



PROFILE

- * I am a postdoctoral research assistant in Astrophysics at the University of Oxford. My research is focused on advanced millimetre- and submillimetre-wave receivers for radio astronomy. For my DPhil thesis, I developed a wide bandwidth SIS mixer and a focal plane array at 230 GHz.
- * I have a strong technical background in:
 - **Superconducting detectors:** SIS mixer theory, modelling quantum tunnelling effects, and testing SIS devices in cryogenic systems
 - **Electrical engineering:** RF design, electromagnetic simulations, and low-noise testing
 - **Software development:** building complex simulation software and analyzing experimental results from SIS mixers
- * I have published my research in top academic journals, including 4 first author papers. These papers combined have [179 citations](#).

Work Experience

POSTDOC

- Astrophysics**, University of Oxford, Oxford, UK Sep. 2018 – pres.
- * Projects: Testing a new terahertz receiver system, simulating frequency multiplication in distributed SIS junctions, and developing a focal plane array at 230 GHz.
 - * Publishing the research from my DPhil.

Education

DOCTORATE

- DPhil Astrophysics**, University of Oxford, Oxford, UK 2014 – 2018
- * Supervisor: Prof. Ghassan Yassin
 - * Thesis: *[A 230 GHz Focal Plane Array Using a Wide IF Bandwidth SIS Receiver](#)*
 - Developed a wide bandwidth SIS mixer and a 1×4 focal plane array
 - Built a software package to simulate SIS mixer operation/performance (online: [QMix](#))
 - Observed star formation in intermediate redshift galaxies using the IRAM 30 m telescope

MASTERS

- MSc Electrical Engineering**, University of Calgary, Calgary, Canada 2012 – 2014
- * Supervisor: Dr. Elise Fear
 - * Thesis: *[Average Dielectric Property Analysis of Non-Uniform Structures](#)*
 - Developed a new technique to estimate the average dielectric properties of complex and non-uniform structures using microwave transmission measurements
 - This can be used to provide *a priori* information to microwave imaging algorithms
 - * Graduate courses including letter grade: Antenna Design (A+), RFIC Design (A+), Analog IC Design (A), RF Microwave Passive Circuits (A+). GPA: 4.0 / 4.0

BACHELORS

- BSc Electrical Engineering**, University of Alberta, Edmonton, Canada 2008 – 2012
- * Capstone project: *[Nanowire Metamaterials for Biosensing Applications](#)*
 - * Graduated with distinction

Publications

JOURNAL PAPERS

- J. Garrett, B.-K. Tan, F. Boussaha, C. Chaumont, and G. Yassin, "Simulating the Behavior of a 230 GHz SIS Mixer Using Multi-Tone Spectral Domain Analysis," submitted to *IEEE Transactions on Terahertz Science and Technology*.
- J. Garrett, A.W. Pollak, G. Yassin, and M. Henry, "A Compact and Easy to Fabricate E-plane Waveguide Bend," submitted to *IEEE Microwave and Wireless Components Letters*.
- J. Garrett, and G. Yassin, "QMix: A Python package for simulating the quasiparticle tunneling currents in SIS junctions," *Journal of Open Source Software*, vol. 4, no. 35, pp. 1231, Mar. 2019.
- I. Cortzen, J. Garrett, G. Magdis, D. Rigopoulou, F. Valentino, M. Pereira-Santaella, F. Combes, A. Alonso-Herrero, S. Toft, E. Daddi, D. Elbaz, C. Gomez-Guijarro, M. Stockmann, J. Huang, and C. Kramer, "PAHs as tracers of the molecular gas in star-forming galaxies," *Monthly Notices of the Royal Astronomical Society*, vol. 482, no. 2, pp. 1618–1633, Oct. 2018.
- 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, Jan. 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, Jan. 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, Mar. 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.

SELECTED CONFERENCE PROCEEDINGS

- B.-K. Tan, J. Garrett, and G. Yassin, "Design of a Compact Multi-Beam Phased Array System with Integrated Planar Power Splitter/Combiner," accepted to present at *The 12th UK/Europe-China Workshop on Millimetre-Waves and Terahertz Technologies (UCMMT)*, London, U.K., 2019.
- J. Garrett, F. Boussaha, C. Chaumont, B.-K. Tan, and G. Yassin, "Multi-tone Spectral Domain Analysis of a 230 GHz SIS Device," presented at *The 30th International Symposium on Space Terahertz Technology (ISSTT)*, Gothenburg, Sweden, 2019.
- J. Garrett, J. Leech, F. Boussaha, C. Chaumont, B. Ellison, and G. Yassin, "A 1×4 Focal Plane Array Using 230 GHz SIS Mixers," in *Proceedings of the 29th IEEE International Symposium on Space Terahertz Technology (ISSTT)*, Los Angeles, CA, 2018, pp. 240–244.
- J. Garrett, H. Rashid, V. Desmaris, V. Belitsky, and G. Yassin, "Spectral Domain Simulation of SIS Frequency Multiplication," in *Proceedings of the 28th International Symposium on Space Terahertz Technology (ISSTT)*, Cologne, Germany, 2017.
- J. Garrett, F. Boussaha, C. Chaumont, B.-K. Tan, and G. Yassin, "A 230 GHz Finline SIS Receiver with Wide IF Bandwidth," in *Proceedings of the 27th International Symposium on Space Terahertz Technology (ISSTT)*, Nanjing, China, 2016.
- J. Garrett, B.-K. Tan, F. Boussaha, C. Chaumont, and G. Yassin, "A 220 GHz Finline Mixer with Ultra-Wide Instantaneous Bandwidth," in *Proceedings of the 26th International Symposium on Space Terahertz Technology (ISSTT)*, Cambridge, MA, 2015.
- J. Garrett, and E. Fear, "Average Property Estimation Validation with Realistic Breast Models," in *Proceedings of the 8th European Conference on Antennas and Propagation (EuCAP)*, The Hague, Netherlands, 2014, pp. 1279–1280.
- J. Garrett, and E. Fear, "A Time- and Temperature-Stable Complex Breast Phantom for Microwave Breast Imaging," in *Proceedings of the 2013 USNC-URSI Radio Science Meeting (Joint with IEEE AP-S Symposium)*, Lake Buena Vista, FL, 2013, pp. 32.

Scholarships and Awards

SCHOLARSHIPS	* Clarendon Fund Scholarship & New College Graduate Scholarship	2014 – 2018
	– £13,863/year plus all university and college fees for 3.5 years	
	– Awarded to top 1.8% of graduate applicants to Oxford	
	* Alberta Innovates Technology Futures (AITF) Scholarship	2012 – 2014
	– Provincial award, \$26,500/year for 2 years	
	* NSERC Undergraduate Student Research Award (USRA)	2011
SELECTED AWARDS	– National award, \$4,500/16 weeks	
	* ALIS Sir James Lougheed Award of Distinction (Doctoral)	2015
	– Provincial scholarship (1 of 8 yearly): \$20,000	
	* IEEE Antennas and Propagation Pre-Doctoral Research Award	2013
	– International award (1 of 6 yearly): \$1,000 USD	

Teaching

TEACHING ASSISTANT	* First Year Electromagnetics, University of Oxford	2016 – 2018
	– Assisting weekly labs (24 hrs./term)	
	* Electromagnetic Waves and Applications, University of Calgary	2013 – 2014
	– Planning material, grading, and delivering tutorials and labs (102 hrs./term)	
	* Electromagnetic Fields and Applications, University of Calgary	2013
	– Assisting weekly tutorials, drop-in hours and grading (68 hrs./term)	

Extracurricular

VOLUNTEER	* Stargazing at Oxford (science outreach)	2014 – 2018
	* Sports Representative, New College MCR Committee	2015
	* Volunteer Ski Instructor, Canadian Association for Disabled Skiing	2012 – 2013
COMPETITIVE ATHLETICS	* New College Rugby Football Club	2014 – 2018
	* New College VIII's (rowing)	2014 – 2015
	* Calgary Rams Rugby Club	2012 – 2014
	* University of Calgary Triathlon Club	2013
	* University of Alberta Triathlon Club	2010 – 2012