Isaac C. D. Lenton

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Education

2017–present **Doctorate of Philosophy (Physics)** The University of Queensland
Expected completion date: 25 January 2021.
Thesis topic: Optical tweezers: experiments and modelling.

2016–2017 **Bachelor of Science (Honours)** The University of Queensland
Research & Coursework, Physics Field of Study.
Thesis topic: Finite difference time domain method for modelling optical tweezers.

2012–2015 **Bachelor of Science** The University of Queensland
Physics and Computational Science dual major.
Completed Advanced Studies Program in Science (ASPInS).

Experience

2015–2019 **UQ Science Demo Troupe** The University of Queensland
Equipment manager and risk assessor
Responsibilities involved writing risk assessments, maintaining equipment and demonstrations, planning new experiments, working in department chemistry lab.

2017–2018 **Science and Mathematics Simulations (SciMS)** The University of Queensland
Casual Learning Designer
Development of simulations for the Science and Mathematics Simulations (SciMS) project, https://teaching.smp.uq.edu.au/scims/. Responsibilities included developing simulations and teaching material for PHYS2055 and PHYS1171 courses.

2013–2018 **Tutor** The University of Queensland
Casual Physics Tutor

PHYS3071	Computational Physics (Semester 1, 2017 & 2018)
COSC3000	Visualization, Computer Graphics & Data Analysis (Semester 1, 2017)
COSC2500	Numerical Methods in Computational Science (Semester 2, 2013, 2015 & 2017)

2014–2015 **EQuS Atom Optics Lab** The University of Queensland
Casual Research Assistant
Various projects related to incorporating a digital micromirror device (DMD) for generating interesting optical potentials for manipulating Bose-Einstein Condensates (BEC). Involved determining concept feasibility, selecting and purchasing a suitable device, designing mounts using CAD software, and implementing a control interface in C/Matlab.

2013 **Research project with Dr Michael Bromley** The University of Queensland
Undergraduate Research Student
Working on a Joomla based web interface for computing dipole- and hyper-polarizabilities for different atomic energy levels. Completed as part of the ASPInS program including forum style poster presentation.

2012–2013 **Research project with Dr Michael Bromley** The University of Queensland
Undergraduate Research Student
Developing a pipeline for visualising 5-dimensional wave functions. Involved working with FORTRAN, Python and ParaView.

Publications

2020 **OTSLM Toolbox for Structured Light Methods**
Computer Physics Communications, 107199 (2020)

2020 **Orientation of swimming cells with annular beam optical tweezers**
Optics Communications 459, 124864 (2020)

2019 **Optical-trapping of particles in air using parabolic reflectors and a hollow laser beam**
Optics Express 27 (23), 33061-33069 (2019)

2017 **Visual guide to optical tweezers**
European Journal of Physics38, 034009 (2017)

2016 **Theory and practice of simulation of optical tweezers**
Journal of Quantitative Spectroscopy and Radiative Transfer (2016)

2016 **Direct imaging of a digital-micromirror device for configurable microscopic optical potentials**
Optica 3(10), 1136-1143 (2016)

Open source software

Optical tweezers toolbox

Updated release of the optical tweezers toolbox including a more user-friendly object orientated interface, graphical user interface and additional features.
https://github.com/ilent2/ott

OTSLM Toolbox for Structured Light Methods

Toolbox for simulating and controlling spatial light modulators with a focus on optical tweezers experiments.
https://github.com/ilent2/otslm

Academic Presentations

2020 **Understanding particle trajectories by mapping optical force vortices** SPIE, San Francisco
2019 **Meta-trapping: optical forces on meta-materials** ELS, Hangzhou
2019 **Shining light on particle dynamics with machine learning** ELS, Hangzhou
2018 **A new dynamic optical tweezers toolbox** AIP, Perth
2018 **OTSLM: A toolbox for production of flexible structured light** AIP, Perth
2018 **Measuring the motility and drag forces acting on biological particles** SPIE, San Diego
2018 **Optical Tweezers Toolbox: full dynamics simulations for particles of all sizes** SPIE, San Diego
2017 **Optical tweezers for direct measurement of swimming forces of living cells** IONSKOALA, Brisbane
2017 **Optical tweezers simulations using finite difference time domain method** ICFO, Barcelona
2016 **Finite difference time domain method for computationally modelling optical trapping** AIP, Brisbane
2014 **Optimisation of digital micromirror device patterns for optical trapping** AIP, Canberra