

Anthony Baptista

Birth date: 02/06/1997 Nationality: French
Spoken languages: English (fluent), French (native), Spanish (working knowledge)
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Research Interests

Computational Biology & Spatial Biology, Multimodal integration, Biological networks, Cancer
Network Science: Multilayer networks, Higher-order networks, Network embedding, Random walks
Geometry & Topology: Topological data analysis, Differential geometry, Network geometry
Artificial Intelligence: Geometric deep learning, Explainable AI, Graph convolutional networks

Education & Research Positions

2024–ongoing

Senior Postdoctoral Research Fellow: Cancer Bioinformatics, School of Cancer & Pharmaceutical Sciences, Faculty of Life Sciences and Medicine, King's College London
Working on three main projects: Multimodal integration within spatial transcriptomics methods, Explainable AI, and higher-order interactions in biological networks. Collaborating with Anita Grigoriadis (KCL) and Christopher Banerji (KCL, UCL, Turing Institute)

Co-lead - King's College London Spatial Biology Facility

Co-organiser - Alan Turing Interest Group: Topology and Geometry for Data, The Alan Turing Institute

Co-creator - Startup Scianno-Mosaics, based at the University of Colorado - Boulder

2022–2024 Postdoctoral Research Assistant

School of Mathematical Sciences, Queen Mary University of London & The Alan Turing Institute
Project: "Learning from data with structured missingness" (Turing-Roche partnership). Collaborating with Ginestra Bianconi (QMUL), Ruben Sanchez-Garcia (Southampton Univ.), and Roche-Genentech.

2019–2022 Ph.D. in Biomathematics and Complex Systems

Aix-Marseille University, Marseille

Topic: Multilayer models and exploration methods for biological networks. Supervised by Anaïs Baudot (MMG U1251) and Aitor Gonzalez (TAGC U1090). Funded by CENTURI (Turing Centre for Living Systems).

Awarded: Very honourable, with Committee Praise.

2018–2019 MSc in Statistical Physics and Biophysics

Paris Cité University, Sorbonne University, and Paris-Saclay University (joint degree)
Obtained with honours

2017–2018 MSc in Fundamental Physics

Sorbonne University, Paris
Obtained with honours

2015–2017 BSc in Physics

Sorbonne University, Paris
Obtained with honours

2014–2015 Maths Sup

Lycée Saint Louis, Paris
Undergraduate courses to prepare nationwide competitive exams in sciences. Obtained with honours.

Publications

Published (co-first authorship = *)

1. H. Rafique, **A. Baptista**, E. Parisini, I. Wall, A. Grigoriadis, *Spatial gene expression inference from histology using feature-level fusion of pathology foundation models*, Submitted to ECCB 2026
2. **A. Baptista**, R. Nuamah, C. Chiappini, A. Grigoriadis, *MOSAIC: Multi-Origin Spatial Transcriptomics Analysis and Integration Kit*, Journal of Open Source Software, 11(117), 8795 (2026)
3. **A. Baptista***, M. Niedostatek*, J. Yamamoto, B. McArthur, J. Kurths, R. J. Sánchez-García, G. Bianconi, *Mining higher-order triadic interactions*, Nat. Commun. 16, 11613 (2025)
4. G. Verghese*, **A. Baptista***, C. Eke*, H. Rafique*, M. Li, F. Mohamed, A. Bhalla, L. Ryan, M. Pitcher, E. Parisini, C. Piazzese, L. Simmons, A. Grigoriadis, *PySlyde: A Lightweight, Open-Source Toolkit for Pathology Preprocessing*, arXiv:2511.05183 (2025)
5. I. Wall*, **A. Baptista***, J. Quist*, H. Rafique, M. Li, L. Ryan, G. Verghese, S. Marcotti, T.A. Phillips, C. Owczarek, S. Clausen, T. Tramm, G. Booker, A. Mera, J. Timbres, King's Health Partners Biobank, E. Sawyer, C. Gillet, S. Irshad, S. Pinder, M. Parsons, A. Grigoriadis, *SMART: A Spatio-Molecular Atlas of Response Trajectories in Triple-Negative Breast Cancer*, Under review at Nat. Cancer (2025)
6. L. R. Orozco, A. E. Weaver, C. C. Pauli, C. J. Grassa, D. Vergara, **A. Baptista**, K. White, B. F. Emery, N. R. M. Castro, R. F. Guerrero, B. C. Keegan, N. C. Kane, *Unraveling Cross-Cellular Communication in Cannabis sativa Sex Determination: A Network Ontology Transcript Annotation Analysis*, bioRxiv: 10.1101/2025.05.05.650505, Under review at Sci. Rep. (2025)
7. **A. Baptista**, C. R. S. Banerji, A. Barp, T. Chakraborti, C. Harbron, B. D. MacArthur, *Deep Learning as Ricci Flow*, Sci. Rep. 14, 23383 (2024)
8. **A. Baptista**, B. D. MacArthur, C. R. S. Banerji, *Charting cellular differentiation trajectories with Ricci flow*, Nat. Commun. 15, 2258 (2024)
9. C. Beust, A. Valdeolivas, **A. Baptista**, G. Brière, N. Lévy, O. Ozisik, A. Baudot, *The molecular landscape of premature aging diseases defined by multilayer network exploration*, Advanced Biology, 2400134 (2024)
10. **A. Baptista**, G. Brière, A. Baudot, *Random Walk with Restart on multilayer networks: from node prioritisation to supervised link prediction and beyond*, BMC Bioinformatics 25, 70 (2024)
11. **A. Baptista**, R. J. Sánchez-García, A. Baudot, G. Bianconi, *Zoo Guide to Network Embedding*, J. Phys. Complex. 4, 042001 (2023)
12. **A. Baptista**, A. Gonzalez, A. Baudot, *Universal Multilayer Network Exploration by Random Walk with Restart*, Commun. Phys. 5, 170 (2022)
13. L. Almàsy, A. I. Kuklin, M. Pozar, **A. Baptista**, A. Perera, *Microscopic origin of the scattering pre-peak in aqueous propylamine mixtures: X-Ray and Neutron experiments versus simulations*, Phys. Chem. Chem. Phys. 21, 9317–9325 (2019)
14. **A. Baptista**, A. Perera, *Modeling micro-heterogeneity in mixtures: the role of many body correlations*, J. Chem. Phys. 150, 064504 (2019)

In Preparation (co-last authorship = †)

- Devina Chokshi, **A. Baptista**[†], A. Grigoriadis[†], *Unveiling cell-cell communications with Random walks on spatial transcriptomics* (2026-2027)
- L. Bellersheim, **A. Baptista**, N. Safinia, *Multimodal Spatial Integration to Study Tregs in Liver Cancer* (2026)
- A. Becalick, M. Bourdenx[†], **A. Baptista**[†] *3D Cell-Segmentation for Brain Tissue Spatial Transcriptomics* (2026)
- I. Wall, A. Grigoriadis[†], **A. Baptista**[†], *Topological Data Analysis for Tissue Architecture Classification in spatial transcriptomics* (2026)

- **A. Baptista**, M. Pitcher, H. Rafique, L. Ryan, A. Grigoriadis, *Spatial Multimodal Integration in Breast Cancer* (2026)
- **A. Baptista**, A. Grigoriadis, V. Sousa Moreno *Spatial Transcriptomics Reveals Pathways Connecting Infection in Gingiva and Heart Tissue* (2026)
- **A. Baptista**, A. Grigoriadis, X. Montano *Spatial Transcriptomics Informed Neuroblastoma Treatment* (2026)
- N. Ayareh, **A. Baptista**[†], *A Systematic Review and Narrative Synthesis of Deep Learning Integration with Spatial Transcriptomics and Digital Pathology in Oncology* (2026)
- K. Baird, G. D'Amico Lago, E. Heylen, R. Wallis, **A. Baptista**, I. Wall, A. Grigoriadis, K. Hodivala-Dilke *Spatial Transcriptomics Reveals Novel Ethnicity-Associated Signature of Breast Cancer Recurrence* (2026)
- S. Chen, F. S. Mohamed, G. Booker, G. Verghese, M. Li, C. Eke, **A. Baptista**, S. Arslan, H. Yan, A. Oozer, M. D'Angelo, R. Barrow, R. Nelan, C. McMaster-Christie, M. Sobral-Leite, F. de Martino, E. Sahai, C. Briskin, M. J. Smalley, E. Lips, C. Gillett, J. L. Jones, C. R. S. Banerji, H. Chockler, S. E. Pinder, A. Grigoriadis, *BreastAgeNet Identifies Pathological Accelerated Tissue Ageing in Normal Breast Tissue in Younger gBRCA1/2m Carriers* (2026)
- **A. Baptista**, V. Boulat, A. Bhalla, E. Alberts, D. Calado, A. Grigoriadis, *Hierarchical Dependencies and Parallels Between Tumour Draining Lymph Node and TLS Formation in Triple Negative Breast Cancers*, Internal report between King's College London and Boehringer Ingelheim (2026)
- **A. Baptista**, R. J. Sánchez-García, G. Bianconi, *Exploring the Geometry of Structure Missingness Networks* (2026)

Grants & Prizes

- **Flexible Fund - DisCouRSE: Developing a Community of Leaders Network Plus Programme 2026** – £10,000 for the project *SpatiaLondon Network*. Co-investigators: Alessandra Vigilante, Nik Matthews, Maria Del Pilar Acedo Nunez, Francesca Ciccarelli, Ines Sequeira.
- **School of Cancer & Pharmaceutical Sciences Annual Symposium 2025 Poster Prize** – £500 award
- **OpnMe Innovation Grant - Boehringer Ingelheim** (Co-Investigator with Prof. Grigoriadis, KCL) – £80,000. Project: spatial transcriptomics characterisation of tertiary lymphoid structure (TLS) maturity in TNBC to identify biomarkers of lymphoid aggregate progression and potential axes for accelerating their maturation into TLS, structures that are favourably prognostic for survival and immunotherapy response.
- **Fellowship application to the Wellcome Trust Early Career Award 2025** – *SPACE - Spatial biology, statistical Physics, and explainable AI for Cancer deciphering Enhancement*
- **1st position in the Theory and Methods Challenge Fortnights Call 2024** – £30,000 funding for organising the workshop: *Geometry-Informed Data Representations*
- **International Ph.D. fellowship CENTURI** (Turing Centre for Living Systems) – **3 years funding**

Scientific Skills

- **Spatial Transcriptomics:** Analysis at region-based (Nanostring GeoMx) and single-cell resolution (Nanostring CosMx, 10X Xenium)
- **Programming:** Proficient in Python, R, Julia, Matlab, Fortran (77, 90), C; including AI methods and GPU optimisation
- **Scientific Communication:** Written research papers and reviews, oral presentations (long and short format), poster presentations, group meetings (multilingual: English, French, Spanish)
- **Project Management:** Grant applications, scientific project management

- **Software Development:** Creation of open-source and reproducible packages with user-friendly documentation (GitHub, Docker, Conda, Snakemake, PyPI, ReadTheDocs)
- **Event Organisation:** Conferences, workshops, interest groups
- **Teaching & Mentoring:** Undergraduate, graduate, and Ph.D. student levels

Teaching Experience

- **Python introduction for bioinformatics** – Comprehensive Cancer Centre Internal Lecture, 04/02/2025–19/03/2025
- **Biological interaction networks** – Assistant lecturer, MSc (Bioinformatics and Computational Biology), 2020–2022
- **Introduction to computer programming in Python** – Assistant lecturer, BSc (Biology), 2019–2020
- **Mathematics tools for bioinformatics** – Assistant lecturer, MSc (Bioinformatics), 2019–2022
- **Introduction to computer programming in Python** – Assistant lecturer, BSc Honours (Bioinformatics), 2019–2022

Student Supervision

- **Antonella Zupa** (Ph.D. student, Bioinformatics) – “Single cell and spatial analysis of DBLCL”, March–September 2026
- **Devina Chokshi** (Master’s student, Bioinformatics) – “Unveiling cell-cell communications with Random walks on spatial transcriptomics network”, January–July 2026
- **Diane Cruizat** (Undergraduate student, Bioinformatics) – “Cells segmentation in the context of single cell spatial transcriptomics”, July–October 2025
- **Yiren Niu** (Master’s student, Bioinformatics) – “Leveraging Spatial Transcriptomics to study cell-cell interactions”, April–July 2025
- **Marta Niedostatek** (Ph.D. student, Applied Maths) – “Mining higher-order triadic interactions”, September–May 2024
- **Jun Yamamoto** (Master’s student, Theoretical Physics) – “Mining higher-order triadic interactions”, January–July 2023
- **Loumi Trémas** (Master’s student, Machine Learning) – “Prioritising nodes by Katz based Model in Multilayer networks”, April–June 2021
- **Yorgo El Moubayed** (Master’s student, Bioinformatics) – “Analysis of Hi-C and promoter capture Hi-C data”, April–June 2020

Professional Service & Leadership

- **Lead of Bioinformatics and Analytical Development** – KCL Spatial Biology Facility, 2024–ongoing
- **Co-organiser** – Turing Interest Group: Topology and Geometry for Data, Alan Turing Institute, 2024–ongoing
- **Co-organiser** – Guy’s Cancer Forum (GCF) seminar series, King’s College London, 2025–ongoing
- **Co-organiser** – SCPS Staff Committee, King’s College London, 2025–ongoing
- **Co-creator** – Startup Scianno-Mosaics, based at the University of Colorado - Boulder, 2024–Ongoing
- **Member** – Sustainability iHub at King’s College London, contributed to Gold recognition from LEAF committee, 2024–ongoing

- **Co-organiser** – “Spatial Biology Day at KCL” with Anita Grigoriadis and Ciro Chiappini, October 20, 2025
- **Co-organiser** – Workshop “Numeric Approaches to FSHD research” with Anaïs Baudot and Elisabeth Remi, CIRM, Marseille, March 10–12, 2025
- **Director** – London Postdoc Network (LPN), (interdisciplinary association connecting postdoc researchers across London), 2022–2024
- **Organiser** – Seminar series on Philosophy and History of Science, Turing Institute, 2023–2024
- **Co-organiser** – Centre for Complex Systems (CCS) seminar series, QMUL, 2023–2024

Selected Research Experience

2024–ongoing Senior Postdoctoral Research

Cancer Bioinformatics, School of Cancer & Pharmaceutical Sciences, King’s College London

Leading two major research projects: (1) Multimodal integration methods for spatial transcriptomics data combining multiple platforms and data types, (2) Explainable AI for spatial transcriptomics and cancer biology. Collaborating with Anita Grigoriadis (KCL) and Christopher Banerji (KCL, UCL, Turing Institute). Co-leading the KCL Spatial Biology Facility, developing bioinformatics pipelines and analytical methods for region-based (Nanosting GeoMx) and single-cell resolution (Nanosting CosMx, 10X Xenium) spatial transcriptomics platforms.

2022–2024 Postdoctoral Research

School of Mathematical Sciences, Queen Mary University of London & The Alan Turing Institute
Investigated structured missingness in complex datasets as part of the Turing-Roche partnership. Developed novel methods for mining higher-order triadic interactions in networks and applied network embedding techniques to understand patterns in missing data. Created computational frameworks for inferring network structure from incomplete information and studying higher-order interactions in biological networks using topological and geometric approaches. Collaborated with Ginestra Bianconi (QMUL), Ruben Sanchez-Garcia (University of Southampton), and researchers at Roche-Genentech. Published key findings in Nature Communications.

2019–2022 Ph.D. Research

MMG U1251 (Marseille Medical Genetics) and TAGC U1090 (Theories and Approaches of Genetics Complexity). Developed new formalism of random walk with restart on multilayer networks to explore heterogeneous multiplex networks. Created MultiXrank Python package. Applications included gene-disease associations, comorbidities between rare and common diseases, and 3D DNA conformation networks. Generalized Katz similarity measure to multilayer networks and developed new community detection methods based on random walks. Conducted comprehensive review of network embedding literature and developed embedding methods for complex multilayer networks.

04–06/2019 Research Internship

MSC U7057 (Laboratoire Matière et Systèmes Complexes)

Developed new image analysis methods to determine cell polarity during epithelial cells migration. Supervised by François Graner.

01–04/2019 Research Internship

LPTMC U7600 (Laboratoire de Physique Théorique de la Matière Condensée)

Developed theoretical and numerical methods to solve N-body problems in statistical physics of liquids. Supervised by Aurélien Perera.

04–06/2018 Research Internship

LPTMC U7600 (Laboratoire de Physique Théorique de la Matière Condensée)

Studied non-electrostatic models of polar molecules. Supervised by Aurélien Perera.

Selected Presentations

2026

- CNRS Interest Group “Heterogeneous data integration”: “How integrating multi-omics and multimodal data?”, March 3, 2025

2025

- Spatial Technologies User Meeting – “Spatial Multimodal Integration in Breast Cancer”, 1 December 2025
- HAB Research Seminar – “Spatial Multimodal Integration in Breast Cancer”, 27 November 2025
- Spatial Biology Day at KCL – “Spatial Multimodal Integration in Breast Cancer”, 20 October 2025
- FoDOCS Research Staff Away Day – “Spatial Biology at KCL”, 15 October 2025
- CoLC PhD programme – “Spatial Biology, an introduction”, 22 September 2025
- CRUK City of London Centre and Crick STP Joint Facilities Day – “Spatial Biology through the lens of Topology and Geometry”, 17 June 2025
- Bruker Spatial Biology - Galaxy Spatial Tour London – “Spatial Biology through the lens of Topology and Geometry”, 6 June 2025
- The King’s Festival of AI – “Explainable AI for Health & Medicine”, 20 May 2025
- School of Cancer & Pharmaceutical Sciences Annual Symposium – “Statistical Physics and Topology for Spatial Transcriptomics”, 6 May 2025
- Workshop on Numeric Approaches to FSHD research – “Spatial Transcriptomics through the lens of Topology and Geometry”, Marseille, 12 March 2025
- Workshop on Temporal and Dynamic Interactions – “Temporal and Spatial Transcriptomics through the lens of Network Theory”, Oxford, 21 February 2025
- PI’s retreat School of Cardiovascular Medicine & Metabolic Sciences – “Spatial Biology at King’s College London”, Brighton, 20 February 2025
- CCC Bioinformatics Day – “Spatial Transcriptomics through the lens of Topology and Geometry”, KCL, 7 February 2025
- Guy’s Cancer Forum – “Spatial Transcriptomics through the lens of Topology and Geometry”, KCL, 4 February 2025

2024

- CompleNet 2024 – “Mining higher-order triadic interactions”, Exeter, 26 April 2024
- The Turing-Roche Knowledge Share Series – “Mining higher-order triadic interactions”, London, 27 February 2024
- Data Science Unit’s group meeting – “Study structured missingness with network embedding”, University of Edinburgh, 23 February 2024
- Machine Learning for Integrative Genomics group – “Inference of cell differentiation trajectory”, Pasteur Institute, Paris, 19 February 2024

2023

- Complex Networks 2023 – “Inference of triadic interactions”, Menton, 28 November 2023
- London TDA Seminar – “Zoo guide to network embedding”, QMUL, London, 5 May 2023
- Ghent Methusalem Junior Seminar – “Introduction to network embedding”, Ghent University, 3 May 2023

2020–2022

- Seminar for undergraduate students (QMUL) – “From PageRank to Biological networks”, 30 November, 2022
- Invited speaker for Denis Thieffry and Laura Cantini group meetings (ENS-PSL) – “Integration of Multilayer networks and chromatin networks”, Paris, 11 February, 2022
- Invited speaker for Daniel Rico, Lisa Russell and Sarra Ryan group meetings (Newcastle University) – “Methods for Multilayer networks”, Newcastle, 14 December, 2021
- Journées du GDR BIM 2021 – “Universal Multilayer Network Exploration by Random Walk with Restart”, Lyon, 24 November, 2021
- Programme transversal Variabilité Génomique (GOLD) – “Universal Multilayer Network Exploration by Random Walk with Restart”, Nantes, 26 October, 2021
- Internal seminar TAGC – “Studying relationships between rare and common diseases with full multilayer networks”, Remote, 3 March, 2021
- NetBioMed 2020 (satellite of NetSci) – “Multi-Layer network exploration by Random walk with Restart”, Remote presentation and poster, 17 September, 2020