

Cody B. Duncan

CV

Profile

During the course of my studies and research, I have developed a passion for programming and using simulations to test our understanding of the physical processes that we observe in Nature. I have added to the codebase of Herwig and Pythia (C++ particle physics simulations), primarily working on hadronization and the non-perturbative aspects of QCD. I am interested in continuing to research the cutting edge of low-energy QCD, where the typical tools of particle physicists break down.

Work History

- 2020–Present **Postdoctoral Researcher**, *Karlsruhe Institute of Technology (KIT)*, Karlsruhe, Germany.
Early career researcher, working on non-perturbative and perturbative aspects of event generation in Herwig.
- 2020 **Postdoctoral Researcher**, *Monash University*, Melbourne, Australia.
Employed for 3 months as a research assistant to Dr Peter Skands. Worked on perturbative corrections in parton showers.

Education and Qualifications

- 2016–2020 **Ph.D. in Theoretical Particle Physics**, *Monash University*, Melbourne, Australia.
My research is in the interface between theoretical and experimental QCD, working with Dr. Peter Skands. My work is on developing the Monte Carlo generators Pythia, Vincia, & Herwig to help scientists run models of LHC collisions. Funded by the Research Training Program Scholarship. Awarded the prestigious J L William Scholarship.
Thesis title: *On Hadronization Phenomenology in Monte Carlo Event Generators*
- 2018 **Marie Curie Early Stage Researcher**, *Karlsruhe Institute of Technology (KIT)*, Karlsruhe, Germany.
Research exchange for 6 months working on Herwig, with PD Dr. Stefan Gieseke, in particular implementing several new algorithms and physics models.
- 2014–2015 **M.Sc. in Theoretical Physics**, *Edinburgh University*, Edinburgh.
Distinction.
Thesis title: *Correlators of Two Wilson Lines, and Webs in QCD*
- 2011–2014 **M.A. (Hons) in Physics**, *Balliol College, Oxford University*, Oxford.
2:i (Upper second class). Final year research project in the material science of spherical tokamaks.

Papers

- *Rivet for Heavy Ions* (EPJ C, arXiv: 2001.10737 [hep-ph])
- *Fragmentation of Two Repelling Lund Strings* (SciPost Physics, arXiv: 1912.09639 [hep-ph])
- *Spacetime Colour Reconnection in Herwig 7* (EPJ C, arXiv: 1909.08850 [hep-ph])
- *Kinematic Strangeness Production in Cluster Hadronization* (EPJ C, arXiv: 1811.10336 [hep-ph])

Conferences and Schools

- **Parton Showers & Resummation 2019, Vienna**
- **Rivet for Heavy Ions Workshop 2018, Copenhagen**
- **MCNet School 2018, Prato** - Monte Carlo event generators
- **Parton Showers & Resummation 2018, Lund**
- **MCNet Meeting 2018, CERN**
- **CTEQ 2017, Pittsburgh** - SM & BSM phenomenology
- **MCNet School 2017, Lund**
- **CoEPP Meeting 2017, Adelaide** - Australian HEP.
- **Higgs School 2015, Edinburgh** - BSM physics & QCD.

Talks

- *Hadronization Phenomenology in Monte Carlo Event Generators*, Monash, October 2019
- *Spacetime Colour Reconnection*, Vienna, June 2019
- *Spacetime Colour Reconnection in Herwig*, Göttingen, May 2019
- *Spacetime Colour Reconnection*, Monash, October 2018
- *Hadronization in PYTHIA & Herwig*, KIT, May 2018
- *Vortex Lines in Hadronization*, CERN, April 2018

Technical Skills

Programming **C/C++ (experienced), Python (experienced).**
Languages

Scripting **Python (experienced), Bash (experienced).**
Version **git (average), hg (average), svn (average).**
Control

OS **MacOS (experienced), Linux (experienced), Windows (average).**

Python **Matplotlib (experienced), Numpy (average), Pandas (basic).**
packages

Activities and Interests

- Ex-national/international level swimmer. Two-time Blues swimmer for University of Oxford.
- Volunteer in hands-on physics and after-school physics & maths programs.
- An avid fan of film, literature, & music. Extremely interested in politics & philosophy, and creative & critical writing. Published several pieces of work in the Monash student magazine, *Lot's Wife*.
- Postgraduate Council representative for the School of Physics & Astronomy at Monash University (2017-2018)