

Armando Consiglio

Curriculum Vitae

Academic studies

- 10/19 - today **Doctor of Philosophy, Physics**, *Julius-Maximilians-Universität Würzburg, Department of Theoretical Physics and Astrophysics, Würzburg, Germany*
- 10/17 - 07/19 **M.Sc. Physics**, *Alma Mater Studiorum - University of Bologna*
Department of Physics and Astronomy "Augusto Righi", Bologna, Italy,
Dissertation title: Molecular Dynamics Simulations of Conducting Polymer Nanocomposites
Supervisors: Prof. Tobias Cramer, Prof. Andrei V. Komolkin
Final degree mark: 110/110 *with honors*
- 10/13 - 07/17 **B.Sc. Physics**, *Alma Mater Studiorum - University of Bologna*
Department of Physics and Astronomy "Augusto Righi", Bologna, Italy,
Dissertation title: Time-fractional diffusion equation and its applications in physics
Supervisors: Prof. Francesco Mainardi, Dr.ssa Silvia Vitali
Final degree mark: 107/110

Employment

- 01/24 - today **Research fellow**, *Italian National Research Council (CNR) - Institute of materials (IOM), Trieste, Italy*

Studies and experiences abroad

- 03/19 - 04/19 **Visiting Master Student**, *Saint Petersburg State University*
Department of Nuclear-Physics Research Methods, Saint Petersburg, Russia
- 09/18 - 12/18 **Visiting Master Student**, *Saint Petersburg State University*
Department of Nuclear-Physics Research Methods, Saint Petersburg, Russia

Teaching activities

- 09/24 - 02/25 **Data Science (Lab tutorials)**, *University of Bologna, Bologna, Italy*
- 10/23 - 04/24 **Computational Materials Science (Density Functional Theory module)**, *Julius Maximilians Universität Würzburg, Würzburg, Germany*
- 10/22 - 04/23 **Computational Materials Science (Density Functional Theory module)**, *Julius Maximilians Universität Würzburg, Würzburg, Germany*
- 04/22 - 10/22 **Quantum Mechanics 2 (exercises)**, *Julius Maximilians Universität Würzburg, Würzburg, Germany*

- 10/21 - 04/22 **Theoretical Mechanics (exercises)**, *Julius Maximilians Universität Würzburg*, Würzburg, Germany
- 05/21 - 10/21 **Quantum Mechanics 1 (exercises)**, *Julius Maximilians Universität Würzburg*, Würzburg, Germany
- 10/20 - 04/21 **Mathematics 3 for physicist and engineers (exercises)**, *Julius Maximilians Universität Würzburg*, Würzburg, Germany

Thesis supervision

- 04/24 - 09/24 **First principles calculations of electronic properties of CsV_3Sb_5 kagome metal under doping**, *Bachelor thesis*, Lorenzo Riguzzi, University of Bologna, (co-supervision)
- 02/22 - 10/22 **Topological and electrical properties of non-hermitian graphene**, *Master thesis*, Riccardo Sorbello, University of Catania, (co-supervision)

Awards

“Paolo Mazzoldi” Prize for Condensed Matter Physics, *Italian Physical Society*, <https://2024.congresso.sif.it/info/premiati-2024>, 02/08/2024

Communication with special mention of Section 2 - Physics of matter, *reported by the Scientific Committee of the 109th National Congress - Italian Physical Society, Salerno, Italy*, <https://www.sif.it/attivita/congresso/109/comunicazioni>, 13/09/2023

Peer review

European Physical Journal Plus
npj Computational Materials
Physical Review Research
Advanced physics research

Books and chapters

Fractional Diffusive Waves in the Cauchy and Signalling Problems (book chapter), *Nonlocal and Fractional Operators, SEMA SIMAI Springer Series*, 2021, [A. Consiglio*](#), F. Mainardi, https://link.springer.com/chapter/10.1007/978-3-030-69236-0_8

Publications and preprints

Theory of unconventional magnetism in a Cu-based kagome metal, *Submitted to Physical Review Letters*, 2024, A. Wenger, [A. Consiglio](#), H. Hohmann, M. Dürrnagel, F. O. von Rohr, H. D. Scammell, J. Ingham, D. Di Sante, R. Thomale, <https://arxiv.org/pdf/2411.03563>

Pomeranchuk instability from electronic correlations in CsTi₃Bi₅ kagome metal, *Submitted to Nat. Comm.*, 2024, C. Bigi, M. Dürrnagel, L. Klebl, [A. Coniglio](#), G. Pokharel, F. Bertran, P. Le Fèvre, T. Jaouen, H. C. Tchouekem, P. Turban, A. De Vita, J. A. Miwa, J. W. Wells, D. Oh, R. Comin, R. Thomale, I. Zeljkovic, B. R. Ortiz, S. D. Wilson, G. Sangiovanni, F. Mazzola, D. Di Sante, <https://arxiv.org/pdf/2410.22929>

Theory of excitonic order in kagome metal ScV₆Sn₆, *Submitted to Physical Review Letters*, 2024, J. Ingham, [A. Coniglio](#), D. Di Sante, R. Thomale, H. D. Scammell, <https://arxiv.org/pdf/2410.01994>

Pomeranchuk Instability Induced by an Emergent Higher-Order van Hove Singularity on the Distorted Kagome Surface of Co₃Sn₂S₂, *Submitted to Nature Materials*, 2024, P. Nag, R. Batabyal, J. Ingham, N. Morali, H. Tan, J. Koo, [A. Coniglio](#), E. Liu, N. Avraham, R. Queiroz, R. Thomale, B. Yan, C. Felser, <https://arxiv.org/pdf/2410.01994>

Orbital-Selective Spin-Triplet Superconductivity in Infinite-Layer Lanthanum Nickelates, *Submitted to Physical Review Letters*, 2024, F. Jakubczyk, [A. Coniglio](#), D. Di Sante, R. Thomale, C. Timm, <https://arxiv.org/abs/2403.19617>

Strain-induced enhancement of the charge-density-wave in the kagome metal ScV₆Sn₆, *Submitted to Physical Review Letters*, 2024, M. Tuniz, [A. Coniglio*](#), G. Pokharel, F. Parmigiani, T. Neupert, R. Thomale, G. Sangiovanni, S. D. Wilson, I. Vobornik, F. Salvador, F. Cilento, D. Di Sante, F. Mazzola, <http://arxiv.org/abs/2403.18046>

Giant Strain Response of Charge Modulation and Singularity in a Kagome Superconductor, *Submitted to Nature Communications*, 2024, C. Lin, [A. Coniglio](#), O. K. Forslund, J. Küspert, M. M. Denner, H. Lei, A. Louat, M. D. Watson, T. K. Kim, C. Cacho, D. Carbone, M. Leandersson, C. Polley, T. Balasubranianian, D. Di Sante, R. Thomale, Z. Guguchia, G. Sangiovanni, T. Neupert, J. Chang, <https://arxiv.org/abs/2402.16089>

Emergent Coupling of Protected Edge States of 2D Topological Insulators in a Crystalline Multilayer Heterostructure with Ion Mobility, *Submitted*, 2024, E. Carrillo-Aravena, J. Heßdörfer, C. N. Saggau, [A. Coniglio](#), S. Sharma, F. Reinert, G. Sangiovanni, D. Di Sante, O. Janson, K. Nielsch, N. Pérez, M. Ruck

Electron glass phase with resilient Zhang–Rice singlets in LiCu₃O₃, *Physical Review Letters*, 2024, [A. Coniglio*](#), G. Gatti, E. Martino, L. Moreschini, J. C. Johanssen, K. Prša, P. G. Freeman, D. Sheptyakov, H. M. Rønnow, R. Scopelliti, A. Magrez, L. Forró, C. Schmitt, V. Jovic, C. Jozwiak, A. Bostwick, E. Rotenberg, T. Hofmann, R. Thomale, G. Sangiovanni, D. Di Sante, M. Greiter, M. Grioni, S. Moser, <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.132.126502>

Excitons at room temperature in a two-dimensional quantum spin Hall insulator, *Il Nuovo Cimento C*, 2024, [A. Coniglio*](#), <https://www.sif.it/riviste/sif/ncc/econtents/2024/047/05/article/10>

Dynamics and Resilience of the Charge Density Wave in a bilayer kagome metal, *Communications Materials*, 2023, M. Tuniz, A. Consiglio*, D. Puntel, C. Bigi, S. Enzner, G. Pokharel, P. Orgiani, W. Bronsch, F. Parmigiani, V. Polewczyk, P. D. C. King, J. W. Wells, I. Zeljkovic, P. Carrara, G. Rossi, J. Fujii, I. Vobornik, S. D. Wilson, R. Thomale, T. Wehling, G. Sangiovanni, G. Panaccione, F. Cilento, D. Di Sante, F. Mazzola, <https://www.nature.com/articles/s43246-023-00430-y>

Flat band separation and resilient spin-Berry curvature in bilayer kagome metals, *Nature Physics*, 2023, D. Di Sante, C. Bigi, P. Eck, S. Enzner, A. Consiglio, G. Pokharel, P. Carrara, P. Orgiani, V. Polewczyk, J. Fujii, P. D. C. King, I. Vobornik, G. Rossi, I. Zeljkovic, S. D. Wilson, R. Thomale, G. Sangiovanni, G. Panaccione, F. Mazzola, <https://www.nature.com/articles/s41567-023-02053-z>

Theory of nematic charge orders in kagome metals, *Physical Review B*, 2023, F. Grandi, A. Consiglio, M. A. Sentef, R. Thomale, D. M. Kennes, <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.107.155131>

Role of electronic correlations in the Kagome lattice superconductor LaRh_3B_2 , *Physical Review B*, 2023, S. Chaudhary, Shama, J. Singh, A. Consiglio, D. Di Sante, R. Thomale, Y. Singh, <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.107.085103>

Real-space Obstruction in Quantum Spin Hall Insulators, *Physical Review B*, 2022, P. Eck, C. Ortix, A. Consiglio, J. Erhardt, M. Bauernfeind, S. Moser, R. Claessen, D. Di Sante, G. Sangiovanni, <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.106.195143>

Observation of room temperature excitons in an atomically thin topological insulator, *Nature Communications*, 2022, M. Syperek, R. Stühler, A. Consiglio*, P. Holewa, P. Wyborski, Ł. Dusanowski, F. Reis, S. Höfling, R. Thomale, W. Hanke, R. Claessen, D. Di Sante, C. Schneider, <https://www.nature.com/articles/s41467-022-33822-8>

A note on a modified fractional Maxwell model, *Chaos, Solitons & Fractals*, 2022, R. Garra, A. Consiglio, F. Mainardi, <https://doi.org/10.1016/j.chaos.2022.112544>

Wright functions of the second kind and Whittaker functions, *Fractional Calculus and Applied Analysis*, Springer Nature, 2022, F. Mainardi, R. B. Paris, A. Consiglio, <https://doi.org/10.1007/s13540-022-00042-2>

Van Hove tuning of AV_3Sb_5 kagome metals under pressure and strain, *Physical Review B*, 2022, A. Consiglio*, T. Schwemmer, X. Wu, W. Hanke, T. Neupert, R. Thomale, G. Sangiovanni, D. Di Sante, <https://link.aps.org/doi/10.1103/PhysRevB.105.165146>

Nature of Unconventional Pairing in the Kagome Superconductors AV_3Sb_5 ($A = \text{K, Rb, Cs}$), *Physical Review Letters*, 2021, X. Wu, T. Schwemmer, T. Müller, A. Consiglio, G. Sangiovanni, D. Di Sante, Y. Iqbal, W. Hanke, A. P. Schnyder, M. M. Denner, M. H. Fischer, T. Neupert, R. Thomale, <https://link.aps.org/doi/10.1103/PhysRevLett.127.177001>

The Bateman Functions Revisited after 90 Years — A Survey of Old and New Results, *Mathematics*, 2021, A. Apelblat, [A. Consiglio](#), F. Mainardi, <https://doi.org/10.3390/math9111273>

On the asymptotics of Wright functions of the second kind, *Fractional Calculus and Applied Analysis*, Springer, 2021, R. B. Paris, [A. Consiglio](#), F. Mainardi, <https://link.springer.com/article/10.1515/fca-2021-0003>

Momentum for Catalysis: How Surface Reactions Shape the RuO₂ Flat Surface State, *American Chemical Society - Catalysis*, 2021, V. Jovic, [A. Consiglio](#), K. E. Smith, C. Jozwiak, A. Bostwick, E. Rotenberg, D. Di Sante, S. Moser, <https://pubs.acs.org/doi/10.1021/acscatal.0c04871>

The Pioneers of the Mittag-Leffler Functions in Dielectrical and Mechanical Relaxation Processes, *WSEAS Transactions on Mathematics*, 2020, F. Mainardi, [A. Consiglio](#), <https://wseas.com/journals/mathematics/2020/a585106-051.pdf>

The Wright Functions of the Second Kind in Mathematical Physics, *Mathematics*, 2020, F. Mainardi, [A. Consiglio](#), <https://www.mdpi.com/2227-7390/8/6/884>

Some Notes on the Wright Functions in Probability Theory, *WSEAS Transactions on Mathematics*, 2019, [A. Consiglio](#), Y. Luchko, F. Mainardi, <https://wseas.com/journals/articles.php?id=1719>

On the evolution of fractional diffusive waves, *Ricerche di Matematica*, Springer, 2019, [A. Consiglio*](#), F. Mainardi, <https://link.springer.com/article/10.1007/s11587-019-00476-6>

Conferences and workshops

- 09/09/23 - **110th National Congress - Italian Physical Society**, *Bologna, Italy*, Oral presentation: 'Electron glass phase with resilient Zhang-Rice singlets in LiCu₃O₃'
13/09/23
- 17/07/24 - **International School of Physics "Enrico Fermi Italian Physical Society**,
22/07/24 *Varenna, Italy*, Poster presentation: 'Excitons at room temperature in a two-dimensional quantum spin Hall insulator'
- 17/03/24 - **DPG conference - German Physical Society**, *Berlin, Germany*, Oral presentation:
22/03/24 'Electron glass phase with resilient Zhang-Rice singlets in LiCu₃O₃'
- 27/09/23 - **Second Fall School 'Topological Quantum Matter'**, *Leipzig, Germany*
29/09/23
- 25/09/23 - **Fourth QMA Retreat**, *Leipzig, Germany*, Chair of Session 4: Topology
27/09/23
- 11/09/23 - **109th National Congress - Italian Physical Society**, *Salerno, Italy*, Oral pre-
15/09/23 sentation: 'Excitons at room temperature in a two-dimensional quantum spin Hall insulator'

- 04/09/23 - **CMD30 FisMat 2023, Milano, Italy**, Oral presentation: 'Dynamics and Resilience of the Charge Density Wave in a bilayer kagome metal'
- 08/09/23
- 13/07/23 - **International Workshop on Complexity and Topology in Quantum Matter (ct.qmat23), Würzburg, Germany**
- 14/07/23
- 20/03/23 - **ct.qmat Cluster Retreat, Bayreuth, Germany**
- 22/03/23
- 05/03/23 - **American Physical Society March Meeting 2023, Las Vegas, Nevada, USA**, Oral presentation: 'Room temperature excitons in the atomically thin topological insulator Bi:SiC'
- 10/03/23
- 15/11/22 - **VASP workshop "Electronic correlations from first principles", online edition**
- 18/11/22
- 10/10/22 - **Hands on spectroscopy calculations of quantum materials, Heidelberg, Germany**
- 14/10/22
- 20/08/22 - **School on UV and X-ray Spectroscopies of Correlated Electron Systems, Les Houches, France**, Poster presentation: 'Evidence of excitons in an atomically thin topological insulator'
- 09/09/22
- 25/07/22 - **International Conference on Complexity and Topology in Quantum Matter, Würzburg, Germany**, Poster presentation: 'Pressure and strain tuning in AV_3Sb_5 ($A = Cs, Rb, K$) kagome metals'
- 29/07/22
- 13/10/21 - **First Fall School 'Topological Quantum Matter', Erfurt, Germany**
- 15/10/21
- 11/10/21 - **Second QMA retreat meeting, Erfurt, Germany**, Poster presentation: 'Adsorption of Small Molecules on the (110) surface of the Dirac Semimetal RuO_2 '
- 13/10/21
- 07/06/21 - **New Generation in Strongly Correlated Electron Systems 2021, online edition**, Oral presentation: 'Electronic Properties and Competing Zhang-Rice Singlets in a Stochastically Hole Doped Mixed Valence Cuprate with Glassy Behavior: the Case of $LiCu_3O_3$ '
- 10/06/21
- 21/09/20 - **Autumn School on Correlated Electrons: Topology, Entanglement, and Strong Correlations, Jülich, Germany**
- 25/09/20
- 02/09/19 - **New Generation in Strongly Correlated Electron Systems 2019, Silvi Marina, Italy**
- 06/09/19
- 22/07/19 - **Computational Methods for Fractional-Order Problems, Bari, Italy**
- 26/07/19
- 12/07/19 - **Nonlocal and Fractional Operators, Rome, Italy**, Poster presentation: 'Evolution of a Box-Signal in the Time-Fractional Diffusion-Wave Equation'
- 13/07/19
- 31/03/19 - **16-th International School-Conference Spinus 2019 "Magnetic resonance and its applications", Saint Petersburg, Russia**, Poster presentation: 'Computer Simulations of PEDOT:PSS/solid interface'
- 05/04/19

- 12/11/18 - **International Student Conference 'Science and Progress 2018'**, *Saint Petersburg, Russia*, Poster presentation: 'Molecular Dynamics Simulations of Conducting Polymer Blend PEDOT:PSS'
- 18/06/18 - **Bologna International School on NANOMaterials physics NANO-BIS**, *Bologna, Italy*
23/06/18

Miscellaneous

Hobbies: Coffee, Cycling, Kayak, Photography

Erdős number: 4 <https://mathscinet.ams.org/mathscinet/freetools/collab-dist>