

Dr. Luca Tagliacozzo

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Current position

Lecturer in Physics and Chancellor's Fellow, the University of Strathclyde Glasgow,
Visiting scientist, the Institute of Photonic Science, ICFO, Barcelona.

Areas of specialization

Physics, the quantum many body problem, tensor networks and quantum simulations. I am a leading expert in the tensor network and quantum simulation approaches to the equilibrium and out-of-equilibrium physics of many body quantum systems. My expertise ranges from high-energy physics to ultra-cold atomic gases and I master a large set of analytical and numerical techniques such as field theoretical approaches, Monte-Carlo simulations, DMRG, and 2D tensor networks.

Appointments held

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| 2015-present | <i>Lecturer and Chancellor's Fellow</i> in the Physics Department of the University of Strathclyde. I am setting up a research group working on novel approaches to the equilibrium and out-of-equilibrium physics of many body quantum systems based on tensor networks and quantum simulations. |
| 2011-2015 | <i>Research fellow</i> in the QOT group of Prof. Lewenstein ICFO. I was in charge of the group working on quantum many body systems, both at equilibrium and out of equilibrium. |
| 2008-2010 | <i>Post doctoral research fellow</i> at the University of Queensland with Prof. G. Vidal. I worked on developing novel approaches to two dimensional quantum systems based on tensor networks. |
| 2006-2007 | <i>Post doctoral research fellow</i> at the University of Barcelona with Prof. J. I. Latorre. I worked on the role of entanglement at quantum critical points. |

Education

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| 10-2006 | PHD in Physics, Universidad de Barcelona working on confinement in lattice gauge theories. |
| 03-2005 | PHD in Physics, Politecnico di Torino working on supersymmetric Yang Mills theories. |
| 10-2000 | MSC in Physics, Università degli studi di Torino. |

Grants, honors & awards

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|--------------|---|
| 2015-present | Chancellor's Fellowship at the University of Strathclyde. |
| 2011-2013 | Marie Curie International Incoming Fellowship at ICFO, Barcelona. |
| 1999 | Summer Student at CERN. |

Publications & talks

I have authored 32 publications in peer reviewed journals that have attracted more than 950 citations. I have h-index 17. I have given more than 20 invited talks at international conferences, and more than 40 invited seminars.

HIGHLIGHTED JOURNAL ARTICLES

Measuring multipartite entanglement via dynamic susceptibilities, P. Hauke, M. Heyl, L. Tagliacozzo, P. Zoller, **Nat. Phys.** doi:10.1038/nphys3700, (2016), (arXiv:1509.01739).

THz Field Control of In-Plane Orbital Order in $La0.5Sr1.5MnO4$, T. A. Miller, R. W. Chhajlany, L. Tagliacozzo, B. Green, S. Kovalev, D. Prabhakaran, M. Lewenstein, M. Gensch, S. Wall, **Nat. Comm.** 6, 8175, (2015), (arxiv:1506.01546).

Tensor Networks for lattice gauge theories with continuous groups, L. Tagliacozzo, A. Celi, M. Lewenstein, **Phys. Rev. X** 4, 041024 (2014), (arXiv:1405.4811).

Spread of correlations in long range interacting systems, P. Hauke and L. Tagliacozzo, **Phys. Rev. Lett.** 111, 207202 (2013), (arXiv:1304.7725).

Simulations of non-Abelian gauge theories with optical lattices, L. Tagliacozzo, A. Celi, P. Orland, M. Mitchell and M. Lewenstein, **Nat. Comm.** 4, 2615 (2013), (arXiv:1211.2704).

Entanglement entropy for the long range Ising chain, T. Koffel, M. Lewenstein, L. Tagliacozzo, **Phys. Rev. Lett.** 109, 267203 (2012), (arXiv:1207.3957).

Entanglement renormalization and gauge symmetry, L. Tagliacozzo and G. Vidal, **Phys. Rev. B** 83, 115127 (2011), (arXiv:1007.4145).

Entanglement entropy of two disjoint blocks in critical Ising models, V. Alba, L. Tagliacozzo, P. Calabrese, **Phys. Rev. B** 81, 060411(R) (2010), (arXiv:0910.0706).

Simulation of two-dimensional quantum systems using a tree tensor network: entropic area law at work, L. Tagliacozzo, G. Evenbly, G. Vidal, **Phys. Rev. B** 80, 235127 (2009), (arXiv:0903.5017).

Scaling of entanglement support in Matrix product states, L. Tagliacozzo, T. De Oliveira, S. Iblisdir, J. I. Latorre, **Phys. Rev. B** 78, 024410 (2008), (arXiv:0712.1976).

HIGHLIGHTED INVITED TALKS

- 07-2016 *Lecture on tensor Networks*, at International Workshop on Tensor Networks and Quantum Many-Body Problems (TNQMP2016) Tokyo, (Japan).
- 07-2015 *Novel approaches to gauge theories*, at International workshop on cold gases and quantum information Bilbao (Spain).
- 06-2015 *Classical and quantum simulations of lattice gauge theories*, at Cold atoms meet high-energy physics, ECT* Trento (Italy).
- 03-2015 *Entanglement and out-of-equilibrium dynamics*, at Quantum Many body systems out of equilibrium Stellenbosch (South Africa).
- 08-2014 *Tensor Networks and Lattice Gauge theories*, at Numerical Methods for many body quantum systems, Benasque (Spain).
- 05-2014 *Long range Ising models*, at Quantum Gases and Quantum Coherence at Levico Terme (Italy).
- 03-2014 *Splitting a critical spin chain*, at "BilbaoQuantum 2014", Bilbao (Spain).
- 02-2014 *Quantum simulations of lattice gauge theories*, at Sign2014 GGI Darmstad, (Germany).
- 06-2013 *Quantum simulations of lattice gauge theories*, at Fermions and extended objects on the lattice Banasque, (Spain).
- 05-2013 *Tensor Networks and Lattice Gauge theories*, at Tensor network algorithms, ETH Zurich (Switzerland).
- 05-2012 *Local quenches with Tensor Networks techniques*, at Networking Tensor Networks, Bilbao (Spain).
- 11-2012 *Simulations of gauge theories with optical lattices*, at Quantum simulations 2012 Bilbao, (Spain).