
Publications & Pre-prints

- (with C. Fields, J. Glazebrook, A. Marciano) “Operational protocols cannot certify classicality”, arXiv:2510.08239 (submitted).
- (with C. Fields, J. Glazebrook, A. Marciano) “Amplituhedra for Generic Quantum Processes from Computation-Scattering Correspondence”, arXiv:2509.19772 (submitted).
- (with M. Saito) “Quantum Cocycle Invariants of Knots from Yang-Baxter Cohomology”, arXiv:2509.04267 (submitted).
- (with A. Giola, A. Kramer, E. Greco) “Neural Integral Operators for Inverse problems in Spectroscopy”, arXiv:2505.03677 (submitted).
- (with Zhang, He, Ying, van Dijk et al.) “Non-Markovian Discrete Diffusion with Causal Language Models”, arXiv:2502.09767, to appear in **Conference on Neural Information Processing Systems (NeurIPS 2025)**.
- (with C. Fields, J. Glazebrook, A. Marciano) “Whether a quantum computation employs nonlocal resources is operationally undecidable”, arXiv:2501.14298, **Europhysics Letters**, 10.1209/0295-5075/adfd0e.
- (with C. Fields, J. Glazebrook, A. Marciano) “ER = EPR is an operational theorem”, arXiv:2410.16496, **Physics Letters B** <https://doi.org/10.1016/j.physletb.2024.139150>.
- “Leray-Schauder Mappings for Operator Learning”, arXiv:2410.01746 (submitted).
- (with He, van Dijk et al.) “CaLMFlow: Volterra Flow Matching using Causal Language Models”, arXiv:2410.05292 (submitted).
- (with Zhang, van Dijk et al.) “Intelligence at the Edge of Chaos”, arXiv:2410.02536, **International Conference on Learning Representations (ICLR) 2025**, <https://openreview.net/pdf?id=IeRcpsdY7P>.
- (with M. Bagherian) “Universal Approximation of Operators with Transformers and Neural Integral Operators”, arXiv:2409.00841 (submitted).
- (with T. Asselmeyer-Maluga, M. Lulli, A. Marciano, R. Pasechnik) “A geometric phase approach to quark confinement from stochastic gauge-geometry flows”, arXiv:2408.15986.
- (with M. Saito) “Deformation Cohomology for Braided Commutativity”, arXiv:2407.02663, to appear in **Michigan Math. J.**
- “Projection Methods for Operator Learning and Universal Approximation”, arXiv:2406.12264 (submitted).
- “Perturbative Expansion of Yang-Baxter Operators”, arXiv:2403.09796, to appear in **Publ. RIMS Kyoto Univ.**
- “Spectral methods for Neural Integral Equations”, arXiv:2312.05654, **Ricerche di Matematica**, <https://doi.org/10.1007/s11587-025-01021-4>.
- (with M. Saito) “Yang-Baxter Solutions from Categorical Augmented Racks”, arXiv:2312.01033, to appear in **J. Knot Theory Ramifications**.
- (with M. Lulli & A. Marciano) “The exact evaluation of hexagonal spin-networks and topological quantum neural networks”, arXiv:2310.03632, to appear in **Fortschritte der Physik**.
- (with D. Levine, S. He, S. Rizvi, S. Levy, D. van Dijk) “Operator Learning Meets Numerical Analysis: Improving Neural Networks through Iterative Methods”, arXiv:2310.01618.

- (with J. Ortega Caro, A. Fonseca, & D. van Dijk et al.) “BrainLM: A foundation model for brain activity recordings”, **International Conference on Learning Representations (ICLR)** (2024), <https://iclr.cc/virtual/2024/poster/18625>.
- (with M. Elhamdadi and P. Senesi) “On the representation theory of cyclic and dihedral quandles”, arXiv:2307.03728, **J. Algebra and its Applications**, <https://doi.org/10.1142/S0219498827500022>.
- (with M. Saito) “Yang-Baxter Hochschild Cohomology”, arXiv:2305.04173, **International J. Math.**, <https://doi.org/10.1142/S0129167X25500624>.
- (with A. Fonseca, J. Ortega Caro & D. van Dijk) “Continuous spatiotemporal transformers”, arXiv:2301.13338, **International Conference on Machine Learning (ICML)** (2023), <https://dl.acm.org/doi/10.5555/3618408.3618699>.
- (with Marciano, Chen, Farbocini, Fields, Lulli) “Deep Neural Networks as the Semi-classical Limit of Topological Quantum Neural Networks: The problem of generalisation”, arXiv:2210.13741 (submitted).
- (with Rizvi, Nguyen, Lyu, Christensen, Caro, Brbic, Dhodapkar and van Dijk) “AMPNet: Attention as Message Passing for Graph Neural Networks”, arXiv:2210.09475.
- (with A. Fonseca, J. Ortega Caro, A. Moberly, M. Higley, J. Cardin & D. van Dijk) “Learning integral operators via neural integral equations”, **Nature Machine Intelligence** <https://doi.org/10.1038/s42256-024-00886-8>.
- (with M. Elhamdadi) “Deformations of Yang-Baxter operators via n -Lie algebra cohomology”, **Nuclear Physics B** <https://doi.org/10.1016/j.nuclphysb.2023.116331>.
- (with M. Saito) “Extensions of Augmented Racks and Surface Ribbon Cocycle Invariants”, arXiv:2207.04570, **Topology Appl.** <https://doi.org/10.1016/j.topol.2023.108555>.
- (with A. Fonseca, A. Moberly, M. Higley, C. Abdallah, J. Cardin & D. van Dijk) “Neural Integro-Differential Equations”, **Proceedings of AAAI** (2023) <https://doi.org/10.1609/aaai.v37i9.26315>.
- (with N. Gresnigt and A. Marciano) “On the dynamical emergence of the Turaev-Viro model in $2+1D$ quantum gravity with cosmological constant”, **Phys. Rev. D** <https://journals.aps.org/prd/abstract/10.1103/PhysRevD.107.046018>.
- (with M. Saito) “Fundamental Heaps for Surface Ribbons and Cocycle Invariants”, arXiv:2109.07569, **Illinois J. Math.** (2023) <https://doi.org/10.1215/00192082-10972597>.
- (with Marciano, Chen, Fabrocini, Fields, Greco, Gresnigt, Jinkclub, Lulli & Terzidis) “Quantum Neural Networks and topological quantum field theories”, **Neural Networks** (2022) <https://doi.org/10.1016/j.neunet.2022.05.028>.
- (with M. Elhamdadi, A. Makhlof & S. Silvestrov) “Derivation problem for quandle algebras”, arXiv:2106.08289, **Inter. J. of Algebra & Comput.** <https://doi.org/10.1142/S0218196722500424>.
- (with N. Gresnigt and A. Marciano) “Braided matter interactions in quantum gravity via 1-handle attachment”, **Phys. Rev. D**, <https://doi.org/10.1103/PhysRevD.104.086021>.
- (with V. Abramov) “3-Lie Algebras, Ternary Nambu-Lie algebras and link invariants”, arXiv:2103.11472, **Journal of Geometry and Physics** <https://doi.org/10.1016/j.geomphys.2022.104687>.
- “Quantum invariants of framed links from ternary self-distributive cohomology”, arXiv:2102.10776, **Osaka J. Math.**, Vol. 59 No.4 (October 2022).
- (with M. Saito) “Braided Frobenius Algebras from certain Hopf Algebras”, arXiv:2102.09593, **J. Algebra Appl.**, <https://doi.org/10.1142/S0219498823500123>.
- (with M. Saito) “Fundamental heap for framed links and ribbon cocycle invariants”, arXiv:2011.03684, **J. Knot Theory Ramifications** <https://doi.org/10.1142/S0218216523500402>.

- (with Tsukamoto, Kikuchi, Najarian, Kuroda, Yasuhara) “Mechanistic study of membrane disruption by methacrylate random copolymers with antimicrobial activity by the single giant vesicle method”, **Langmuir** (2021), <https://doi.org/10.1021/acs.langmuir.1c01047>.
- (with M. Elhamdadi & M. Saito) “Skein theoretic approach to Yang-Baxter Homology”, arXiv:2004.00691, **Topology Appl.** Volume 302, 1 October 2021, 107836 <https://doi.org/10.1016/j.topol.2021.107836>.
- (with M. Elhamdadi & M. Saito) “Heap Cohomology and Ternary Self-Distributive Cohomology”, **Comm. Algebra**, <https://doi.org/10.1080/00927872.2020.1871484>.
- (with M. Elhamdadi & M. Saito), “Higher Arity Self-Distributive Operations in Cascades and their Cohomology”, **J. Algebra Appl.**, <https://doi.org/10.1142/S0219498821501164>.
- (with M. Elhamdadi & M. Saito) “Continuous Cohomology of Topological Quandles”, **J. Knot Theory Ramifications**, vol 28, no 06, 1950036 (2019). <https://doi.org/10.1142/S0218216519500366>.