

NEIL J. ROBINSON

SYNOPSIS

I am a Marie Skłodowska-Curie fellow working in the Institute for Theoretical Physics at the University of Amsterdam. Whilst my research interests are relatively diverse within the field of Condensed Matter Physics, the main focus of my recent research is the study of equilibrium dynamical properties and non-equilibrium time-evolution of low-dimensional strongly correlated quantum systems. One of my aims is to develop methods for computing dynamics of non-integrable systems.

WORK EXPERIENCE

PERIOD	October 2017 — October 2019	
EMPLOYER	Universiteit van Amsterdam	Amsterdam, The Netherlands
JOB TITLE	Marie Skłodowska-Curie Fellow	
	Experienced (lead) researcher of the Horizon2020 project “ <i>Dynamics of two-component quantum gases</i> ”.	
PERIOD	September 2014 — September 2017	
EMPLOYER	Brookhaven National Laboratory	Upton, New York, USA
JOB TITLE	Postdoctoral Research Associate	
	Lead researcher on multiple theoretical projects, and local supporting theorist for experimental collaborations. Produced four letters (incl. one in preparation), four articles (incl. one in preparation), and one large review article.	

EDUCATION

PERIOD	October 2010 — August 2014	
DEGREE	DPhil in Theoretical Physics	
ADVISOR	Prof. Fabian Essler	
UNIVERSITY	University of Oxford	Oxford, UK
	Three major projects focused on strongly correlated one-dimensional quantum systems. (i) Pair density wave phases in Hubbard ladders. (ii) Quasi-particle breakdown in CoNb_2O_6 . (iii) Prethermalization in the non-equilibrium dynamics of a weakly non-integrable model.	
PERIOD	October 2006 — August 2010	
DEGREE	MPhys Master of Physics	
RANK	First Class (with honours)	
UNIVERSITY	University of Exeter	Exeter, UK
	MPhys dissertation conducted under the supervision of Prof. Misha Portnoi. Studied confinement of electron in graphene using electrostatic and magnetic potentials. Proposed an electronic analogy to fibre optic cables, which has recently been observed in experiments.	

AWARDS, HONORS AND FUNDING

- 2017–2019 Marie Skłodowska-Curie Fellowship (165,000€)
2017 BNL Spotlight Award for Exceptional Performance
2016 BNL Spotlight Award for Exceptional Performance
2010 National Physical Laboratory SET Award
UoE Israel B. Black Award for excellence in final year examinations
UoE Newman Prize for most innovative MPhys dissertation
2007–2010 UoE Commendation from the Dean of Undergraduate Studies
UoE School of Physics prize for top examination candidate
UoE Millhayes Academic Scholarship

PUBLICATIONS

(* denotes alphabetical ordering of authors)

Letters

- (1)* TITLE *Prethermalization and thermalization in models with weak integrability breaking*
AUTHORS B. Bertini, F. H. L. Essler, S. Groha and **N. J. Robinson**
JOURNAL [Phys. Rev. Lett. **115**, 180601 \(2015\)](#)
- (2) TITLE *Motion of a distinguishable impurity in the Bose gas: arrested expansion without a lattice and impurity snaking*
AUTHORS **N. J. Robinson**, J.-S. Caux and R. M. Konik
JOURNAL [Phys. Rev. Lett. **116** 145302 \(2016\)](#)
- (3)* TITLE *Umklapp scattering as the origin of T -linear resistivity in the normal state of high- T_c cuprate superconductors*
AUTHORS T. M. Rice, **N. J. Robinson**, and A. M. Tsvelik
JOURNAL [Phys. Rev. B **96**, 220502\(R\) \(2017\)](#)
- (4) TITLE *Magnetism in artificial Ruddlesden-Popper iridates leveraged by structural distortions*
AUTHORS D. Meyers, Y. Cao, G. Fabbris, **N. J. Robinson**, *et al.*
JOURNAL [arXiv:1707.08910 \(2017\)](#) (submitted to Sci. Adv.)
- (5) TITLE *The Emergence of Majorana Zero Modes in Inhomogeneous Non-Topological Phases*
AUTHORS **N. J. Robinson**, A. Altland, R. Egger, N. Gergas, W. Li, D. Schuricht, A. M. Tsvelik, A. Weichselbaum, and R. M. Konik
JOURNAL in preparation, to be submitted to Phys. Rev. Lett.
- (6) TITLE *Quantum quench in a driven Ising model*
AUTHORS **N. J. Robinson**, I. Perez Castillo and S. E. Tapias
JOURNAL in preparation, to be submitted to Phys. Rev. Lett.
- (7) TITLE *Further results from the two-fluid model of the normal state of high- T_c cuprate superconductors*
AUTHORS **N. J. Robinson**, T. M. Rice, and A. M. Tsvelik,
JOURNAL in preparation.

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Articles

- (1) TITLE *Smooth electron waveguides in graphene*
AUTHORS R. R. Hartmann, **N. J. Robinson**, and M. E. Portnoi
JOURNAL [Phys. Rev. B **81**, 245431 \(2010\)](#)
- (2) TITLE *Finite wave vector pairing in doped two-leg ladders*
AUTHORS **N. J. Robinson**, F. H. L. Essler, E. Jeckelmann and A. M. Tsvelik
JOURNAL [Phys. Rev. B **85**, 195103 \(2012\)](#)
- (3)* TITLE *Quench dynamics in a model with tunable integrability breaking*
AUTHORS F. H. L. Essler, S. Kehrein, S. Manmana and **N. J. Robinson**
JOURNAL [Phys. Rev. B **89**, 165104 \(2014\)](#)
- (4) TITLE *Quasiparticle breakdown in the quasi-one-dimensional Ising ferromagnet CoNb_2O_6*
AUTHORS **N. J. Robinson**, F. H. L. Essler, I. Cabrera and R. Coldea
JOURNAL [Phys. Rev. B **90**, 174406 \(2014\)](#)
- (5) TITLE *Exact nonequilibrium dynamics of a class of initial states in one-dimensional two-component quantum gases*
AUTHORS **N. J. Robinson**, J.-S. Caux and R. M. Konik
JOURNAL [arXiv:1602.05532 \(2016\)](#)
- (7)* TITLE *Thermalization and light-cones in a model with weak integrability breaking*
AUTHORS B. Bertini, F. H. L. Essler, S. Groha and **N. J. Robinson**
JOURNAL [Phys. Rev. B **94**, 245117 \(2016\)](#)
- (8) TITLE *Excitations in the Yang-Gaudin Bose gas*
AUTHORS **N. J. Robinson** and R. M. Konik
JOURNAL [J. Stat. Mech. **2017** 063101 \(2017\)](#)
- (9) TITLE *Signatures of rare states and thermalization in a theory with confinement*
AUTHORS **N. J. Robinson**, A. J. A. James and R. M. Konik
JOURNAL in preparation, to be submitted to Phys. Rev. B
- (10) TITLE *Conjuring Majorana zero modes from inhomogeneous phases of spin ladders*
AUTHORS **N. J. Robinson**, N. Gergas, W. Li, D. Schuricht, A. Weichselbaum, and R. M. Konik
JOURNAL in preparation, to be submitted to Phys. Rev. B

Review Articles

- (1)* TITLE *Non-perturbative methodologies for low-dimensional strongly-correlated systems: From non-Abelian bosonization to truncated spectrum methods*
AUTHORS A. J. A. James, R. M. Konik, P. Lecheminant, **N. J. Robinson**, and A. M. Tsvelik
JOURNAL [Rep. Prog. Phys. **81**, 046002 \(2018\); arXiv:1703.08421 \(2017\).](#)

(2)* TITLE *Anomalies in the pseudogap phase of the cuprates: A perspective on the role of umklapp scattering*
AUTHORS P. D. Johnson, T. M. Rice, **N. J. Robinson**, and A. M. Tsvelik
JOURNAL in preparation.

RECENT INVITED PRESENTATIONS

TITLE *Conjuring Majorana fermions from avoided topological phases*
EVENT Amsterdam Institute of Physics Monthly Pizza Seminar
DATE April 2018

TITLE *Truncated spectrum methods: a whistle-stop tour*
EVENT Amsterdam Master's Student Seminar Series
DATE March 2018

TITLE *Non-thermal states in the non-integrable Ising field theory*
EVENT Hamiltonian methods in strongly coupled quantum field theory
IHES Université Paris-Saclay
DATE January 2018

TITLE *An introduction to truncated spectrum methods*
EVENT UCL Strongly Correlated Systems Group Meeting
DATE November 2017

TITLE *Truncated spectrum methods and non-thermal states in the Ising field theory*
EVENT Triangle Meeting, Delta Institute for Theoretical Physics
DATE November 2017

TITLE *Non-thermal states in the non-integrable Ising field theory*
EVENT Wonders of Broken Integrability, SCGP
DATE October 2017

TITLE *Truncated spectrum methods and non-thermal states in the Ising field theory*
EVENT Center for Computational Quantum Physics Seminar
Flatiron Institute, Simons Foundation, NYC
DATE September 2017

TITLE *First steps towards dynamics of multi-component integrable models*
EVENT Condensed Matter Physics Seminar, UCLA
DATE May 2017

TITLE *Emergent phenomena in condensed matter physics*
EVENT CrossTalk Colloquium, BNL Association of Students and Postdocs
DATE May 2017

TITLE *First steps towards dynamics of multi-component integrable models*
EVENT Dynamics and hydrodynamics of certain quantum matter
City University of New York
DATE March 2017

TITLE *Prethermalization and thermalization in an integrability-breaking quench*
EVENT Condensed Matter Theory Seminar, Universiteit van Amsterdam
DATE February 2017

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TITLE *Dynamics of a mobile impurity in the Bose gas*
EVENT Condensed Matter Theory Seminar
Georg-August-Universität Göttingen
DATE February 2017

RECENT MEETINGS (SINCE 2016)

TITLE Hamiltonian methods in strongly coupled quantum field theory
LOCATION IHES Université Paris-Saclay 2018
CONTRIBUTION Oral Presentation

TITLE Delta Institute for Theoretical Physics Triangle Meeting
LOCATION University of Utrecht 2017
CONTRIBUTION Invited Oral Presentation

TITLE Wonders of Broken Integrability
LOCATION Simons Center for Geometry and Physics 2017
CONTRIBUTION Invited Oral Presentation

TITLE Dynamics and hydrodynamics of certain quantum matter
LOCATION City University of New York 2017
CONTRIBUTION Invited Oral Presentation

TITLE APS March Meeting
LOCATION New Orleans 2017
CONTRIBUTION Contributed Oral Presentation

TITLE Quantum dynamics: from models to materials
LOCATION Aspen Center for Physics 2017
CONTRIBUTION Poster

TITLE ICFT16
LOCATION King's College, London 2016
CONTRIBUTION N/A

TITLE APS March Meeting
LOCATION Baltimore 2016
CONTRIBUTION Contributed Oral Presentation

TITLE Mathematical aspects of quantum integrable models
in and out of equilibrium
LOCATION Isaac Newton Institute, University of Cambridge 2016
CONTRIBUTION N/A

TITLE Isolated quantum many-body systems out of equilibrium
LOCATION Physikzentrum Bad Honnef 2016
CONTRIBUTION Poster

OUTREACH

2017 Mentor, High School Summer Research Program, BNL
Life as a physicist talk to high school students, BNL
Scientist at 'Meet a Scientist' high school careers event
Moderator, Long Island Regional High School Science Bowl
Assistant, MoMath Introduction to Scientific Computing

- 2016 Scientist at ‘Meet a Scientist’ high school careers event
Moderator, Long Island Regional Middle School Science Bowl
- 2015 Judge, NY State Science Congress High School Science Fair
Judge, Long Island Regional Elementary School Science Fair
Moderator, Long Island Regional High School Science Bowl

PROFESSIONAL ACTIVITIES

- REFEREE APS Journals: Phys. Rev. Lett., Phys. Rev. X, Phys. Rev. B
IOP Journals: J. Stat. Mech.
- 2017/18 Board member, Jong UvA
2017 Mentor, BNL High School Research Program
2017 Advisor to the BNL Association of Students and Postdocs
2017 Organizing Committee, BNL Early Career Researchers Symposium
- 2016–17 Executive Board Member, Brookhaven Women in Science (BWIS)
2016–17 Renate W. Chasman Scholarship Committee Chair, BWIS
2016–17 CMPMS Division Seminar Committee Theory Representative
- 2016 Organizer, APS–BNL Author and Referee Tutorial
2016 Organizing Committee, BNL Early Career Researchers Symposium
2016 Advisor to the BNL Association of Students and Postdocs
- 2015 Presentations Chair, BNL Young Researchers Symposium
2015 Organizing Committee, BNL Young Researchers Symposium
2015 Board Member, BNL Association of Students and Postdocs
- 2013–14 Computing Committee, University of Oxford Theoretical Physics

TEACHING

- TITLE** Student Seminar: Theoretical Physics
POSITION Assistant + 6 hrs of lectures
TIME 2018, 15 sessions
SIZE c. 30 students
TOPICS Three Facets of 1D Quantum Physics: Integrability/Bethe Ansatz, Bosonization and Re-fermionization, Conformal Field Theory
- TITLE** C6 Theoretical Physics
POSITION Problems Class Tutor
TIME 2011–13, 6 Terms
SIZE 10–15 students
TOPICS Many body quantum mechanics, classical and quantum field theory, statistical mechanics, stochastic processes, phase transitions and critical phenomena

MISC SKILLS

- Computer Languages** C, C++, L^AT_EX, Mathematica, Python
Libraries OpenMP, LAPACK, ALPS, iTensor
Operating Systems Mac OSX, Linux, Windows
Languages English (native), French (basic), Dutch (basic)

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