John Garrett

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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 3 first author papers, which combined have 66 citations (excl. self-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

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, 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.
* 25 citations, excl. self-citations

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.
* 15 citations, excl. self-citation

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.
* 26 citations, excl. self-citations

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.
* 22 citations, excl. self-citations

Conference Proceedings

J. Garrett, J. Leech, B. Ellison, and G. Yassin, "A 1×4 Focal Plane Array Using 230 GHz SIS Mixers," in *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 *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 *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 *The 26th International Symposium on Space Terahertz Technology (ISSTT)*, Cambridge, MA, 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, 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, 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, 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, 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.

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 CAD/year for 2 years
* NSERC Undergraduate Student Research Award (USRA) — 2011
  - National award, $4,500 CAD/16 weeks

Selected Awards

* ALIS Sir James Lougheed Award of Distinction (Doctoral) — 2015
  - Provincial scholarship (1 of 8 yearly): $20,000 CAD
* 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 – pres.
* Sports Representative, New College MCR Committee — 2015
* Volunteer Ski Instructor, Canadian Association for Disabled Skiing — 2012 – 2013

Competitive Athletics

* Oxford University Australian Rules Football Club — 2018 – pres.
* New College Rugby Football Club — 2014 – pres.
* New College VIII's (crew/rowing) — 2014 – 2015
* University of Calgary Triathlon Club — 2013
* University of Alberta Triathlon Club — 2010 – 2012