

Liam Pinchbeck

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Objective:

I am a motivated physicist and teaching associate with experience in scalable hierarchical Bayesian inference methods, specializing in investigating BSM physics in Very High Energy gamma ray event data.

Education

Monash University

PhD Candidate

Area: Computational Astro-particle Physics

Focus: Statistical methods for gamma-ray event analysis for dark matter parameter inference

Clayton, VIC

2023-

Monash University

Bachelor of Advanced Science Research - Hons. GPA 3.969

Thesis Title: Sensitivity of the Cherenkov Telescope Array to a Dark Matter signal from the Galactic Centre

Majors: Physics and Mathematics

(Physics) Subjects Taken: PHS1011, PHS1022, PHS2061, PHS2081, PHS2062, PHS3000, PHS3101, PHS3102, PHS3201, PHS3350

Clayton, VIC

2023

Ferntree Gully High School

Ferntree Gully, VIC

Experience

Monash University

Teaching Associate

Clayton, VIC

Mar 2024 –

- As a teaching associate I helped students through complex physical and mathematical ideas that underpin key topics within the field of Physics.
- Additionally, I supervised lab classes where I helped students undergo in-person practical activities to work on their research abilities.

Monash University

Postdoctoral Candidate (PhD student)

Clayton, VIC

Feb 2023 –

- As part of being a PhD student I develop frameworks that allow one to find indicators for dark matter, a hypothetical particle(s) that makes up most of the matter in the universe, through gamma ray event data.
- For this, I work with machine learning, hierarchical Bayesian inference, code design structures, quantum field theory, stochastic sampling methods, variational inference methods and various other fields to develop a code framework called *GammaBayes* that allows one to use these various tools and ideas to constrain dark matter parameters based on gamma ray event data collected particularly by the CTA Observatory.

Monash University

Research Scholarship

Clayton, VIC

Dec 2021 – Jan 2022

- In this research scholarship I developed a python pipeline to construct multilayer perceptron (MLP) and convolutional (CNN) neural networks to analyse Phase-I COMET data searching for muon to electron events that would only exist outside the standard model of particle physics.
- The title of the project was “Search for muon to electron conversion” under supervision by Dr. Yuki Fujii of Monash University.

VCE Mathematics and Physics Tutor

Feb 2019 – Nov 2023

- As a tutor, I guided students through complex ideas and problems related to VCE Mathematics and Physics.
- A key aspect of this position was working *together* with the students to address problems or concepts and communicating with the legal guardians of their progress and managing the schedules of everyone involved.

Monash University

Clayton, VIC

Research Scholarship

Dec 2020 – Jan 2021

- Within this position I investigated and proved various theorems relating to the unique continuation property for solutions to elliptic partial differential equations
- The title of the project was “Topics of unique continuation theorems” under supervision of Dr. Wenhui Shi of Monash University

Monash University

Clayton, VIC

Research Scholarship

Dec 2020 – Feb 2020

- Within this position I developed a temperature LabVIEW control code and interface that would control a Peltier module to regulate the temperature of a 2D material for use within a larger 2D material experiment
- The title of the project was “Design a smart PID interface on ultra-precise temperature control with Peltier modules” under supervision by Dr. Shao-Yu Chen of Monash University (at the time of the project).

Awards and Scholarships

J.L. Williams Scholarship

Clayton, VIC

Awarded by School of Physics and Astronomy – Monash University

2022

- Among other selection criteria this award, valued at \$6000, is given to those enrolling in the Honours program within the School of Physics and Astronomy that have high academic performance and otherwise strong applications.

Dean’s List Award

Clayton, VIC

Awarded by Monash University

2022

- Awarded for outstanding academic achievement in the year of 2021.

Dean’s List Award

Clayton, VIC

Awarded by Monash University

2021

- Awarded for outstanding academic achievement in the year of 2020.

Dean’s List Award

Clayton, VIC

Awarded by Monash University

2020

- Awarded for outstanding academic achievement in the year of 2019.

Vice-Chancellor’s Scholarship

Clayton, VIC

Awarded by Monash University

2019

- Awarded to high achieving students from under-represented schools enrolling full-time into a Monash Undergraduate degree (Bachelor). Recipients receive \$4000 over the course of their degree.

Skills & Interests

Technical: Proficient in Python, C++ and Fortran with experience in R, LabVIEW, MATLAB, Mathematica, and Kotlin.