

Jacob Cook

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Summary

PhD student in biophysics/systems biology applied to ecological problems. Background in theoretical physics so strong grounding in mathematical and computational techniques. Particular interest in the application of techniques from stochastic thermodynamics to complex ecosystems.

Education

2017-2020 PhD in Ecology/Biophysics, Imperial College London

Project: Entropy Production as a Driver for Increased Functioning of Complex Ecosystems

Supervisors: Dr. Robert G. Endres, Dr. Samraat Pawar, Dr. Guy-Bart Stan

NERC funded QMEE CDT

2013-2017 MPhys (First Class) Physics with Theoretical Physics, University of Manchester, UK

Research Projects:

- Quantifying Chaos in Order to Assess the Reliability of Various Particle-Mesh Simulations
- QCD and the Structure of the Nucleon

Key modules: Statistical Physics, Non-Linear Physics, Equilibrium Thermodynamics, Object Oriented Programming, Mathematical Methods, Introductory Fluid Mechanics.

2006-2013 Downend School, South Gloucestershire BS16 6XA

A levels: A* Further Maths, A Maths, A Physics

AS levels: A Biology

GCSEs: 7 A*'s, 1 A, 1 B

Research Projects

PhD research project, Imperial College London 2017-2020

- Entropy Production as a Driver for Increased Functioning of Complex Ecosystems
- *This project aims to use recent advances in stochastic thermodynamics to investigate the validity of the Maximum Entropy Production Principle. I will aim to link this principle with present ecological theory and data to generate a new coarse grained modelling framework for ecosystem functioning.*

Masters research project, University of Manchester February-June 2017

- Quantifying Chaos in Order to Assess the Reliability of Various Particle-Mesh Simulations. Supervisor Dr. Richard James. Performed in collaboration with George Beeton.
- *This project involved the comparison of simulations of particle orbits using different particle-mesh approximation schemes. These schemes differed both in mesh size and the order of numerical differentiation used. The comparison was performed via various fractal dimensions and Lyapunov exponents.*

Masters research project, University of Manchester September 2016-January 2017

- QCD and the Structure of the Nucleon. Supervisor Dr. Judith McGovern. Performed in collaboration with George Beeton.
- *This project involved the comparison of constants obtained via the approximation of chiral perturbation theory with numerical results obtained by other groups using large time simulations of lattice QCD.*

Other Experience

Graduate Teaching Assistant, Imperial College London, November 2017-Present

- Role involved assisting in the teaching of basic mathematical and computational skills to both 3rd year biology undergraduates and to ecology masters students.

Skills

- Experienced in the use of C++, MATLAB and julia programming languages for simulation and analysis of models.
- Familiarity with modelling techniques used across biophysics/systems biology.

References

Dr Robert G. Endres,
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Sir Ernst Chain Building,
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