# Gabriel Collin

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Melbourne, AUS

## Summary

Physicist and statistician with 11 years of experience in data analysis and statistical methodology, transitioning outside of academia. Proficient in Python, C/C++, JAX, Bayesian statistics, machine learning and Monte-Carlo methods.

## Education

**Massachusetts Institute of Technology**

2012 - 2018 Cambridge, USA

Ph.D. in Particle and Nuclear Physics

**Australian National University**

2008 - 2011 Canberra, AUS

Ph.B. in Physics (University Medal)

## Skills/Exposure

- Python (Numpy, Scipy, Matplotlib, JAX, Tensorflow)
- C/C++
- Numerical computing
- Machine learning
- Accelerated and cluster computing
- Git
- Linux

## Methodology/Approach

- Functional programming
- Imperative/OO programming
- Concurrent/parallel programming
- First principles statistical modelling
- Bayesian/frequentist statistics

## Experience

**Research Fellow**

*The University of Adelaide* - Ramsay Fellowship

2021 Nov. – 2025 Nov. Adelaide, AUS

- Developed the state of the art Bayesian non-parametric point-source inference methodology: Parametric Cataloging.
- Mentored masters student on the application of this method to astronomical data.

**Postdoctoral Teaching Associate**

*Massachusetts Inst. of Technology* - Institute for Data, Systems, and Society

2020 Sep. – 2021 Jun. Cambridge, USA

- Course development and teaching of masters-level statistical analysis and simulation methods.

**Postdoctoral Research Associate**

*Massachusetts Inst. of Technology* - Institute for Data, Systems, and Society

2018 Sep. – 2021 Jun.. Cambridge, USA

- Developed the state of the art Bayesian parametric point-source inference methodology: Compound Poisson Generators.
- Mentored masters students on the statical analysis of astronomical data.

**Graduate student research**

*Massachusetts Inst. of Technology* - Department of Physics

2012 Sep. – 2018 Aug. Cambridge, USA

- Created a comprehensive statistical framework for analysing all world data relating to a beyond standard model neutrino hypothesis.
- Pioneered the use of convolutional deep learning for the analysis of particle physics data.

**Undergraduate student research**

*Australian National University*

2008 Jan. – 2011 Oct. Canberra, AUS

- Various projects in atomic physics, computed X-ray tomography, plasma physics, materials science, and nuclear physics.

## Software

**multitables** - https://github.com/ghcollin/multitables
Python library for high speed streaming and random read access of HDF5 files from disk using shared memory and multiprocessing.

**cpg_likelihood** - https://github.com/ghcollin/cpg_likelihood
Implementation of the CPG parametric point source inference method (arXiv:2104.04529).

**healjax** - https://github.com/ghcollin/healjax
Implementation of HEALPix equal-area spherical pixelisations in JAX.