Dr. Neil J. Robinson

Marie Skłodowska-Curie Fellow, Institute for Theoretical Physics, University of Amsterdam

Research Keywords

- Strongly correlated systems (electronic/magnetic chains and ladders, cold atomic gases)
- Quantum field theories with confinement
- High-temperature cuprate superconductors, iridate heterostructures, manganate thin films
- Integrable systems (lattice and continuum)
- Conformal field theory
- Truncated spectrum methods, numerical approaches to quantum field theories
- Weak integrability breaking and nonperturbative methodologies

Research Career

Marie Skłodowska-Curie Individual Fellow *10/17–09/19*
Institute for Theoretical Physics, University of Amsterdam, Netherlands
Host: Prof. Jean-Sébastien Caux
Publications: 2× Phys. Rev. Lett., 2× Phys. Rev. B, 1× Physics, 1× Sci. Rep.

Research Associate *10/14–09/17*
Condensed Matter Physics & Material Science Division, Brookhaven National Lab, USA
Supervisor: Dr. Robert Konik
Publications: 2× Phys. Rev. Lett., 1× Phys. Rev. B Rapid Commun., 1× Phys. Rev. B, 1× J. Stat. Mech., 1× Rep. Prog. Phys.

Research Funding

Horizon 2020 Marie Skłodowska-Curie Individual Fellowship *10/17–09/19*
Principal Investigator (165,000€)

Education

DPhil Theoretical Physics *10/10–09/14*
University of Oxford, UK
Supervisor: Prof. Fabian Essler
Publications: 3× Phys. Rev. B

MPhys Physics (First Class, Honours) *10/06–08/10*
University of Exeter, UK
Thesis Supervisor: Prof. Misha Portnoi
Publications: 1× Phys. Rev. B

Teaching and Supervision

MSc supervisor, one student *10/18–08/19*

Course coordinator, *Student Seminar in Theoretical Physics* *03/19–06/19*
6EC MSc Course covering a range of topics in theoretical physics

Instigator & coordinator, *Condensed Matter Theory Journal Club* *10/18–present*
Covering classic and comtemporary topics in condensed matter theory.
Circa 20 attendees, including students, postdocs, and faculty.

Course assistant, *Student Seminar in Theoretical Physics* *01/18–05/18*
6EC MSc Course. Main coordinator: Prof. Jean-Sébastien Caux.
Lectured 6hrs introduction to conformal field theory. Main coordinator of project section.

High school student research supervisor *06/17–08/17*
Part of the High School Summer Research Program at Brookhaven National Lab

Graduate teaching assistant, *C6 Theoretical Physics* *09/11–05/13*
Problem class tutor for the final year theory option, University of Oxford

Recent Invited Talks

1. Quantum Snapshots 2019, City University of New York *03/19*
   30 min: *Nonthermal states in nonintegrable models with confinement*
2. Condensed Matter Theory Seminar, University of Utrecht *01/19*
   60 min: *Ladder-like physics in transport phenomena of high-Tc cuprates*
3. Institute of Physics Monthly "Pizza Seminars", University of Amsterdam *11/18*
   15 min: *Non-thermal states in non-integrable models*
4. Theory of Condensed Matter Seminar, University of Nottingham *11/18*
   60 min: *Non-thermal states in non-integrable models with confinement*
5. Quantum Paths Workshop, Erwin Schrödinger Institute, University of Vienna *05/18*
   30 min: *Non-thermal states in theories with confinement*
6. MSc Students' Seminar, University of Amsterdam *03/18*
   60 min: *Truncated spectrum nethods: A whistle-stop tour*
7. Hamiltonian Methods in Strongly Coupled QFT, IHES Université Paris-Saclay *01/18*
   60 min: *Non-thermal states in the non-integrable Ising field theory*
8. Triangle Meeting of the Delta Institute for Theoretical Physics *11/17*
   60 min: *Non-thermal states in the non-integrable Ising field theory*
9. Wonders of Broken Integrability Workshop, Simons Center, Stony Brook *10/17*
   45 min: *Truncated spectrum methods and non-thermal states in the Ising field theory*
10. Computational Quantum Physics Seminar, Flatiron Institute (Simons Foundation) *09/17*
    60 min: *Truncated spectrum methods and non-thermal states in the Ising field theory*

Recent Outreach Activities

"Life as a physicist" talk to high school students, BNL *2017*
Assistant, MoMath Intro to Scientific Computing Course *2017*
Scientist at "Meet a scientist" high school careers event, BNL *2016–17*
Moderator, Long Island Middle School Science Bowl *2016*
Judge, NY State Science Congress High School Science Fair *2015*
Judge, Long Island Elementary School Science Fair *2015*
Moderator, Long Island High School Science Bowl *2015–17*

Professional Activities

Referee APS Journals (Phys. Rev. Lett, Phys. Rev. X, Phys. Rev. B, Phys. Rev. A)
Referee IOP Journals (New J. Phys, J. Stat. Mech, J. Phys. A)
Referee Other Journals (SciPost Phys.)
PhD Thesis Committee, Ana Silva, University of Amsterdam *2019*
Invited "Viewpoint in Physics", APS Physics *2018*
Theory Representative, Seminar Committee, BNL CMPMS Division *2016–17*
Executive Board Member, Brookhaven Women in Science; 501(c)3 charity *2016–17*
Chair of Chasman Scholarship Committee, Brookhaven Women in Science *2016–17*
Organizing Committee, BNL Early Career Researchers Symposium *2015–17*
Presentations Committee Chair, BNL Young Researchers Symposium *2015*
Board Member (Advisor 2016–17), BNL Association of Students & Postdocs *2015*

Publication List

Overview. Four letters appearing in Physical Review Letters and one rapid communication in Physical Review B. One major review article in Reports on Progress in Physics, with another submitted. One invited Viewpoint in Physics. Other articles appearing in journals such as Physical Review B, Scientific Reports, and Journal of Statistical Mechanics.

Citation summary. Total number of citations is 433 (380) with h-index 9 (8). Citation counts for each paper are listed from Google Scholar (bracketed figures from NASA ADS).

Authorship conventions. Generally the lead author is listed first. If all authors made significant contributions it is not unusual to shift to alphabetical ordering of authors.

1. N. J. Robinson, P. D. Johnson, T. M. Rice, and A. M. Tsvelik, *"Anomalies in the pseudogap phase of the cuprates: A perspective on the role of umklapp scattering"*, under review at Rep. Prog. Phys. (2019).

2. N. J. Robinson, A. J. A. James, and R. M. Konik, *"Signatures of rare states and thermalization in the perturbed Ising field theory"*, Phys. Rev. B **99**, 195108 (2019). 3 (6) citations

3. A. J. A. James, R. M. Konik, and N. J. Robinson, *"Nonthermal states arising from confinement in one and two dimensions"*, Phys. Rev. Lett. **122**, 130603 (2019). 9 (14) citations

4. D. Meyers, Y. Cao, G. Fabbris, N. J. Robinson, L. Hao, C. Frederick, N. Traynor, J. Yang, J. Lin, M. H. Upton, D. Casa, J.-W. Kim, T. Gog, E. Karapetrova, Y. Choi, D. Haskel, P. J. Ryan, L. Horak, X. Liu, J. Liu, and M. P. M. Dean, *"Magnetism in artificial Ruddlesden-Popper iridates leveraged by structural distortions"*, Sci. Rep. **9**, 4263 (2019). 4 (6) citations

5. L. Classen, N. J. Robinson, and A. M. Tsvelik, *"Ladder-like optical conductivity in the spin-fermion model"*, Phys. Rev. B **99**, 115110 (2019).

6. N. J. Robinson, A. Altland, R. Egger, N. M. Gergs, W. Li, D. Schuricht, A. M. Tsvelik, A. Weichselbaum, and R. M. Konik, *"Non-Topological Majorana Zero Modes in Inhomogeneous Spin Ladders"*, Phys. Rev. Lett. **122**, 027201 (2019). 3 (4) citations

7. N. J. Robinson, *"Viewpoint: Cold Atoms bear a Quantum Scar"*, Physics **11**, 105 (2018). 1 (1) citations

8. A. J. A. James, R. M. Konik, P. Lecheminant, N. J. Robinson, and A. M. Tsvelik, *"Non-perturbative methodologies for low-dimensional strongly-correlated systems: From non-Abelian bosonization to truncated spectrum methods"*, Rep. Prog. Phys. **81**, 046002 (2018). 20 (23) citations

9. T. M. Rice, N. J. Robinson, and A. M. Tsvelik, *"Umklapp scattering as the origin of T-linear resistivity in the normal state of high-T_c cuprate superconductors"*, Phys. Rev. B Rapid Commun. **96**, 220502 (2017). 6 (5) citations

10. N. J. Robinson and R. M. Konik, *"Excitations in the Yang-Gaudin Bose gas"*, J. Stat. Mech. **2017** 063101 (2017).

11. B. Bertini, F. H. L. Essler, S. Groha, and N. J. Robinson, *"Thermalization and light-cones in a model with weak integrability breaking"*, Phys. Rev. B **94**, 245117 (2016). 33 (27) citations

12. N. J. Robinson, J.-S. Caux and R. M. Konik, *"Motion of a distinguishable impurity in the Bose gas: arrested expansion without a lattice and impurity snaking"*, Phys. Rev. Lett. **116**, 145302 (2016). 21 (19) citations

13. N. J. Robinson, J.-S. Caux, and R. M. Konik, *"Exact nonequilibrium dynamics of a class of initial states in one-dimensional two-component integrable quantum gases"*, arXiv:1602.05532 (2016). 4 (7) citations.

14. B. Bertini, F. H. L. Essler, S. Groha, and N. J. Robinson, *"Prethermalization and thermalization in models with weak integrability breaking"*, Phys. Rev. Lett. **115**, 180601 (2015). 93 (82) citations

15. N. J. Robinson, F. H. L. Essler, I. Cabrera, and R. Coldea, *"Quasiparticle breakdown in the quasi-one-dimensional Ising ferromagnet $CoNb_2O_6$"*, Phys. Rev. B **90**, 174406 (2014). 11 (8) citations

16. F. H. L. Essler, S. Kehrein, S. R. Manmana, and N. J. Robinson, *"Quench dynamics in a model with tuneable integrability breaking"*, Phys. Rev. B **89**, 165104 (2014). 116 (104) citations

17. N. J. Robinson, F. H. L. Essler, E. Jeckelmann, and A. M. Tsvelik, *"Finite wave vector pairing in doped two-leg ladders"*, Phys. Rev. B **85**, 195103 (2012). 16 (11) citations

18. R. R. Hartmann, N. J. Robinson, and M. E. Portnoi, *"Smooth electron waveguides in graphene"*, Phys. Rev, B **81**, 245431 (2010). 93 (63) citations

Manuscripts in preparation for submission

1. X. H. Verbeek, J.-S. Caux, and N. J. Robinson, *"Dynamical correlation functions in the perturbed Ising field theory"*, to be submitted to SciPost Phys. (2019).

2. N. J. Robinson, A. J. J. M. de Klerk, and J.-S. Caux, *"Finite interaction quenches in the Lieb-Liniger model"*, to be submitted to SciPost Phys. (2019).

3. E. Gutmán, I. Pérez Castillo, and N. J. Robinson, *"Quantum quench in a driven Ising chain"*, to be submitted to Phys. Rev. Lett. (2019).

4. N. J. Robinson, A. Altland, R. Egger, N. M. Gergs, W. Li, D. Schuricht, A. M. Tsvelik, A. Weichselbaum, and R. M. Konik, *"Conjuring Majoranas from avoided topological phases of spin ladders"*, to be submitted to Phys. Rev. B (2019).

5. N. J. Robinson, D. Meyers, and M. P. M. Dean, *"Magnons in single- and bilayer Ruddlesden-Popper iridates"*, to be submitted to Phys. Rev. B (2019).

6. A. Cortés Cubero and N. J. Robinson, *"Mesons as non-thermal states in 1+1D QCD"*, to be submitted (2019).