

# CHIARA VILLA

Sorbonne Université ◊ Postdoc ◊ Mathematical Biology

**Email** chiara.villa[at]inria.fr  
**Website** <https://chiaravilla.github.io/website/index.html>  
**Languages** Italian, English, French  
**Software** MATLAB, Python, LaTeX, Fortran90, COMSOL, Maple, R, HTML5, MS Office

## ACADEMIC APPOINTMENTS

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02/25 - today **Postdoc**, *Inria Saclay Centre*, Paris (FR)  
Postdoctoral researcher in the Inria team MUSCA, project OVOPAUSE  
01/23 - 12/24 **PRFP postdoc**, *Laboratoire Jacques-Louis Lions, Sorbonne Université*, Paris (FR)  
Laureate of the Paris Region Fellowship Programme (PR and EU MSCA funding)  
04/22 - 12/22 **Postdoc**, *Laboratoire Jacques-Louis Lions, Sorbonne Université*, Paris (FR)  
Postdoctoral researcher in the group of Prof Benoît Perthame (ERC ADORA funding)

## EDUCATION & RESEARCH EXPERIENCE

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09/18 - 03/22 **PhD, Mathematics**, *University of St Andrews*, St Andrews (UK)  
Supervisors: Prof Mark Chaplain, Dr Tommaso Lorenzi  
01/22 - 03/22 Research visit at Institute Henri Poincaré  
2014 - 2018 **MMaths, Applied Mathematics**, *University of St Andrews*, St Andrews (UK)  
Fast Track, First Class Honours awarded.  
Summer 2017 Undergraduate Summer Research Internship, *University of St Andrews*  
Summer 2016 Complex Systems Biology Research Internship, *Università degli Studi di Torino*

## FUNDING, GRANTS AND PRIZES AWARDED

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2023 **BOUM SMAI funding**, MC2D workshop organisation, Paris 10/2023 (**€1000**).  
2023 **PEPS JCJC** funding for the project “Conservative numerical schemes for novel structured PDE models of cancer invasion” with Alexandre Poulain (**€4900**).  
2023 **UFR funding**, Sorbonne Université, MC2D workshop organisation (**€1500**).  
2022 **Junior Fellowship** for the participation to the workshop “Parabolic and kinetic models in population dynamics” in Toulouse in September 2022.  
2022 **Paris Region Fellowship Programme** laureate with the proposed project on “Mechanistic models of cell migration and cancer invasion” (**€257760**).  
2021 **IHP financial support** for the “Mathematical modeling of organization in living matter” thematic program at the Institute Henri Poincaré during 10/01-01/04 2022 (**€4500**).  
2020 **SMBdevBio Poster Prize 1**, Society for Mathematical Biology, SMB2020 (**\$250**)  
2020 **LMS ECR Travel Grant**, London Mathematical Society, 12th ECMTB (**£500**)  
2018 **PhD funding**, School of Mathematics and Statistics, UoStA (**£49124.25**)  
2018 **The Principal’s Scholarship for Academic Excellence**, prize awarded to the top 50 academically performing students in their final year at the UoStA (**£1000**)  
2014 - 2018 **The Deans’ list**, annual award for academic excellence by the Deans of the UoStA  
2017 **Research scholarship**, Undergraduate Summer Research Internship, UoStA (**£1684.29**)

## PROFESSIONAL RESPONSIBILITIES

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01/23 - 12/24 **Member of ‘Comité Parité’**, *Laboratoire Jacques-Louis Lions, Sorbonne Université*  
10/22 - 12/24 **Postdoctoral Research Rep**, *Laboratoire Jacques-Louis Lions, Sorbonne Université*

03/21 - today	<b>Journal Peer Reviewer</b> , <i>International Journal of Non-Linear Mechanics</i> , <i>Bulletin of Mathematical Biology</i> , <i>iScience</i> , <i>European Journal of Applied Mathematics</i> , <i>Mathematical Biosciences</i> , <i>European Control Conference 2022</i> , <i>Frontiers in Ecology and Evolution</i> (Special issue: From Ecology to Cancer Biology and Back Again)
11/20	<b>Piscopia Society</b> , <i>School of Mathematics and Statistics, University of St Andrews</i> , Testimonial encouraging female/non-binary students considering a PhD in mathematics
09/18 - 09/19	<b>Postgraduate Research Rep &amp; Postgraduate Research Executive Rep</b> , UoStA
09/18 - 09/19	<b>University of St Andrews Student Rep</b> , <i>SMSTC</i>

## MENTORING, TEACHING AND MARKING

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All activities of 2017-2022 undertaken with the School of Mathematics and Statistics, University of St Andrews. Teaching activities undertaken with groups of 50 (demonstrating) or 11 (tutoring) students. Feedback on Explanation (E), Organisation (O) and Availability (A) on a scale of 1 (excellent) to 5 (poor).

01/23 - 08/23	<b>Master thesis supervision</b> of Federica Padovano (EPFL), at LJLL (SU)
09/18 - 06/22	<b>Mentor in Peer Mentoring scheme</b> of 4 Undergraduate, 3 Master, 2 PhD students
Autumn 2020	<b>MT2000 Computing Workshop</b> , Demonstrator of computing in Python
Autumn 2019	<b>MT2000 Computing Workshop</b> , Demonstrator of computing in Python
Autumn 2019	<b>MT2501 Linear Mathematics</b> , Tutor of 2 groups (E=1.44, O=1.33, A=1.33)
Spring 2019	<b>MT2507 Mathematical Modelling</b> , Tutor of 2 groups (E=1.45, O=1.85, A=1.45)
Spring 2019	<b>MT2507 Mathematical Modelling</b> , Demonstrator of 3 groups
Autumn 2018	<b>MT2503 Multivariate Calculus</b> , Tutor of 2 groups (E=1.17, O=1.5, A=1.17)
Autumn 2018	<b>MT2504 Combinatorics and Probability</b> , Marking of 100 computing projects
Autumn 2017	<b>UK Undergraduate Ambassadors Scheme</b> , weekly teaching in secondary school (S1, S3, Advanced Higher Maths), <i>Waid Academy, Anstruther (UK)</i>

## SELECTED SCIENTIFIC MEETINGS

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### Scientific meetings organised

07/24	<b>Minisymposium</b> on ‘Recent advances in modelling cancer invasion’ at <i>ECMTB2024</i>
10/23	<b>Workshop ‘Mathematical challenges in modelling cancer dynamics’</b> (MC2D), <i>Laboratoire Jacques-Louis Lions, Sorbonne Université</i> , <a href="https://mc2d.sciencesconf.org/">https://mc2d.sciencesconf.org/</a>
09/20 - 12/21	<b>StAMBio seminar series</b> , Weekly talks (online) by members of the St Andrews Mathematical Biology research group and international guest speakers
01/20	<b>Postgraduate Interdisciplinary Mathematics Symposium</b> , for PhD students of the School of Mathematics and Statistics of the University of St Andrews, <i>Edzell</i>
11/18	<b>‘MT234 Research and Party’</b> , Organiser and speaker, event encouraging Undergraduate students & research staff exchange, School of Mathematics and Statistics, UoStA

### Invitations to speak at International Workshops

April 2024	<b>Mathematical and numerical tools for Oncology</b> , <i>Oncolille Institut</i>
Nov 2023	<b>Mechanistic models for continuous phenotypic adaptation</b> , <i>University of Leeds</i>
Jun 2023	<b>Mathematical Biology: Analysis and Application</b> , <i>Technische Universität Dresden</i>
Feb 2023	<b>Multiscale analysis and methods for PDEs</b> , <i>Institute for Mathematical Sciences (SG)</i>
Oct 2022	<b>Modelling cell and tissue biomechanics</b> , <i>LJLL, Sorbonne University (SU)</i>
Jun 2021	<b>Soft Tissue Mechanics</b> , <i>University of St Andrews</i> , Online
May 2021	<b>Mathematical Biology on the Mediterranean Coast</b> , <i>LJLL, SU</i> , Online

Invitations to speak at Seminars: Séminaire de modélisation mathématique en sciences de la vie et santé (LJLL, Paris, 11/24), Mathematical Biology Seminar (University of Leeds, 05/24), Puissant Lab (Saint-Louis Medical Center, Paris, 04/24), The Evolution Seminar (Bielefeld University, 05/23), Analyse Numérique et Équations aux Dérivées Partielles (Université de Lille, 04/23), Synthsys Seminar (Centre for Synthetic and Systems Biology, Edinburgh, 11/22).

## MAJOR RESEARCH OUTPUTS

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### Preprints

- [15] B. Perthame, C. Villa, Regularity and stability in a strongly degenerate nonlinear diffusion and haptotaxis model of cancer invasion, 2024. **arXiv:2412.18261**, **hal-04854773**
- [14] T. Lorenzi, N. Loy, C. Villa, Phenotype-structuring of non-local kinetic models of cell migration driven by environmental sensing, 2024. **arXiv:2412.16258**, **hal-04851469**
- [13] T. Lorenzi, K.J. Painter, C. Villa, Phenotype structuring in collective cell migration: a tutorial into mathematical models and methods, 2024. **arXiv:2410.13629**, **hal-04851615**
- [12] A.P. Browning, R. Crossley, C. Villa, P. K. Maini, A.L. Jenner, T. Cassidy and S. Hamis, Identifiability of heterogeneous phenotype adaptation from low-cell-count experiments and a stochastic model, 2024. **bioRxiv 2024.08.19.608540**, **hal-04854906**
- [11] S. Hamis, A.P. Browning, A.L. Jenner, C. Villa, P. K. Maini and T. Cassidy, Growth rate-driven modelling reveals how phenotypic adaptation drives drug resistance in BRAFV600E-mutant melanoma 2024. **bioRxiv 2024.08.14.607616**, **hal-04851795**
- [10] C. Villa, P. K. Maini, A.P. Browning, A.L. Jenner, S. Hamis and T. Cassidy, Reducing phenotype-structured PDE models of cancer evolution to systems of ODEs: a generalised moment dynamics approach, 2024. **arXiv:2406.01505**, **hal-04599519**
- [9] L. Almeida, A. Poulain, A. Pourtier, C. Villa, Mathematical modelling of the contribution of senescent fibroblasts to basement membrane digestion during carcinoma invasion, 2024. **hal-04574340**

### Papers published in peer-reviewed journals and Conference proceedings

- [8] F. Padovano, C. Villa, The development of drug resistance in metastatic tumours under chemotherapy: an evolutionary perspective, *Journal of Theoretical Biology*, 595(1):111957, 2024. DOI: 10.1016/j.jtbi.2024.111957, **hal-04595087v3**
- [7] L. Almeida, J.A. Denis, N. Ferrand, T. Lorenzi, M. Sabbah, C. Villa, Evolutionary dynamics of glucose-deprived cancer cells: insights from experimentally-informed mathematical modelling, *Journal of the Royal Society Interface*, 21(210):20230587, 2024. DOI: 10.1098/rsif.2023.0587, **hal-03947209v2**.
- [6] C. Villa, A. Gerisch, M.A.J. Chaplain, A novel nonlocal partial differential equation model of endothelial progenitor cell cluster formation during the early stages of vasculogenesis, *Journal of Theoretical Biology*, 534(1):110963, 2022. DOI: 10.1016/j.jtbi.2021.110963, **hal-04415625**.
- [5] F. Mottes, C. Villa, M. Osella, M. Caselle, The impact of whole genome duplications on the human gene regulatory networks, *PLOS Computational Biology*, 17(12):e1009638, 2021. DOI: 10.1371/journal.pcbi.1009638 **hal-04415666**.
- [4] C. Villa, M.A.J. Chaplain, A. Gerisch, T. Lorenzi, Mechanical models of pattern and form in biological tissues: the role of stress-strain constitutive equations, *Bulletin of Mathematical Biology*, 83:80, 2021. DOI: 10.1007/s11538-021-00912-5, **hal-04415645**.
- [3] C. Villa, M.A.J. Chaplain, T. Lorenzi, Evolutionary dynamics in vascularised tumours under chemotherapy: Mathematical modelling, asymptotic analysis and numerical simulations, *Vietnam Journal of Mathematics*, 49, 143–167, 2021. DOI: 10.1007/s10013-020-00445-9, **hal-04415601**.
- [2] C. Villa, M.A.J. Chaplain, T. Lorenzi, Modelling phenotypic heterogeneity in vascularised tumours, *SIAM Journal on Applied Mathematics*, 81, 434–453, 2021. DOI: 10.1137/19M1293971, **hal-04415631**.
- [1] T. Lorenzi, F.R. Macfarlane, C. Villa, Discrete and continuum models for the evolutionary and spatial dynamics of cancer: a very short introduction through two case studies, (pp. 359-380) in *Trends in Biomathematics: Modeling Cells, Flows, Epidemics, and the Environment*, Ed. R. Mondaini, Springer, Cham, 2019. DOI: 10.1007/978-3-030-46306-9\_22, **hal-04415585**.

### Doctoral thesis

- [T1] C. Villa, Partial differential equation modelling in cancer and development, PhD thesis, University of St Andrews, St Andrews, 2022. HAL Id: **tel-04442733**.