

Rob Welch

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SKILLS

Strong and varied computing background - Programming in C++ (numerical simulations), Python (data analysis, visualisation), Mathematica. Experience using Git, Jenkins, LaTeX, Linux, CMake, CTest, MPI, OpenMP, Doxygen, and high-performance computing. Other general-purpose computing skills: Object-orientated programming (OOP), GUI and CLI implementation, refactoring and optimisation, documentation and code maintenance, unit testing, system/web administration, web development, embedded computing (e.g. Raspberry Pi, Arduino).

Physics - Postgraduate experience designing and developing biophysical simulations at the molecular mesoscale. Atomistic molecular dynamics experience including AMBER and GROMACS. Knowledge of numerical methods, stochastic calculus, and computational biophysics. IOP-accredited 1st class Physics degree with additional experience in photonics, computing, mathematical logic, biophysics and statistical mechanics.

Visualisation and communication - data visualisation and analysis (PyMOL, VMD, Matplotlib, VPython), scientific publications, presentations, technical whitepapers, code and process documentation, video production and editing, teaching materials, occasional fiction writing. Ability to write and present with clarity, brevity and entertainment value on topics at any level. Invited to and presented at several international conferences (video recordings available at www.robwel.ch).

Interdisciplinary work and collaboration - experience in teams both large and small, crossing many disciplines - physicists, biologists, software, mechanical and electronic engineers, web developers, graphic designers, illustrators and musicians. Experience working on large, multidisciplinary collaborations.

EDUCATION

PhD, Physics
University of Leeds, UK - 2016-2020

Bachelor of Science, Physics, 1st Class Hons
University of Leeds, UK - 2012-2016

A-Levels: Physics, Mathematics, Biology

TEACHING

Postgraduate demonstrator
University of Leeds, UK 2016-2020

- PHYS1220 - Computing 1: Fundamentals of Programming
- PHYS2320 - Computing 2: Computational Physics

- PHYS3190 - Molecular Simulation: Theory and Practice (also co-wrote course materials)

PUBLICATIONS

- **Welch R. J.**, Harris S. A., Harlen O. G. Read D. J. “KOBRA: A Fluctuating Elastic Rod Model for Slender Biological Macromolecules” (2020), *Soft Matter* 16, 7544-7555.
- Solernou A., Hanson B., Richardson R. A., **Welch R.**, Read D. J., Harlen O. G. Harris S. A. “Fluctuating Finite Element Analysis (FFEA): A continuum mechanics software tool for mesoscale simulation of biomolecules” (2018) *PLOS Comput. Biol.* 14(3): e1005897.

EXPERIENCE

Research Postgraduate 2016 - 2020
University of Leeds, UK

- Developing a mesoscale simulation model for slender biomolecules (KOBRA), modelling them as fluctuating elastic rods, as part of the FFEA software package.
- Investigating the application of current simulation technologies to the NDC80c kinetochore protein complex and its role in cell division.
- Working collaboratively with cell and molecular biologists to place findings in a broader biological context.
- Updating and maintaining the FFEA (Fluctuating Finite Element Analysis) software package with new features, tools, tests and documentation.

BSc Project 2015 - 2016
University of Leeds, UK

- Generated and parameterised coarse-grained Myosin-VII models using FFEA.
- Ran simulations and developed analysis and visualisation tools.

LED Test Engineer 2014 - 2015
Sharp Devices Europe, Oxford, UK

- Designed, executed, and documented procedure for LED thermal testing and performance optimisation, analysed data, produced technical documents and customer guides on thermal integration.
- Developed user-friendly software tools relating to colour science and analysis of optical measurements.
- Designed and developed prototype LED department website, helped secure funding for full project. Worked collaboratively with Oxford-based web agency Electric Studio for final product.
- Helped customers troubleshoot problems with light fixture design and improve performance and lifespan of LEDs in real products.

Web Developer 2010-2013
Self-employed (spare time)

REFERENCES

Dr Sarah Harris - Researcher, University of Leeds
01133 433 816 / s.a.harris@leeds.ac.uk

Dr Alastair Grundy - Senior Project Manager, Sharp Devices Europe
01865 334 261 / alastair.grundy@sharp.eu