ALEX DE BEER

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EDUCATION

The University of Sydney

PhD, Statistics *2024–28*

- Thesis title: Transport Maps for Digital Twins With Applications to Soft Tissue Mechanics.
  Supervisor: Dr. Tiangang Cui.

The University of Auckland

ME, Engineering Science (Grade: A+) *2023–24*

- Thesis title: Ensemble Methods for Geothermal Inverse Problems.
  Supervisors: Dr. Oliver Maclaren, Dr. Ruanui Nicholson.

BE (Hons), Engineering Science (Honours GPA: 9.00 / 9.00) *2019–22*

- Thesis title: Expansion of Electricity Distribution Networks Under Uncertainty.
  Supervisors: Prof. Andy Philpott, Dr. Tony Downward.
- Relevant coursework: inverse problems, Bayesian inference, probability theory, stochastic optimisation, machine learning, continuum mechanics.

RESEARCH EXPERIENCE

University of Auckland Geothermal Institute

Research Assistant *Nov 2021–Feb 2025*

Developed uncertainty quantification methods and software for geothermal reservoir modelling.

Auckland Bioengineering Institute

Research Assistant *Mar 2024–Oct 2024*

Developed software infrastructure to perform uncertainty quantification for physiological models.

PUBLICATIONS

Peer-Reviewed Journal Articles

Ensemble Kalman Inversion for Geothermal Reservoir Modelling

A de Beer, EK Bjarkason, M Gravatt, R Nicholson, JP O'Sullivan, MJ O'Sullivan, OJ Maclaren
Geophysical Journal International **241**, 580–605 (2025)
DOI, preprint, code

Data Space Inversion for Efficient Predictions and Uncertainty Quantification for Geothermal Models

A de Beer, A Power, D Wong, K Dekkers, M Gravatt, EK Bjarkason, JP O'Sullivan, MJ O'Sullivan, OJ Maclaren, R Nicholson
Computers & Geosciences **97**, 105882 (2025)
DOI, preprint, code

Working Papers

A New Framework for the Assessment of Undeveloped Geothermal Resources

K Dekkers, **A de Beer**, M Gravatt, O Maclaren, R Nicholson, R Nugraha, M O'Sullivan, J Popineau, T Renaud, J Riffault, R Tonkin, J O'Sullivan
Under review

`deep_tensor`**: An Implementation of the DIRT Algorithm for Uncertainty Quantification**

A de Beer, S Dolgov, T Cui
In preparation
software package

December 2, 2025

Theses

- Ensemble Methods for Geothermal Inverse Problems
  Master's Thesis (2024).
- Expansion of Electricity Distribution Networks Under Uncertainty
  Honours Report (2022).

PRESENTATIONS

- Ensemble Methods for Large-Scale Nonlinear Optimal Experimental Design
  Joint Meeting of the NZMS, AustMS and AMS, Auckland, NZ (Dec 2024)
  SIAM Conference on Uncertainty Quantification, Trieste, Italy (Feb 2024)
- Ensemble Methods for Geothermal Model Calibration
  45$^{\text{th}}$ New Zealand Geothermal Workshop, Auckland, NZ (Nov 2023)
- Geologically Consistent Priors for Uncertainty Quantification of Geothermal Reservoirs
  48$^{\text{th}}$ Workshop on Geothermal Reservoir Engineering, Stanford, CA (Feb 2023)
- Distribution Network Planning Using JuDGE
  20$^{\text{th}}$ EPOC Winter Workshop, Auckland, NZ (Sept 2022)

ADDITIONAL WORK EXPERIENCE

The University of Sydney

Workshop Tutor — *Aug 2025–Present*

Facilitating weekly tutorials for the following courses.

- Math 1062: Introduction to Statistics (2025)

The University of Auckland

Teaching Assistant — *Feb 2021–Jul 2024*

Provided assistance to groups of 30–80 students during tutorials for the following courses.

- EngSci 233: Computational Techniques and Computer Systems (2024)
- Geotherm 620: Geothermal Engineering (2023)
- EngSci 263: Engineering Science Design I (2023)
- Maths 199: Advancing in Mathematics (2021, 2023)
- EngGen 131: Introduction to Engineering Computation and Software Development (2021)

Part I Assistance Centre Mentor — *Feb 2021–June 2021*

Provided individual tutoring to first-year engineering students for core courses.

Ministry of Business, Innovation and Employment

Analytics and Insights Intern — *Nov 2022–Feb 2023*

Built a prototype dashboard to communicate the relationships between research funding and outputs in New Zealand.

Xtracta

Data Science Intern — *Nov 2020–Feb 2021*

Built machine learning models for product recommendation, document classification and document de-noising.

SELECTED HONOURS & AWARDS

- Senior scholar award (awarded to graduates with the highest undergraduate marks) — *2022*
- First equal, Faculty of Engineering summer research poster competition — *2022*
- First in course awards for 16 / 32 undergraduate courses — *2020–22*

SKILLS

Programming	Python, Julia, MATLAB, R, SQL, C++, C.
Tools	Jupyter Notebook, Quarto, LaTeX, Git, Excel, PowerBI.

December 2, 2025