JOHN D. GARRETT

University Group
Experimental Radio/mm Cosmology
Astrophysics
Department of Physics
University of Oxford

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Profile

- Third year PhD student in Astrophysics
- Strong background in:
  - Electrical engineering: RF design and simulation, experimental lab work (including optics, cryogenics and RF test equipment)
  - Numerical programming: experience with Python+Numpy, version control, and the command line. Basics of C, C++, MATLAB and HTML.
  - Quantum tunnelling: theory and hands-on experience
- Distinguished academic record:
  - Recipient of the prestigious Clarendon Scholarship, an international award from IEEE, the ALIS Sir James Lougheed Award of Distinction, and the Alberta Innovates Technology Futures Scholarship
- Demonstrated research productivity:
  - 12 refereed research contributions including 3 first author journal papers

EDUCATION

Doctorate of Philosophy
2014–2018 (est.)

Astrophysics, Instrumentation, *University of Oxford*

- Supervisor: Dr. Ghassan Yassin
- Research focus: New technology for millimetre-wave receivers
- **Thesis project:**
  - → A 230 GHz focal plane array using wide IF bandwidth SIS receivers
  - Significance: This work will help to increase the imaging speed of ultra-sensitive, superconducting receivers on radio telescopes
- Sub-projects:
  1. Developing a wide IF bandwidth receiver at 230 GHz
  2. Developing a 1x4 focal plane array
  3. Developing a software package to simulate SIS receiver performance
  4. Observing star formation in nearby galaxies with IRAM 30 m

Master of Science Degree
2012–2014

Electrical Engineering, Applied Electromagnetics, *University of Calgary*

- Supervisor: Dr. Elise Fear
- Research focus: New approaches to microwave imaging and sensing
- **Thesis Project:**
  - New technique to estimate the average dielectric properties of complex and non-uniform structures from transmission measurements
  - Significance: Improving microwave breast imaging results for non-invasive cancer detection
- Courses (including letter grade): Antenna Design (A+), Radio-frequency Integrated Circuit Design (A+), Analog Integrated Circuit Design (A), Radio-Frequency Microwave Passive Circuits (A+) [GPA: 4.0 / 4.0]

Bachelor of Science Degree
2008–2012

Electrical Engineering, Biomedical Option, *University of Alberta*

- **Senior design project:** Nanowire Metamaterials for Biosensing Applications
- Graduated with distinction

PUBLICATIONS

Journal Papers

J. Garrett, and E. Fear, "A New Breast Phantom with a Durable Skin Layer for Microwave Breast Imaging," *IEEE Transactions on Antennas and Propagation,* vol. 63, no. 4, pp. 1693–1700, Apr. 2015.

J. Garrett, and E. Fear, "Average Dielectric Property Analysis of Complex Breast Tissue with Microwave Transmission Measurements," *Sensors (MDPI),* vol. 15, no. 1, pp. 1199–1216, 2015.

J. Garrett, and E. Fear, "Stable and Flexible Materials to Mimic the Dielectric Properties of Human Soft Tissues," *IEEE Antennas and Wireless Propagation Letters,* vol. 13, pp. 599–602, 2014.

J. Bourqui, J. Garrett, and E. Fear, "Measurement and Analysis of Microwave Frequency Signals Transmitted Through the Breast," *International Journal of Biomedical Imaging,* vol. 2012, Article ID 562563, 11 pages, 2012.

Conference Abstracts & Proceedings

J. Garrett, H. Rashid, V. Desmaris, V. Belitsky, and G. Yassin, "Spectral Domain Simulation of SIS Frequency Multiplication," in *The 28th International Symposium on Space Terahertz Technology (ISSTT)*, Cologne, Germany, Mar. 2017.

J. Garrett, F. Boussaha, C. Chaumont, B.K. Tan, and G. Yassin, "A 230 GHz Finline SIS Receiver with Width IF Bandwidth," in *The 27th International Symposium on Space Terahertz Technology (ISSTT)*, Nanjing, China, Apr. 2016.

J. Garrett, B.K. Tan, F. Boussaha, C. Chaumont, and G. Yassin, "A 220 GHz Finline Mixer with Ultra-Wide Instantaneous Bandwidth," in *The 26th International Symposium on Space Terahertz Technology (ISSTT)*, Cambridge, MA, Mar. 2015.

J. Leech, G. Yassin, B.K. Tan, Y. Zhou, J. Garrett, and P. Grimes, "An SIS Mixer Based Focal-Plane Array at 230 GHz," in *The 26th International Symposium on Space Terahertz Technology (ISSTT)*, Cambridge, MA, Mar. 2015.

J. Garrett, and E. Fear, "Average Property Estimation Validation with Realistic Breast Models," in *The 8th European Conference on Antennas and Propagation (EuCAP)*, The Hague, Netherlands, Apr. 2014, pp. 1279–1280.

J. Garrett, and E. Fear, "A Time- and Temperature-Stable Complex Breast Phantom for Microwave Breast Imaging," in *The 2013 USNC-URSI Radio Science Meeting (Joint with IEEE AP-S Symposium)*, Lake Buena Vista, FL, Jul. 2013, pp. 32.

J. Garrett, J. Bourqui, and E. Fear, "Average Property Estimation of Breast Tissue: the Use of Time-Gating and Antenna Compensation Techniques," presented at *The 2012 IEEE Antennas and Propagation Symposium*, Chicago, IL, Jul. 2012.

J. Bancroft, G. Lachapelle, T. Williams, and J. Garrett, "GPS Observability and Availability for Various Antenna Locations on the Human Body," in *Proceedings of the 23rd International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS 2010)*, Portland, OR, 2010, pp. 2941-2951.

Other Presentations

J. Garrett, B.K. Tan, F. Boussaha, C. Chaumont, and G. Yassin, "Preliminary Measurements of a 220 GHz Finline Mixer with Ultra-Wide Instantaneous Bandwidth," presented at the *National Astronomy Meeting 2015 (Royal Astronomical Society)*, Llandudno, Wales, Jul. 2015.

AWARDS AND HONOURS

Major Scholarships

Clarendon Fund Scholarship: 2014-2018
- Oxford graduate scholarship for top 4% of applicants
- £13,863 / year for 3.5 years + tuition/college fees

New College Graduate Scholarship: 2014-2018
- College award: Operates in conjunction with the Clarendon Scholarship

Alberta Innovates Technology Futures (AITF) Scholarship: 2012 to 2014
- Provincial award (1 of 125 yearly): $26,500 / year for 2 years

NSERC Undergraduate Student Research Award (USRA): 2011
- National award: $4,500 / 16 weeks

Selected Awards

ALIS Sir James Lougheed Award of Distinction (Doctoral): 2015
- Provincial scholarship (1 of 8 yearly): $20,000

IEEE Antennas and Propagation Society Pre-Doctoral Research Award: 2013
- International award (1 of 6 yearly): $1,000

TEACHING

Teaching Assistant

Electromagnetics (1st Year), Oxford **Fall 2016 - pres.**
- Guiding undergraduate students through EM experiments

Electromagnetic Waves and Applications, UofC **Winter 2014**
- Planned course material, delivered tutorials, ran weekly labs, and graded exams
- Plane wave propagation, transmission lines, Smith charts and waveguides

Electromagnetic Fields and Applications, UofC **Fall 2013**
- Assisted weekly tutorials, drop-in hours and grading (68 hours/term)
- 3D vector calculus, Maxwell's equations, time-varying fields and plane waves

Electromagnetic Waves and Applications, UofC **Winter 2013**
- Ran weekly labs and assisted in grading (68 hours/term)
- Plane wave propagation, transmission lines, Smith charts and waveguides

EXTRA-CURRICULAR

Leadership

Sports Representative, New College MCR Committee **Mar. 2015 - Oct. 2015**
- Planning sports-related events for the graduate students of New College
- Participating in MCR committee meetings, decisions, and events

VP Operations, ECE Graduate Student Assn., UofC **Aug. 2012 - Aug. 2013**
- Planning seminars, workshops and active events as well as advocating for graduate students in electrical and computer engineering (ECE)

VP Operations, Lister Hall Students' Assn. (LHSA), UofA **Aug. 2011 - Apr. 2012**
- Executive leader of the largest residence government in Canada
- Responsible to 1800 students with a $46,000 department budget

Community Involvement and Service

Stargazing at Oxford **Oct. 2014 - pres.**
- An outreach program to teach the general public about astronomy
- Interacting, demonstrating, and answering questions participants may have

Canadian Association for Disabled Skiing **Dec. 2012 - Mar. 2013**
- Taught a disabled woman how to ski through 1-on-1 lessons (4 hrs/week)

Community Service Learning: Ecuador **Sept. 2011 - Apr. 2012**
- Studied social inequality in Canada and in Ecuador
- Traveled to Ecuador to help an indigenous community with water sanitation

Competitive Athletics

Rugby
- Clubs:
  - New College Rugby Football Club, Oct. 2014 - pres.
  - Rams Senior Men Rugby Club, May 2013 - Sep. 2014

Rowing
- New College VIII's, Oct. 2014 - Apr. 2015

Triathlon
- Competed in 11 triathlons including 3 Half-Ironman races
- Clubs:
  - University of Calgary Triathlon Club, Jan. 2013 - Oct. 2013
  - University of Alberta Triathlon Club, Jan. 2010 - Apr. 2012

Other Interests
- Traveling: Visited 29 countries since graduating from high school
- Backcountry skiing, backpacking, woodworking, and brewing beer