Dr. Luca Mingarelli

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My website and professional page

Research interests

My research focuses on collective effects in superfluids and ultracold atomic gases. The theoretical description of such systems can be approached by means of numerical investigation of the associated non-linear equations of motion under mean-field theory.

more technical...

The systems under study are described, within mean field theory, by a non-linear PDE. We have developed an integral transform which diagonalises certain operators of interest. This has allowed for the implementation of faster and more accurate numerical methods, permitting to achieve detailed results and to study previously unexplored phase-spaces.

Education

Imperial College London
Ph.D., Mathematics, 2014-2018.
MRes, Mathematical Sciences, 2013-2014.
King's College London
MSc, Theoretical Physics, 2012-2013 .
Universitá di Bologna
BSc, Physics, 2009-2012 (*cum laude).*

Teaching

Department of Mathematics, Imperial College London
(2014-2018) Graduate teaching assistant in: Probability and Statistics, Statistical Modelling, Time Series, Analysis, Mathematical Methods I and II, Differential Equations, Mechanics, Python, Matlab, Maple, Computing in C++, Mathematics and Physics courses for the Chemistry, Physics and Aerospace departments.

Technical Skills

UNIX, Matlab, Python, C++, Q/Kdb+(*work in progress*), Mathematica, Maple

Consultancy

CVING, JinnCapital, Outsmart Insight and BAE Systems.

Publications

Exotic vortex lattices in binary repulsive superfluids, with Ryan Barnett, *Physical Review Letters*, 2019, (*arXiv*);

Vortex lattices in binary mixtures of repulsive superfluids, with Eric Keaveny, Ryan Barnett, *Physical Review A*, 2018, (*arXiv*);

Simulating superfluids with many vortices, JPhys+, 2016;

Simulating infinite vortex lattices in superfluids, with Eric Keaveny, Ryan Barnett, *IOP-Journal of Physics: Condensed Matter*, 2016, (*arXiv*);

Fellowships Awards and other experiences

Representative of Mathematics PhD students (Imperial College, 2014-2017)
Member of Mathematics Research committee (Imperial College, 2014-2017)
Member of Teaching Strategy committee (Imperial College, 2013-2017)
APS Travel grant (New Orleans, 2017)
HAIRS Grant for MBP-SQS Conference (Cape Town, 2016)
Global Fellow at Massachusetts Institute of Technology (Boston, 2015)
International School of Physics Grant (Varenna, 2014)
King's Leadership Award (2013)

Conferences

- *APS March Meeting* — New Orleans 2017 (US)
- *Joint Quantum Center, Multicomponent Atomic Condensates and Rotational Dynamics* — Newcastle 2016 (UK)
- *Theory of Condensed Matter Group Annual Meeting* — Warwick 2016 (UK)
- *Many-body physics in Synthetic Quantum Systems* — Stellenbosch 2016 (South Africa)
- *Quantum Matter at Ultralow Temperature* — Varenna 2014 (Italy)