Damon Binder

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I am interested in quantum field theory and its applications, in particular to particle physics. I am also interested in category theory as a universal language for mathematics and physics.

Research Experience

FEB 2016 – NOV 2016 — **Nuclear Interaction from Effective Field Theory**
Honours Thesis
Dr Cédric Simenel
Investigated the origin of Skyrme functionals from quantum hadrodynamical and quark-meson coupling models of nuclear interaction.

FEB 2016 – JUL 2016 — **Category Theory and Real Numbers**
Dr Scott Morrison
Studied category theory, in particular higher categories and diagrammatic methods. Developed a novel, minimalistic definition of the real numbers, which can be found at *arXiv:1607.05997*.

NOV 2015 – FEB 2016 — **Diphoton Resonance at 750 GeV**
Prof. Raymond Volkas
Reviewed the literature to study the possibility of a portal to dark matter. Wrote a Python script to search through possible intermediate fermions.

Education

Australian National University (2014 – 2016):

Bachelor of Science (Advanced) (Honours) with First Class Honours in Physics

Major: Physics
Minor: Mathematics
GPA: 7.0/7.0 (ANU)
WAM: 94%
Coursework:

- Theoretical Physics (Quantum Field Theory, General Relativity, Statistical Mechanics, Nuclear Physics, Open Quantum Systems, Quantum Measurement Theory)
- Applied Physics (Nuclear Physics, Cosmology, Thermal Physics, Plasma and Fluids)
- Mathematics (Functional Analysis, Complex Analysis, Numerical Analysis, Algebraic Topology, Category Theory, Advanced Algebra)

Townsville Grammar School (2002 – 2013):

Completed International Baccalaureate Diploma with a score 45 (converted to ATAR 99.95).

Academic Awards and Scholarships

2017 – 2019	John Monash Scholarship
2015 – 2016	Bruce Hall Half-Residential Scholarship
2014 – 2016	Bruce Hall Academic Award
	National Undergraduate Scholarship
2015	Deputy Dean (Education) Commendation

2014 – 2015	Chancellor's Letter of Commendation
2013	Mary Foley-Elliott memorial for Dux of Townsville Grammar School

Professional Experience

IT Support, Bruce Hall (2015 – 2016):

Provided assistance to residents and staff with information technology. Maintained the internal website and liaised with university administration.

Skills

Programming Languages: Python, Mathematica, JavaScript, Haskell, Bash
Formatting: LaTeX, Word, HTML and CSS
Presentation: Highly skilled orator and debater, Beamer, PowerPoint
Lab Analysis: Error propagation, Bayesian reasoning, numerical analysis, plotting, MatPlotLib

Extracurricular Interests and Activities

Computing

- Physics simulations and visualizations:
  - → Statistical mechanics (Ising model, lattice gas, continuous magnets)
  - → N-body simulations (gravity, log-gravity, Lennard-Jones potential, ions)
  - → Nature simulations (fires, extinction events)
  - → Partial differential equations (heat, standing waves)

Sports

- Keen runner and cyclist, pushing to challenge myself
- Last year fundraised and rode in the *Protect Your Head Campaign*, a charity ride from Dubbo to Canberra to fundraise for the National Institute for Mental Health Research
- Successfully completed Inward Bound Division 6, an adventure ultramarathon
- Successfully climbed Mt Kilimanjaro

Arts

- Competent pianist
- Acted, sung, and debated through school and at my residential college
- History, and more specifically quantitative and comparative history