

Davide Vodola

Professional appointments

- 09/2019-present Junior assistant professor (RTDA) at the Department of Physics and Astronomy, University of Bologna, Italy.
- 09/2016-08/2019 Postdoctoral fellow at the Quantum Information and Simulation Group, Swansea University, United Kingdom
- 02/2015-07/2016 Postdoctoral fellow at the Quantum Physics Group, Institut de Science et d'Ingénierie Supramoléculaires and Institut de Physique et Chimie des Matériaux, Strasbourg University, France.

Education

- 2012-2015: Ph.D. in Physics at Università degli Studi di Bologna jointly with Université de Strasbourg
- July 2011: M.S. in Physics at Università degli Studi di Bologna, (110/110 cum laude)

Scientific interests

• Topological quantum models for quantum computing • Low-dimensional strongly correlated systems: Hubbard-like models, quantum spin chains, topological phases of matter. Exact solutions (via low-dimensional field theories and Bethe ansatz techniques) and numerical approximations (DMRG-MPS) • Quantum information methods for the study of phase transitions and the characterization of unconventional phases of matter

Publications

- [1] R. Stricker, D. Vodola, A. Erhard, L. Postler, M. Meth, M. Ringbauer, P. Schindler, T. Monz, M. Müller, R. Blatt
Experimental deterministic correction of qubit loss, *Nature* **585**, 207(2020) (arXiv:2002.09532)
- [2] D. Amaro, J. Bennett, D. Vodola, M. Müller
Analytical percolation theory for topological color codes under qubit loss, *Phys. Rev. A* **101**, 032317 (2020) arXiv:1907.12684
- [3] G. Magnifico, D. Vodola, E. Ercolessi, S. P. Kumar, M. Müller, A. Bermudez
 Z_N gauge theories coupled to topological fermions: QED₂ with a quantum-mechanical θ angle *Phys. Rev. B* **100**, 115152 (2019) (arXiv:1906.07005)
- [4] F. Martínez-García, D. Vodola, M. Müller
Adaptive Bayesian phase estimation for quantum error correcting codes
New J. Phys. **21** 123027 (2019) (arXiv:1904.06166)
- [5] T. Botzung, D. Vodola, P. Naldesi, M Müller, E. Ercolessi, G. Pupillo
Algebraic Localization from Power-Law Interactions in Disordered Quantum Wires
Phys. Rev. B **100**, 155136 (2019) (arXiv:1810.09779)
- [6] G. Magnifico, D. Vodola, E. Ercolessi, S. P. Kumar, M. Müller, A. Bermudez
Symmetry-Protected Topological Phases in Lattice Gauge Theories: Topological QED₂,
Phys. Rev. D **99**, 014503 (2019) (arXiv:1804.10568)
- [7] D. Vodola, D. Amaro, M.A. Martin-Delgado, M. Müller
Twins Percolation for Qubit Losses in Topological Color Codes,
Phys. Rev. Lett. **121**, 060501 (2018) (arXiv:1802.04545)
- [8] L. Lepori, D. Vodola, A. Trombettoni
Singular Dynamics and Emergence of Nonlocality in Long-Range Quantum Models,
J. Stat. Mech. 033102 (2017) (arXiv:1607.05358)
- [9] D. Vodola*, L. Lepori*, E. Ercolessi, G. Pupillo *equally contributed
Long-Range Ising and Kitaev Models: Phases, Correlations and Edge Modes,

- New J. Phys. **18** (2016) 015001 (arXiv:1508.00820)
- [10] L. Lepori, D. Vodola, G. Pupillo, G. Gori, A. Trombettoni
Effective Theory and Breakdown of Conformal Symmetry in a Long-Range Quantum Chain,
Annals of Physics **374**, 35-66 (2016) (arXiv:1511.05544)
- [11] O. Viyuela, D. Vodola, G. Pupillo, M.A. Martin-Delgado
Topological Massive Dirac Edge Modes and Long-Range Superconducting Hamiltonians,
Phys. Rev. B **94**, 125121 (2016) (arXiv:1511.05018)
- [12] G.K. Brennen, G. Pupillo, E. Rico, T.M. Stace, D. Vodola
Loops and Strings in a Superconducting Lattice Gauge Simulator,
Phys. Rev. Lett. **117**, 240504 (2016) (arXiv:1512.06565)
- [13] D. Vodola, L. Lepori, E. Ercolessi, A. V. Gorshkov, G. Pupillo
Kitaev Chains with Long-Range Pairing,
Phys. Rev. Lett. **113**, 156402 (2014) (arXiv:1405.5440)
- [14] E. Canovi, E. Ercolessi, P. Naldesi, L. Taddia, D. Vodola
Dynamics of Entanglement Entropy and Entanglement Spectrum Crossing a Quantum Phase Transition,
Phys. Rev. B **89**, 104303 (2014) (arXiv:1311.3612)
- [15] M. Dalmonte, E. Ercolessi, M. Mattioli, F. Ortolani, D. Vodola
Magnetic Properties of Bose-Bose Mixtures in One-Dimensional Optical Lattices,
Eur. Phys. J. Special Topics **217**, 13-27 (2013) (arXiv:1212.3734)

Preprints

- [16] D. Vodola, M. Rispler, S. Kim, M. Müller,
Fundamental thresholds of realistic quantum error correction circuits from classical spin models (arXiv:2104.04847)
- [17] R. Stricker, D. Vodola, A. Erhard, L. Postler, M. Meth, M. Ringbauer, P. Schindler, R. Blatt, M. Müller, T. Monz, Characterizing quantum instruments: from non-demolition measurements to quantum error correction, arXiv:2110.06954