Dr. Jacek **Herbrych**

Wrocław University of Science and Technology

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Appointments

Wrocław University of Science and Technology — *Wrocław, Poland*

Department of Theoretical Physics · Faculty of Fundamental Problems of Technology — *April 2019 - PRESENT*

Group Leader · Assistant Professor

University of Tennessee — *Knoxville, USA*

Department of Physics and Astronomy — *November 2016 - March 2019*

Postdoctoral fellow with Prof. Elbio Dagotto and Prof. Adriana Moreo

Oak Ridge National Laboratory — *Oak Ridge, USA*

Materials Science and Technology Division — *November 2016 - March 2019*

Associate scientist

University of Crete — *Heraklion, Greece*

Department of Physics — *January 2013 - August 2016*

Postdoctoral fellow with Prof. Xenophon Zotos

Jožef Stefan Institute — *Ljubljana, Slovenia*

Department for Theoretical Physics — *September 2010 - December 2013*

Young researcher under supervision of Prof. Peter Prelovšek

Education

University of Warsaw — *Warsaw, Poland*

Habilitation — *September 2022*

- *Thesis:* Properties of orbital-selective Mott insulators within low-dimensional multiorbital systems

University of Ljubljana — *Ljubljana, Slovenia*

Ph.D. in Physics — *September 2010 - November 2013*

- *Thesis:* Finite-temperature dynamics of quantum spin chains
- *Advisor:* Prof. Dr. Peter Prelovšek

University of Łódź — *Łódź, Poland*

M.Sc. in Physics — *September 2005 - July 2010*

- *Thesis:* Space-time symmetries in deformed Minkowski space
- *Advisor:* Prof. Dr. Cezary Gonera

Funding

The National Science Centre (NCN)

Magnetic properties of strongly correlated multi-orbital systems

OPUS 18 2019/35/B/ST3/01207 — *2020-2022*

Principal Investigator (Wrocław University of Science and Technology, Poland)

Past:

Polish National Agency for Academic Exchange (NAWA)
Polish Returns
PPN/PPO/2018/1/00035 *2019-2022*
Principal Investigator (Wrocław University of Science and Technology, Poland)

US Department of Energy (DOE)
Office of Basic Energy Sciences (BES), Materials Sciences and Engineering Division *2016-2019*
Postdoctoral fellow supported by Prof. E. Dagotto grant (University of Tennessee, USA)

EU Seventh Framework Programme (FP7)
Crete Center for Quantum Complexity and Nanotechnology (CCQCN)
EU FP7 REGPOT-2012-2013-1 316165 *2013-2016*
Research scholar supported by Prof. X. Zotos grant (University of Crete, Greece)

EU Marie Sklodowska-Curie Action
Low-dimensional quantum magnets for thermal management (LOTHERM)
EU FP7 PEOPLE-ITN-2008 238475 *2010-2013*
Young researcher supported by Prof. P. Prelovšek grant (Jožef Stefan Institute, Slovenia)

Publication List

Quasiballistic transport in long-range anisotropic Heisenberg model *(43)*
M. Mierzejewski, J. Wronowicz, J. Pawłowski, and J. Herbrych *2023*
Phys. Rev. B **107**, 045134 (2023) & arXiv: cond-mat/2206.05960

From dissipationless to normal diffusion in easy-axis Heisenberg spin chain *(42)*
P. Prelovšek, S. Nandy, Z. Lenarčič, M. Mierzejewski, and J. Herbrych *2022*
Phys. Rev. B **106**, 245104 (2022) & arXiv: cond-mat/2205.11891

Multiple relaxation times in perturbed XXZ chain *(41)*
M. Mierzejewski, J. Pawłowski, P. Prelovšek, and J. Herbrych *2022*
SciPost Phys. **13**, 013 (2022) & arXiv: cond-mat/2112.08158

High-pressure inelastic neutron scattering study of the anisotropic $S = 1$ spin chain $[Ni(HF_2)(3\text{-Clpyridine})_4]BF_4$ *(40)*
D. M. Pajerowski, A. P. Podlesnyak, J. Herbrych, and J. L. Manson *2022*
Phys. Rev. B **105**, 134420 (2022) & arXiv: cond-mat/2206.06249

Relaxation at different length-scales in models of many-body localization *(39)*
J. Herbrych, M. Mierzejewski, and P. Prelovšek *2022*
Phys. Rev. B **105**, L081105 (2022) & arXiv: cond-mat/2110.15635

Prediction of orbital selective Mott phases and block magnetic states in the quasi-one-dimensional iron chain $Ce_2O_2FeSe_2$ under hole and electron doping *(38)*
L.-F. Lin, Y. Zhang, G. Alvarez, J. Herbrych, A. Moreo, and E. Dagotto *2022*
Phys. Rev. B **105**, 075119 (2022) & arXiv: cond-mat/2112.04049

Magnetization dynamics fingerprints of an excitonic condensate t_{2g}^4 magnet *(37)*
N. Kaushal, J. Herbrych, G. Alvarez, and E. Dagotto *2021*
Phys. Rev. B **104**, 235135 (2021) & arXiv: cond-mat/2110.11828

Coexistence of diffusive and ballistic transport in integrable quantum lattice models *(36)*
P. Prelovšek, M. Mierzejewski, and J. Herbrych *2021*
Phys. Rev. B **104**, 115163 (2021) & arXiv: cond-mat/2107.02454

Quantum magnetism of iron-based ladders: blocks, spirals, and spin flux *(35)*
M. Środa, E. Dagotto, and J. Herbrych *2021*
Phys. Rev. B **104**, 045128 (2021) & arXiv: cond-mat/2105.04391

Diffusion in the Anderson model in higher dimensions *(34)*

P. Prelovšek and J. Herbrych *2021*

Phys. Rev. B **103**, L241107 (2021) & arXiv: cond-mat/2104.07801

Ballistic transport in integrable lattice models with degenerate spectra *(33)*

M. Mierzejewski, J. Herbrych, and P. Prelovšek *2021*

Phys. Rev. B **103**, 235115 (2021) & arXiv: cond-mat/2102.07467

Interaction-induced topological phase transition and Majorana edge states in low-dimensional orbital-selective Mott insulators *(32)*

J. Herbrych, M. Środa, G. Alvarez, M. Mierzejewski, and E. Dagotto *2021*

Nat. Commun. **12**, 2955 (2021) & arXiv: cond-mat/2011.05646

Resistivity and its fluctuations in disordered many-body systems: from chains to planes *(31)*

M. Mierzejewski, M. Środa, J. Herbrych, and P. Prelovšek *2020*

Phys. Rev. B **102**, 161111(R) (2020) & arXiv: cond-mat/2003.00495

Block orbital-selective Mott insulators: a spin excitation analysis *(30)*

J. Herbrych, G. Alvarez, A. Moreo, and E. Dagotto *2020*

Phys. Rev. B **102**, 115134 (2020) & arXiv: cond-mat/2006.09495

Prediction of exotic magnetic states in the alkali metal quasi-one-dimensional iron selenide compound Na_2FeSe_2 *(29)*

B. Pandey, L.-F. Lin, R. Soni, N. Kaushal, J. Herbrych, G. Alvarez, and E. Dagotto *2020*

Phys. Rev. B **102**, 035149 (2020) & arXiv: cond-mat/2005.13132

Block-spiral magnetism: An exotic type of frustrated order *(28)*

J. Herbrych, J. Heverhagen, G. Alvarez, M. Daghofer, A. Moreo, and E. Dagotto *2020*

Proc. Natl. Acad. Sci. USA **117**, 16226 (2020) & arXiv: cond-mat/1911.12248

Vanishing Wilson ratio as the hallmark of quantum spin-liquid models *(27)*

P. Prelovšek, K. Morita, T. Tohyama, and J. Herbrych *2020*

Phys. Rev. Research **2**, 023024 (2020) & arXiv: cond-mat/1912.00876

Inelastic neutron scattering study of the anisotropic $S = 1$ spin chain [Ni(HF_2)(3-Clpyridine)$_4$]BF_4 *(26)*

D. M. Pajerowski, J. L. Manson, J. Herbrych, J. Bendix, A. P. Podlesnyak, J. M. Cain, and M. W. Meisel *2020*

Phys. Rev. B **101**, 094431 (2020) & arXiv: cond-mat/2001.08555

Charge-density-wave melting in the one-dimensional Holstein model *(25)*

J. Stolpp, J. Herbrych, F. Dorfner, E. Dagotto, and F. Heidrich-Meisner *2020*

Phys. Rev. B **101**, 035134 (2020) & arXiv: cond-mat/1911.01718

Novel Magnetic Block States in Low-Dimensional Iron-Based Superconductors *(24)*

J. Herbrych, J. Heverhagen, N. D. Patel, G. Alvarez, M. Daghofer, A. Moreo, and E. Dagotto *2019*

Phys. Rev. Lett. **123**, 027203 (2019) & arXiv: cond-mat/1812.00325

Magnetization and energy dynamics in spin ladders: Evidence of diffusion in time, frequency, position, and momentum *(23)*

J. Richter, F. Jin, L. Knipschild, J. Herbrych, H. De Raedt, K. Michielsen, J. Gemmer, and R. Steinigeweg *2019*

Phys. Rev. B **99**, 144422 (2019) & arXiv: cond-mat/1811.02806

Sudden removal of a static force in a disordered system: Induced dynamics, thermalization, and transport *(22)*

J. Richter, J. Herbrych, and R. Steinigeweg *2018*

Phys. Rev. B **98**, 134302 (2018) & arXiv: cond-mat/1808.00497

Non-equilibrium mass transport in the Fermi-Hubbard model *(21)*

S. Scherg, T. Kohlert, J. Herbrych, J. Stolpp, P. Bordia, U. Schneider, F. Heidrich-Meisner, I. Bloch, and M. Aidelsburger *2018*

Phys. Rev. Lett. **121**, 130402 (2018) & arXiv: cond-mat/1805.10990

Spin dynamics of the block orbital-selective Mott phase *(20)*

J. Herbrych, N. Kaushal, A. Nocera, G. Alvarez, A. Moreo, and E. Dagotto *2018*

Nat. Commun. **9**, 3736 (2018) & arXiv: cond-mat/1804.01959

Density-matrix renormalization group study of a three-orbital Hubbard model with spin-orbit coupling in one dimension *(19)*

N. Kaushal, J. Herbrych, A. Nocera, G. Alvarez, A. Moreo, F. A. Reboredo, and E. Dagotto *2017*

Phys. Rev. B **96**, 155111 (2017) & arXiv: cond-mat/1707.04313

Efficiency of fermionic quantum distillation *(18)*

J. Herbrych, A. E. Feiguin, E. Dagotto, and F. Heidrich-Meisner *2017*

Phys. Rev. A **96**, 033617 (2017) & arXiv: cond-mat/1707.01792

Possible bicollinear nematic state with monoclinic lattice distortions in iron telluride compounds *(17)*

C. B. Bishop, J. Herbrych, E. Dagotto, and A. Moreo *2017*

Phys. Rev. B **96**, 035144 (2017) & arXiv: cond-mat/1704.03495

Self-consistent approach to many-body localization and subdiffusion *(16)*

P. Prelovšek and J. Herbrych *2017*

Phys. Rev. B **96**, 035130 (2017) & arXiv: cond-mat/1609.05450

Dynamics of locally coupled oscillators with next-nearest-neighbor interaction *(15)*

J. Herbrych, A. G. Chazirakis, N. Christakis, and J. J. P. Veerman *2017*

Differ. Equ. & Dyn. Syst. **29**, 487 (2021) & arXiv: math/1506.07381

Density correlations and transport in models of many-body localization *(14)*

P. Prelovšek, M. Mierzejewski, O. Barišić, and J. Herbrych *2017*

Ann. Phys. (Berlin) **529**, 1600362 (2017) & arXiv: cond-mat/1611.03611

Interaction-induced weakening of localization in few-particle disordered Heisenberg chains *(13)*

D. Schmidtke, R. Steinigeweg, J. Herbrych, and J. Gemmer *2017*

Phys. Rev. B **95**, 134201 (2017) & arXiv: cond-mat/1607.05664

Effective realization of random magnetic fields in compounds with large single-ion anisotropy *(12)*

J. Herbrych and J. Kokalj *2017*

Phys. Rev. B **95**, 125129 (2017) & arXiv: cond-mat/1606.06013

Universal dynamics of density correlations at the transition to many-body localized state *(11)*

M. Mierzejewski, J. Herbrych, and P. Prelovšek *2016*

Phys. Rev. B **94**, 224207 (2016) & arXiv: cond-mat/1607.04992

Typicality approach to the optical conductivity in thermal and many-body localized phases *(10)*

R. Steinigeweg, J. Herbrych, F. Pollmann, and W. Brenig *2016*

Phys. Rev. B **94**, 180401(R) (2016) & arXiv: cond-mat/1512.08519

Light induced magnetization in a spin $S = 1$ easy-plane antiferromagnetic chain *(9)*

J. Herbrych and X. Zotos *2016*

Phys. Rev. B **93**, 134412 (2016) & arXiv: cond-mat/1505.03004

Heat conductivity of the Heisenberg spin-$1/2$ ladder: From weak to strong breaking of integrability *(8)*

R. Steinigeweg, J. Herbrych, X. Zotos, and W. Brenig *2016*

Phys. Rev. Lett. **116**, 017202 (2016) & arXiv: cond-mat/1503.03871

Antiferromagnetic order in weakly coupled random spin chains *(7)*

J. Kokalj, J. Herbrych, A. Zheludev, and P. Prelovšek *2015*

Phys. Rev. B **91**, 155147 (2015) & arXiv: cond-mat/1409.1757

Effective $S = 1/2$ description of the $S = 1$ chain with strong easy plane anisotropy *(6)*

C. Psaroudaki, J. Herbrych, J. Karadamoglou, P. Prelovšek, X. Zotos, and N. Papanicolaou *2014*

Phys. Rev. B **89**, 224418 (2014) & arXiv: cond-mat/1404.3064

Local spin relaxation within the random Heisenberg chain *(5)*

J. Herbrych, J. Kokalj, and P. Prelovšek *2013*

Phys. Rev. Lett. **111**, 147203 (2013) & arXiv: cond-mat/1307.0370

Eigenstate thermalization in isolated spin-chain systems *(4)*

R. Steinigeweg, J. Herbrych, and P. Prelovšek *2013*

Phys. Rev. E **87**, 012118 (2013) & arXiv: cond-mat/1208.6143

Spin hydrodynamics in the $S = 1/2$ anisotropic Heisenberg chain *(3)*

J. Herbrych, R. Steinigeweg, and P. Prelovšek *2012*

Phys. Rev. B **86**, 115106 (2012) & arXiv: cond-mat/1206.4248

Coexistence of anomalous and normal diffusion in integrable Mott insulators *(2)*

R. Steinigeweg, J. Herbrych, P. Prelovšek, and M. Mierzejewski *2012*

Phys. Rev. B **85**, 214409 (2012) & arXiv: cond-mat/1201.2844

Finite-temperature Drude weight within the anisotropic Heisenberg chain *(1)*

J. Herbrych, P. Prelovšek, and X. Zotos *2011*

Phys. Rev. B **84**, 155125 (2011) & arXiv: cond-mat/1107.3027