Co-supervision of PhD minor project.</b> Collaboration with Prof. Gal in Computer Science dept. at Oxford to supervise PhD project on topic of using machine learning to cross-match multi-wavelength surveys.
Apr 2018	<b>Unit 2 &amp; 3 DARA training at HartRAO.</b> Delivered lectures, interactive tutorials, and an invited talk as part of Development in Africa with Radio Astronomy (DARA) course at Hartebeesthoek Radio Astronomy Observatory, South Africa.
21 Feb 2018	<b>Invited Lecture, Astronomy For All Series.</b> Public lecture on super-massive black holes and galaxy evolution, Green Templeton College, 65 attendees.
Oct 2016 – Jan 2018	<b>Outreach Coordinator, Oxford Women in Physics.</b> New position in the organisation, planning two major upcoming events within the next eight months. Contributed to events like Somerville Girls into Science Day 2017.
Jan 2015 – Jul 2015	<b>Teaching Assistant, Radio Astronomy MSc class.</b> Developed tutorials and practical project for 14 students, supervised hands-on sessions, organized and conducted field trip to Dutch radio observatories.
Oct 2012, 2014	<b>Public Outreach, Leiden Old Observatory.</b> Helped with open day for public to view the observatory, visitor’s center, and participate in outreach activities.
Feb 2010 – Aug 2011	<b>Instructor Electronic Combat Officer.</b> Instructed students one-on-one and in larger classroom settings on all technical and tactical aspects of using the Passive Detection System on the E-3 AWACS.
Apr 2005	<b>Physics Girls’ Inreach.</b> Developed content for and organized all logistics for public inreach targeted to 10/11 year old girls with the intent to interest them in science and show them strong female role models.

- Sep 2004 - Apr 2005 **Co-Founder and Co-President, Society of Women in Physics (SWiP).** Program focused on mentorship of younger women undergraduate students, and promoting women in STEM fields.
- Jan 2003 - Apr 2005 **Angell Hall Public Viewing Nights.** Operated 0.6 meter telescope, Celestron 8 telescopes, and planetarium at Angell Hall Observatory for public viewing nights with the Student Astronomical Society.
- Aug 2004 - Apr 2005 **Physics Public Outreach.** Taught multiple hour-long workshops on various physical principles with the Society of Physics Students.

## SELECTED SCIENTIFIC PRESENTATIONS

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Presentations on scientific results at a rate of 4 times per year, mostly in the setting of scientific conferences or seminars at internationally recognised institutions. Yearly highlights are given.

### 2018

- 12 June, **A Low Frequency Radio Perspective on AGN**, Astronomy Colloquium (Invited), *Oskar Klein Centre, Stockholm, SE*
- 2 May, **LOFAR-VLBI**, Research Meeting, *University of the Western Cape, South Africa*

### 2017

- 26 May, **A Low Radio Frequency Perspective on Galaxy Evolution**, Astronomy Colloquium (Invited), *University of Sussex, UK*
- 9-13 January, **Introduction to LOFAR Long Baselines**, Long Baseline Workshop, *Netherlands Institute for Radio Astronomy, NL*
- 18-22 September, **High-redshift radio sources in MIGHTEE and Experience from LOFAR**, MIGHTEE Continuum Working Group Meeting, *Oxford, UK*

### 2016

- 29-31 October, **Long Baseline Imaging (aka VLBI with LOFAR)**, LOFAR Surveys Key Science Project Meeting, *Bologna, IT*
- 6 September, **Radio Galaxies at Low Frequencies: high spatial and spectral resolution studies with LOFAR**, General Astronomy Colloquium, *University of Leiden, NL*
- 4-7 April, **High Resolution Studies of 4C 43.15 with International LOFAR**, LOFAR Community Science Workshop, *Zandvoort aan Zee, NL*

### 2015

- 12 November, **Low-frequency Views on the Cold Neutral Medium and High Redshift Radio Galaxies**, Galaxy Evolution Seminar, *University of Oxford, UK*
- 20-25 October, **LOFAR Survey of Spatially Resolved Ultra-Steep Spectrum Sources**, The Many Facets of Extragalactic Radio Surveys, *Bologna, IT*
- 12 December, **Carbon Radio Recombination Lines in M82 with P-Band**, Lunch Talk, *National Radio Astronomy Observatory, New Mexico, USA*
- 30 March - 3 April, **Spatially Resolved Studies of High-z Radio Galaxies at 60 MHz**, NL/SA Radio Continuum Science Meeting, *University of Cape Town, SA*

### 2014

- 15-19 September **Spatially Resolved Studies of (Extragalactic Jets in) High-z Radio Galaxies at Low Frequencies**, IAU 313: Extragalactic Jets from Every Angle, *Galapagos, EC*
- **Discovery of Carbon Radio Recombination Lines in M82**
  - 7-11 July, IAU 309: Galaxies in 3D, *University of Vienna, AT*
  - 7-11 April, LOFAR Community Science Workshop, *Amsterdam, NL*

## 2013

- 16 December, **LOFAR: Radio Recombination Lines and High Redshift Radio Galaxies**, Special Seminar (Invited), *University of Oklahoma, USA*
- 4-7 November, **Recombination Line Studies with LOFAR**, The Radio Universe at Ger's (wave)-length, *University of Groningen, NL*
- 11 October, **High Redshift Radio Galaxies and the Advent of LOFAR**, Google Tech Talk, *Google office, Munich, DE*
- 10-14 June, **Radio Recombination Lines and Long Baselines on 4C 41.17**, Astronomy, Radio Sources and Society, *Leiden, NL*
- 29 May, **HBA Tied-Array Observations of Radio Recombination Lines**, LOFAR Status Meeting, *ASTRON, NL*
- 19-22 March, **Radio Spectroscopy with LOFAR**, LOFAR Science Community Workshop, *Dalfts, NL*

## 2012

- 1 August, **Ammonia in NGC 6946**, Lunch Talk, *National Radio Astronomy Observatory, New Mexico, USA*
- 25 July, **Active Galactic Nuclei: from Supermassive Black Holes to Rare FeLoBALs**, Lunch Talk (Invited), *National Radio Astronomy Observatory, New Mexico, USA*
- **X-ray Observations of Broad Absorption Line Quasars**
  - 22 November, Cosmology Seminar, *University of Oxford*
  - 25 October, Cosmology Seminar, *Max Planck Institut für Astronomie*