

Lee James O’Riordan

BSc (Hons), PhD

+353 (0)85 7869457
✉ loriordan@gmail.com
in [loriordan](https://www.linkedin.com/in/loriordan)
📍 [mlxd](https://www.mlxd.com)
<https://loriordan.com>

Education

- 2012–2017 **PhD in Science (Physics)**, Quantum Systems Unit, Okinawa Institute of Science and Technology Graduate University, Japan.
Thesis: “Non-equilibrium vortex dynamics in rapidly rotating Bose–Einstein condensates”
- 2006–2010 **BSc (Hons) in Physics with Computing**, Waterford Institute of Technology, Ireland.
Thesis: “Evaluating magnetic susceptibility in Heisenberg chains using OpenCL implementations of Monte Carlo methods.”

Work experience

- 2019–Current **Research computational scientist, Postdoctoral researcher**, Irish Center for High End Computing (ICHEC), NUI Galway, Ireland.
Developing and implementing quantum models of natural language processing (NLP) algorithms on quantum simulators.
- 2017–2018 **Exascale Crystallographic Computation Postdoctoral Fellow**, Lawrence Berkeley National Lab, United States.
Researched real-time computational analysis of X-ray free electron laser crystallographic data. Worked on extending existing [CCTBX](#) and [DIALS](#) software suites to work with Intel Xeon Phi processors on NERSC’s Cori supercomputer. Work available at [GH:ExaFEL](#).
- 2011–2012 **Research assistant**, University College Cork, Cork, Ireland.
Researching theory of ultracold quantum systems. Organised, guided and demonstrated undergraduate laboratory sessions in physics experiments.
- 2010–2011 **Software developer**, IBM Ireland, Dublin, Ireland.
Developed server-side applications for use with WebSphere Portal platform. Developed solutions using Java, XML, XSLT, Ant, Shell scripting, JDBC, Python, C. Deployed and managed WebSphere Portal, Lotus Sametime, and Lotus Connections software stacks.
- 2009 **Product engineer (intern)**, Analog Devices BV, Limerick, Ireland.
Member of semiconductor device yield improvement team. Analysed and implemented strategies for device failure analysis. Developed software for die yield analysis and characterisation.

Relevant project experience

- Q-NLP** Developing quantum algorithms for natural language processing. Partnership with Intel and Enterprise Ireland. Team size: 4+. Languages & technologies: C++, MPI, Python, Quantum computing. Source code release March 2020.
- GPUE** Architect & developer of GPUE: GPU-enabled Gross–Pitaevskii equation solver; a 1/2/3D parallel pseudospectral linear and nonlinear quantum (Schrodinger equation) partial differential equation solver and simulation tool. Team size: 3+. Languages: CUDA, C/C++, Python, MATLAB, Shell. Source available at [GH:gpue-group/gpue](#) with documentation at [GH:gpue-group](#).
- ExaFEL Project, cctbx, DIALS** Exascale Free Electron Laser project: exascale capable extensions to CCTBX (Computational crystallographic toolbox) and DIALS X-ray diffraction analysis software projects. Team sizes: 5-10+. Technologies: Python, C++, Boost.Python, MPI, OpenMP, Bash. Available at [GH:ExaFEL](#), [GH:cctbx-project/cctbx](#), [GH:dials/dials](#).

University service

- 2017–Current **Board member**, Board of Councilors, OIST, Japan.

- 2015-2016 **Chair**, *Student Council*, OIST, Japan.
Elected by student body. Facilitated regular meetings between the student body and faculty. Improved institutional policies and conditions for students. Developed and founded mentoring program for incoming students.
- 2014-2017 **HPC advanced users group representative**, *Quantum Systems Unit*, OIST, Japan.
Research unit representative to the OIST HPC and scientific computing team. Trained group members on the use of HPC software and advanced programming techniques.
- 2013-2016 **President**, *Music Club*, OIST, Japan.
Founded and run Music club at OIST. Practiced, trained, and performed with many members on a regular basis.
- 2013-2016 **ITSSC member**, *OIST*.
Member of university task force for updating IT policies and compliance.
- 2013-2015 **Outreach**, *Quantum Systems Unit*, OIST, Japan.
Delivered talks to local schools on quantum physics. Delivered a team-based Scratch programming language tutorial for children aged 8-16. Mentored several interns and trained them on numerical computing for quantum physics.

Publications

- 2019 **Photoreversible interconversion of a phytochrome photosensory module in the crystalline state**, E. Sethe Burgie, *et al.*, Proceedings of the National Academy of Sciences (2019). DOI: [10.1073/pnas.1912041116](https://doi.org/10.1073/pnas.1912041116)
- 2019 **Chaotic few-body vortex dynamics in rotating Bose-Einstein condensates**, T. Zhang, J. Schloss, A. Thomasen, L. J. O’Riordan, T. Busch, A. White, *Physical Review Fluids*, (4) 5, 054701 (2019). DOI: [10.1103/PhysRevFluids.4.054701](https://doi.org/10.1103/PhysRevFluids.4.054701)
- 2018 **GPUE: Graphics Processing Unit Gross-Pitaevskii Equation solver**, J. R. Schloss, L. J. O’Riordan, *Journal of Open Source Software*, (3) 32, 1037 (2018). DOI: [10.21105/joss.01037](https://doi.org/10.21105/joss.01037)
- 2018 **Improving signal strength in serial crystallography with DIALS geometry refinement**, A. S. Brewster, D. G. Waterman, J. M. Parkhurst, R. J. Gildea, I. D. Young, L. J. O’Riordan, J. Yano, G. Winter, G. Evans, N. K. Sauter, *Acta Cryst. D.*, **74**, 877-894. DOI: [10.1107/S2059798318009191](https://doi.org/10.1107/S2059798318009191)
- 2017 **Non-equilibrium vortex dynamics in rapidly rotating Bose-Einstein condensates**, L. J. O’Riordan, *Okinawa Institute of Science and Technology Graduate University*. DOI: [10.15102/1394.00000165](https://doi.org/10.15102/1394.00000165)
- 2016 **Topological defect dynamics of vortex lattices in Bose-Einstein condensates**, L. J. O’Riordan, Th. Busch, *Phys. Rev. A* **94**, 053603. DOI: [10.1103/PhysRevA.94.053603](https://doi.org/10.1103/PhysRevA.94.053603)
- 2016 **Moiré superlattice structures in kicked Bose-Einstein condensates**, L. J. O’Riordan, A. C. White, Th. Busch, *Phys. Rev. A* **93**, 023609. DOI: [10.1103/PhysRevA.93.023609](https://doi.org/10.1103/PhysRevA.93.023609)
- 2013 **Coherent transport by adiabatic passage on atom chips**, T. Morgan, L. J. O’Riordan, N. Crowley, Th. Busch, *Phys. Rev. A* **88**, 053618. DOI: [10.1103/PhysRevA.88.053618](https://doi.org/10.1103/PhysRevA.88.053618)

Recent presentations, talks and tutorials

- Dec, 2019 **QNLP 2019**, *Invited talk*, Oxford, UK.
Title: “*Calculating sentence similarity using a hybrid quantum-classical workflow*”
- Nov, 2019 **Intel DevCon 2019**, *Talk*, Denver, Colorado, USA.
Title: “*Extensions to Intel® Quantum Simulator for Quantum Natural Language Processing and Beyond*”
- Aug, 2019 **Dublin Institute for Advanced Studies**, *Tutorial*, Dublin, Ireland.
Title: “*Numerical computing with Julia*”
- Jul, 2019 **HPCS 2019**, *Tutorial*, Dublin, Ireland.
Title: “*Simulating quantum computers on high-end HPC systems*”
- Jun, 2019 **ISC 2019**, *Talk/technical session*, Frankfurt, Germany.
Title: “*Natural language processing with Intel® Quantum Simulator*”

Mar, 2018 **DIALS Workshop 2018**, *Talk/tutorial*, Lawrence Berkeley National Lab, USA.
Title: "*Data analysis and development using Jupyter*"

Apr, 2017 **Waterford Institute of Technology**, *Seminar*, Waterford, Ireland.
Title: "*Ultracold atomic gases*"

Please contact me for further details.