

Dr Matthew T. Moores

Education

- 2015 **Doctor of Philosophy**, *Queensland University of Technology*, Brisbane, Australia.
Thesis title: “Bayesian Computational Methods for Spatial Analysis of Images”
Supervisors: Professor Kerrie Mengersen & Dr Fiona Harden
- 2009 **Master of Mathematical Science**, *Queensland University of Technology*, Brisbane, Australia.
- 1997 **Bachelor of Information Technology (Computing Science)**, *Queensland University of Technology*, Brisbane, Australia.

Employment History

Academic Appointments

- 2018–Present **Lecturer in Statistical Science**, *School of Mathematics & Applied Statistics, University of Wollongong*, New South Wales, Australia.
- Academic Program Director for the Master of Statistics and Bachelor of Data Science & Analytics degrees
 - Member of the Centre for Environmental Informatics in the National Institute for Applied Statistics Research Australia (NIASRA)
 - Associate Investigator, ARC Centre of Excellence in Mathematical and Statistical Frontiers (ACEMS)
- 2017–2018 **Postdoctoral Research Fellow**, *Department of Statistics, University of Warwick*, Coventry, UK.
Under the direction of Professors Gareth Roberts & David Firth: EPSRC-funded research project “Intractable Likelihood: New Challenges from Modern Applications” (*i-like*; ref: EP/K014463/1)
- 2014–2016 **Postdoctoral Research Fellow**, *Department of Statistics, University of Warwick*, Coventry, UK.
Under the direction of Professor Mark Girolami: EPSRC-funded research project “In Situ Nanoparticle Assemblies for Healthcare Diagnostics and Therapy” (ref: EP/L014165/1)
- Awarded merit pay for excellence in 2015/16 and 2016/17 by the Vice Chancellor’s Advisory Group;
 - Applied for and obtained additional funding from the EPSRC Network on Computational Statistics and Machine Learning (NCSML) Award for Postdoctoral Research Assistant Collaboration;
 - I was subsequently awarded the Winton Capital Prize for best final project report.
- 2012–2013 **Sessional Academic**, *Mathematical Sciences School, Queensland University of Technology*, Brisbane, Australia.
Teaching assistant and laboratory demonstrator for undergraduate statistics subjects.

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2009–2010 **Application Developer – Scientific Visualisation**, *ARC Centre of Excellence in Bioinformatics*, Institute for Molecular Bioscience, University of Queensland.

Industry Experience

2003–2008 **Principal Applications Engineer**, *Oracle Corporation*.

2001–2002 **Senior Software Engineer**, *AgileTV Corporation*.

1997–2000 **Systems/Software Engineer 2**, *Digital Equipment Corporation / Compaq Computer Corporation*.

Publications

Journal Articles

- 2020 **M. Moores**, G. K. Nicholls, A. N. Pettitt, and K. Mengersen. Scalable Bayesian inference for the inverse temperature of a hidden Potts model. *Bayesian Analysis*, 15(1):1–27, 2020. DOI: [10.1214/18-BA1130](https://doi.org/10.1214/18-BA1130)
- 2018 C. C. Drovandi, **M. Moores**, and R. J. Boys. Accelerating pseudo-marginal MCMC using Gaussian processes. *Computational Statistics & Data Analysis*, 118:1–17, 2018. DOI: [10.1016/j.csda.2017.09.002](https://doi.org/10.1016/j.csda.2017.09.002)
- J. Noonan, S. Asiala, G.L. Grassia, N. MacRitchie, K. Gracie, J. Carson, **M. Moores**, M. Girolami, A. Bradshaw, T.J. Guzik, G.R. Meehan, H. Scales, J.M. Brewer, I.B. McInnes, N. Sattar, K. Faulds, P. Garside, D. Graham, and P. Maffia. *In vivo* multiplex molecular imaging of vascular inflammation using surface-enhanced Raman spectroscopy. *Theranostics*, 8(22):6195–6209, 2018. DOI: [10.7150/thno.28665](https://doi.org/10.7150/thno.28665)
- 2016 K. Gracie, **M. Moores**, W. E. Smith, K. Harding, M. Girolami, D. Graham, and K. Faulds. Preferential attachment of specific fluorescent dyes and dye labelled DNA sequences in a SERS multiplex. *Analytical Chemistry*, 88(2):1147–1153, 2016. DOI: [10.1021/acs.analchem.5b02776](https://doi.org/10.1021/acs.analchem.5b02776)
- C. Hargrave, N. Mason, R. Guidi, J.-A. Miller, J. Becker, **M. Moores**, K. Mengersen, M. Poulsen, and F. Harden. Automated replication of cone beam CT-guided treatments in the Pinnacle³ treatment planning system for adaptive radiotherapy. *Journal of Medical Radiation Sciences*, 63(1):48–58, 2016. DOI: [10.1002/jmrs.141](https://doi.org/10.1002/jmrs.141)
- 2015 **M. Moores**, C. C. Drovandi, K. Mengersen, and C. P. Robert. Pre-processing for approximate Bayesian computation in image analysis. *Statistics & Computing*, 25(1):23–33, 2015. DOI: [10.1007/s11222-014-9525-6](https://doi.org/10.1007/s11222-014-9525-6)

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M. Moores, C. Hargrave, T. Deegan, M. Poulsen, F. Harden, and K. Mengersen. An external field prior for the hidden Potts model with application to cone-beam computed tomography. *Computational Statistics & Data Analysis*, 86:27–41, 2015. DOI: [10.1016/j.csda.2014.12.001](https://doi.org/10.1016/j.csda.2014.12.001)

M. Falk, C. Alston, C. McGrory, S. Clifford, E. Heron, D. Leonte, **M. Moores**, C. Walsh, A. N. Pettitt, and K. Mengersen. Recent Bayesian approaches for spatial analysis of 2-D images with application to environmental modelling. *Environmental & Ecological Statistics*, 22(3):571–600, 2015. DOI: [10.1007/s10651-015-0311-1](https://doi.org/10.1007/s10651-015-0311-1)

2011
K. Beaumont, N. Hamilton, **M. Moores**, D. Brown, N. Ohbayashi, O. Cairncross, A. Cook, A. Smith, R. Misaki, M. Fukuda, T. Taguchi, R. Sturm, and J. Stow. The recycling endosome protein Rab17 regulates melanocytic filopodia formation and melanosome trafficking. *Traffic*, 12(5):627–643, 2011. DOI: [10.1111/j.1600-0854.2011.01172.x](https://doi.org/10.1111/j.1600-0854.2011.01172.x)

2002
J-M Van Thong, P. J. Moreno, B. Logan, B. Fidler, K. Maffey, and **M. Moores**. Speechbot: an experimental speech-based search engine for multimedia content on the web. *IEEE Transactions on Multimedia*, 4(1):88–96, 2002. DOI: [10.1109/6046.985557](https://doi.org/10.1109/6046.985557)

Book Chapters

2020
M. Moores, A. N. Pettitt, and K. Mengersen. Bayesian computation with intractable likelihoods. In *Case Studies in Applied Bayesian Data Science*, volume 2259. Springer Nature, Cham, Switzerland, 2020. DOI: [10.1007/978-3-030-42553-1](https://doi.org/10.1007/978-3-030-42553-1)

Refereed Conference Proceedings

2014
M. Moores and K. Mengersen. Bayesian approaches to spatial inference: modelling and computational challenges and solutions. In *Proc. 33rd Int. Wkshp MaxEnt*, volume 1636 of *AIP Conference Proceedings*, pages 112–117, Canberra, Australia, 2014. DOI: [10.1063/1.4903719](https://doi.org/10.1063/1.4903719)

M. Moores, C. Hargrave, F. Harden, and K. Mengersen. Segmentation of cone-beam CT using a hidden Markov random field with informative priors. *Journal of Physics: Conference Series*, 489:012076, 2014. DOI: [10.1088/1742-6596/489/1/012076](https://doi.org/10.1088/1742-6596/489/1/012076)

C. Hargrave, **M. Moores**, T. Deegan, A. Gibbs, M. Poulsen, F. Harden, and K. Mengersen. Constructing a clinical decision-making framework for image-guided radiotherapy using a Bayesian network. *Journal of Physics: Conference Series*, 489:012074, 2014. DOI: [10.1088/1742-6596/489/1/012074](https://doi.org/10.1088/1742-6596/489/1/012074)

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- 2010 K. Beaumont, N. Hamilton, **M. Moores**, O. Cairncross, A. Cook, A. Smith, R. Misaki, M. Fukuda, T. Taguchi, R. Sturm, and J. Stow. Rab GTPases, the recycling endosome and regulation of melanosome trafficking and release. In *Pigment Cell & Melanoma Research*, volume 23 of *Proc. 16th Mtg Eur Soc Pigment Cell Research*, page e13. 2010. DOI: [10.1111/j.1755-148X.2010.00735.x](https://doi.org/10.1111/j.1755-148X.2010.00735.x)
- 2005 **M. Moores** and K. Leggett. Integrating XSL-FO with enterprise reporting. In *Proc. 11th Australasian World Wide Web Conference*, Gold Coast, Australia, July 2005. <http://ausweb.scu.edu.au/aw05/papers/refereed/moores/>
- 2000 P. J. Moreno, J-M Van Thong, B. Logan, B. Fidler, K. Maffey, and **M. Moores**. SpeechBot: a content-based search index for multimedia on the web. In *Proc. 1st IEEE Pacific-Rim Conference on Multimedia*, Sydney, Australia, December 2000.

R Packages

- serrsBayes **M. Moores**, J. Carson, and M. Girolami. serrsBayes: Bayesian modelling of Raman spectroscopy, 2020. R package version 0.4-1. <https://CRAN.R-project.org/package=serrsBayes>
- bayesImageS **M. Moores** and K. Mengersen. bayesImageS: Bayesian methods for image segmentation using a Potts model, 2019. R package version 0.6-0. <https://CRAN.R-project.org/package=bayesImageS>

Patents

- 2015 F. A. Mayr, A. Shroff, H. D. Currie, G. Kuhnen, and **M. Moores**. Querying by semantically equivalent concepts in an electronic data record system, U.S. Patent 8,930,386.
- 2014 F. A. Mayr, A. Shroff, H. D. Currie, G. Kuhnen, and **M. Moores**. Querying by concept classifications in an electronic data record system, U.S. Patent 8,856,104.
- 2004 L. C. Davies and **M. Moores**. Automatic method for quantifying the relevance of intra-document search results, U.S. Patent 6,718,323.

Other Research Outputs

- 2017 **M. Moores** and D. Firth. Discussion of "Sparse graphs using exchangeable random measures" by F. Caron & E. B. Fox. *J. R. Stat. Soc. Ser. B*, 2017. DOI: [10.1111/rssb.12233](https://doi.org/10.1111/rssb.12233)
- M. Moores**. Discussion of "Beyond subjective and objective in statistics" by A. Gelman & C. Hennig. *J. R. Stat. Soc. Ser. A*, 2017. DOI: [10.1111/rssa.12276](https://doi.org/10.1111/rssa.12276)

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2016

M. Moores. Bayesian computational methods for spatial analysis of images. *Bull. Aust. Math. Soc.*, 93:345–346, 2016. DOI: [10.1017/S0004972715001598](https://doi.org/10.1017/S0004972715001598)

M. Moores, K. Gracie, J. Carson, K. Faulds, D. Graham, and M. Girolami. Bayesian modelling and quantification of Raman spectroscopy. [arXiv:1604.07299](https://arxiv.org/abs/1604.07299)

Competitive Grants

2015 £2,000 EPSRC NCSML Award for Postdoctoral Research Assistant Collaboration (joint with Dr Kirsten Gracie, U. Strathclyde). Awarded further £250 travel funding to attend the NCSML 2016 workshop and £2,000 Winton Capital Research Project Prize for outstanding research report from the 2015 collaborations.

Awards & Achievements

2019 Runner-up for the departmental best paper prize in FoR 0104: Statistics, School of Mathematics & Applied Statistics, University of Wollongong

2018/19 AU\$13,000 Start-up funding from the Faculty of Engineering and Information Sciences, School of Mathematics & Applied Statistics, and National Institute for Applied Statistics Research Australia, University of Wollongong

2015/16 & 2016/17 Awarded merit pay for excellence by the Vice Chancellor’s Advisory Group, University of Warwick

2014 US\$650 Young Investigator Travel Grant for MCMSki IV: American Statistical Association and ISBA

2012–2014 Australian Postgraduate Award (APA)

2011–2012 QUT Postgraduate Award (QUTPRA)

2012 Best Higher Degree Research Student Presentation (Senior Category) at QUT Maths Postgrad Day

2011 SSAI Travel Award for the Young Statisticians’ Conference

Postgraduate Student Supervision

Doctoral Candidate

2019–Present **Quan Vu**, *joint supervision (with Dr Andrew Zammit-Mangion & Prof. Noel Cressie)*, School of Mathematics & Applied Statistics, University of Wollongong.

2020–Present **Matthew Berry**, *joint supervision (with A/Prof Mark Nelson)*, School of Mathematics & Applied Statistics, University of Wollongong.

Masters Dissertation

2020 **Jonathan Wong**, *joint supervision (with Dr Tam Ha) of epidemiology research project*, School of Health and Society, University of Wollongong.

2019/20 **Daniel Pesu**, *joint supervision (with Prof. Noel Cressie) of MStat research project*, School of Mathematics & Applied Statistics, University of Wollongong.

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2018/19 **Lu Wang**, *MStat research project*, School of Mathematics & Applied Statistics, University of Wollongong.

2017 **Jianyin Peng**, *joint supervision (with Prof. David Firth) of MSc research project*, Department of Statistics, University of Warwick.
Graduated with Distinction (final mark: 90%)

Honours

2020 **Jonty Negus**, *BMathFin (Honours) research project*, School of Mathematics & Applied Statistics, University of Wollongong.

Lachlan Kuhr, *BEng (Honours) research project*, School of Mathematical Sciences, Queensland University of Technology.

2019/20 **Emma Nguyen**, *BMathFin (Honours) research project*, School of Mathematics & Applied Statistics, University of Wollongong.

2019 **Joshua Devall**, *BMathFin (Honours) research project*, School of Mathematics & Applied Statistics, University of Wollongong.
Graduated with first-class honours.

Teaching

2020 **Measure and Integration Theory with Probability**, *3rd year undergraduate module*, development and delivery of new course materials.

School of Mathematics & Applied Statistics, University of Wollongong, Australia

2019 – 2020 **Engineering Mathematics, Introduction to Biostatistics & Introduction to Statistics**, *undergraduate modules*, shared lecturing duties 50%.

School of Mathematics & Applied Statistics, University of Wollongong, Australia

2018 **Design and Analysis & Introduction to Statistics**, *undergraduate modules*, shared lecturing duties 50%.

School of Mathematics & Applied Statistics, University of Wollongong, Australia

2017/18 **Programming for Data Science**, *3rd year undergraduate module*, shared lecturing duties 50% with Dr Paul Jenkins.

Department of Statistics, University of Warwick, UK

○ Introduced R Markdown for all assignments and computer laboratory exercises.

Invited Talks

November 2018 **CFTP: the algorithm ERGM deserves, but not the one it needs right now**, University of California, Irvine, CA, USA.

March 2018 **Bayesian modelling and computation for Raman spectroscopy**, University of Nottingham, UK.

July 2017 **Bayesian computation for medical image segmentation using a Potts model**, *MRC Biostatistics Unit*, University of Cambridge, UK.

August 2016 **Model-based hierarchical clustering of Raman spectral signatures**, *NCSML Workshop on Data Science: pulling together computational statistics and machine learning*, University of Edinburgh, UK.

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- March 2016 **SMC methods for Bayesian model choice, with application to Raman spectroscopy**, *Oxford Computational Statistics and Machine Learning Reading Group (OCSMLRG)*, University of Oxford, UK.
- August 2015 **Lorentzian mixture model for Raman spectroscopy**, *Mathematical Sciences School*, Queensland University of Technology, Brisbane, Australia.
- July 2014 **Pre-processing for SMC-ABC with undirected graphical models**, *ABC in Sydney*, University of New South Wales (UNSW), Sydney, Australia.
- January 2014 **Informative priors for Bayesian image segmentation with application to cone-beam CT**, *Department of Mathematical Sciences*, Norwegian University of Science and Technology (NTNU), Trondheim, Norway.
- November 2012 **Parallel R**, *School of ICT*, Griffith University, Gold Coast, Australia.
- October 2012 **Model-based segmentation of bioimaging with informative priors**, *Division of Computational Biology*, Institute for Molecular Bioscience, University of Queensland, Brisbane, Australia.

Academic Visits

- February 2019 Washera Geospace and Radar Science Laboratory, Bahir Dar University, Ethiopia. Hosted by Asst Prof. Baylie Damtie, Dr Assaye Walelign & Dr Abdu Mohammed.
- November 2018 BIRS-CMO Workshop 18w5023 on *Computational Statistics and Molecular Simulation: A Practical Cross-Fertilization*, Casa Matemática Oaxaca, Mexico.
- November 2018 Statistical Sciences Group, Los Alamos National Laboratory, New Mexico, USA. Hosted by Dr Kary Myers.
- March 2018 Aalto University & Sodankylä Geophysical Observatory, Finland. Hosted by Prof. Simo Särkkä & Dr Lassi Roininen.
- July 2017 Programme on *Scalable inference; statistical, algorithmic, computational aspects*, Isaac Newton Institute, Cambridge, UK.
- February 2014 Department of Mathematical Sciences, Norwegian University of Science & Technology (NTNU), Trondheim, Norway. Hosted by Prof. Håvard Rue.
- January 2014 Centre de Recherche en Mathématiques de la Décision (CEREMADE), Université Paris-Dauphine, Paris, France. Hosted by Prof. Christian Robert.

Selected Conference Presentations

- July 2019 12th International Conference on Monte Carlo Methods and Applications (MCM 2019), University of Technology, Sydney, Australia
- December 2018 ACEMS Workshop on *Intractable Likelihoods and Approximate Bayesian Computation*, Brisbane, Australia.
- July 2018 14th *useR!* International Conference for Users of R, Brisbane, Australia.
- June 2018 *International Society for Bayesian Analysis* World Meeting, Edinburgh, UK.
- April 2018 STOR-*i* Workshop on *Statistical Signal Processing*, University of Lancaster, UK.
- April 2018 *Spring SciX* (FACSS International Conference), Glasgow, UK.

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- Sept 2017 *Royal Statistical Society (RSS) International Conference*, Glasgow, UK.
- Sept 2016 5th Workshop on *Bayesian Inference for Latent Gaussian Models with Applications*, University of Bath, UK.
- July 2015 ACEMS International Workshop on *Monte Carlo Methods for Spatial Stochastic Systems*, Brisbane, Australia.
- July 2014 *ABC in Sydney*, satellite workshop for the *Australian Statistical Conference* (SSAI-IMS joint meeting), Sydney, Australia.
- January 2014 5th *IMS-ISBA joint meeting* (MCMSki IV), Chamonix, France.

Professional Service

- Personal Academic Mentor (2019 – Present)
- Academic Program Director for the Master of Statistics (2019 – Present) and new Bachelor of Data Science & Analytics (2020) degrees
- Subject coordinator for *Introduction to Statistics* (Mathematics undergraduate, 2019–2020) and *Introduction to Biostatistics* (Master of Public Health, 2019–2020)
- Higher-degree research (HDR) student coordinator for NIASRA, 2019 – Present
- Organiser of a contributed session for the ISBA World Meeting, Edinburgh, UK, 2018
- Postdoc representative to the IT committee, Department of Statistics, University of Warwick, 2015/16 & 2017/18 academic years
- Organiser of a contributed session for MCMSki IV, Chamonix Mont-Blanc, France, 2014
- Member of the organising committee for Bayes on the Beach, Caloundra, Australia, 2012

Peer Review

Reviewer for the *Journal of the Royal Statistical Society: Series C* (RSS/Wiley), *Journal of Computational & Graphical Statistics* (ASA/Taylor & Francis), *Statistics & Computing* (Springer), *Computational Statistics & Data Analysis* (Elsevier), *International Statistical Review* (ISI/Wiley), *Electronic Journal of Statistics* (IMS), *Transactions on Image Processing* (IEEE), *Geoscience and Remote Sensing Letters* (IEEE), *Mathematical Medicine & Biology* (IMA/OUP), and the *R Journal* (R Project for Statistical Computing).

Learned Societies

- Fellow of the Royal Statistical Society
- Member of the Statistical Society of Australia (SSAI)
- Member of the International Society for Bayesian Analysis (ISBA)
- Member of the Institute of Electrical and Electronics Engineers (IEEE)

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