

Dr SIMONE PARISOTTO

- Curriculum Vitae (updated December 2020) -

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RESEARCH POSITIONS

01/2019-today: Research Associate, DAMTP & Fitzwilliam Museum, University of Cambridge, UK

- **Unveiling the invisible: mathematics for conservation in Arts and Humanities** (Leverhulme Trust funded project)
- Principal Investigator: Prof Carola-Bibiane Schönlieb; with Dr Spike Bucklow (Hamilton Kerr Institute), Dr Suzanne Reynolds (Fitzwilliam Museum), Dr Alessandro Launaro and Ms Ninetta Leone (Faculty of Classics)

07/2014-09/2014: Research Scholarship, University of Verona, IT

- **Image processing using thermography techniques for non-invasive analysis of Cultural Heritage**
- Infrared Analysis and Image Processing for Cultural Heritage Conservation of “**Monocromo**”, **Leonardo Da Vinci**.

03/2012-12/2012: Internship, Vision, Image Processing & Sound Laboratory, Verona, IT

- Study of the Laplace-Beltrami operator and Heat-Kernel-Signature for 3D shapes. Supervised learning of brain morphological deformations and features possibly correlated to “schizophrenia”. Attendance to ECCV2012 Conference.

EDUCATION

10/2014 – 04/2019: PhD Degree, Cambridge Centre for Analysis - Jesus College, University of Cambridge, UK

- Thesis title: **Anisotropic Variational models and PDEs for inverse imaging problems**. (DOI: [10.17863/CAM.38240](https://doi.org/10.17863/CAM.38240))
- Supervisor: Prof Carola-Bibiane Schönlieb - Co-supervisor: Prof Simon Masnou
- Examiners: Prof Arieh Iserles, Prof Jean-Michel Morel (Submission: 12/2018, PhD viva 02/2019, Approval 04/2019)

2014: Master's Degree in Mathematics, University of Verona, IT (110/110 cum laude)

- Thesis title: **Variational Methods in Image Processing for inpainting and shadow removal**.
- Supervisor: Prof Giandomenico Orlandi - Co-supervisor: Prof Simon Masnou

RESEARCH INTERESTS

Mathematical Image Processing, Inverse Problems, Variational Methods, Anisotropic PDEs, Numerical Analysis, Optimisation, Unsupervised Learning, Heritage Science, Digital Humanities.

EDITORIAL ACTIVITIES

- J. of Mathematical Imaging and Vision (JMIV, 2)
- SIAM J. on Imaging Sciences (SIIMS, 6)
- Sensors (1)
- Heritage Science (1)
- J. of Mathematics and the Arts (1)
- J. of Computational and Applied Mathematics (1)
- Scale Space and Variational Methods (SSVM, 1)

GRANTS, AWARDS AND PRIZES

- 2020: Award of **two additional increments** in the payroll based on exceptional performances, Univ. Cambridge, UK
- 2018: **Best Paper Award**, International Conference on Image and Signal Processing, **ICISP 2018**, Cherbourg, FR
- 2018: **SIAM Imaging Science 2018 Student Travel Award** (\$700)
- 2014-today: Travel grants: **Cambridge Philosophical Society** (+1.5K GBP), **DAMTP** (2K GBP) **Jesus College** (0.65K GBP)
- 2014: **Best Master Thesis Award**, Banca di Credito Cooperativo, Verona, IT

MEMBERSHIP, FELLOWSHIP AND PARTICIPATION TO COMMITTEES

- 09/2020-today: **External collaborator** to the project **ARCH-AI-STORY** (Atelier 2) @ CEPAM, CNRS, FR
- 04/2020-today: **Member** of the “Unione Matematica Italiana” (**UMI**) and its imaging working group **UMI MIVA**
- 11/2019-today: **Member** of the “**Veronesi tutti Math**”, the mathematical alumni association of University of Verona, IT
- 11/2019-today: **Member** of the Alan Turing Institute **AI for Arts** Group and its editing board newsletter
- 10/2016-today: **Member** of the “Society for Industrial and Applied Mathematics” (**SIAM**)

- 02/2015-today: **Fellow** of the **Cambridge Philosophical Society**, Cambridge, UK
- 2017: **Committee Member** and **Master Thesis Reviewer** for candidate Nicola Garibaldi, University of Genova, IT
- 2016: **Committee Member** of the **SIAM-IMA Cambridge Student Chapter**, University of Cambridge, UK

ORGANISATION OF EVENTS

- 11/2020: Mathematics for Applications in Cultural Heritage - Annual Meeting (**MACH20**), Cambridge, UK (online)
- 07/2020: Cultural Heritage Imaging Science, mini-symposium, **SIAM IS20**, Toronto, CA (online)
- 11/2019: Mathematics for Applications in Cultural Heritage - Annual Meeting (**MACH19**), Cambridge, UK
- 07/2019: Mathematical Imaging Models for Cultural Heritage Conservation, mini-symposium, **ICIAM19**, Valencia, ES
- 05/2016: **SIAM-IMA** Cambridge Annual Conference, University of Cambridge, UK
- 04/2015: 5TH Joint **DTC Student Conference** CCA-MASDOC-OxPDE, University of Cambridge, UK
- 2015 (Lent term): Cambridge Analysts' Knowledge Exchange (**C.A.K.E.**) Seminar Series, University of Cambridge, UK
- 10/2014: **Autumn School** in Image Processing 2014. University of Verona, IT

INVITED SPEAKER AT INTERNATIONAL CONFERENCES

- 07/2020: **SIAM Imaging Science (SIAM IS20)**, Toronto, CA (online)
- 07/2019: **International Congress on Industrial and Applied Mathematics (ICIAM19)**, Valencia, ES
- 06/2018: **Image Processing for Art Investigation (IP4AI 2018)**, Ghent, BE
- 06/2018: **SIAM Imaging Science (SIAM IS18)**, Bologna, IT
- 12/2017: **Variational methods and effective algorithms for imaging and vision**, Cambridge, UK
- 09/2016: **First Joint Meeting Brazil-Italy in Mathematics**, Rio de Janeiro, BR
- 03/2016: **British Applied Mathematics Colloquium (BAMC 2016)**, Oxford, UK

INVITED RESEARCH VISITS

- 06-08/02/2020: Dr Cristina Maria Barrocas Dias, **Hercules Lab**, Evora, PT (part of the ARCHMAT EMJMD program)
- 22-28/09/2019: Prof Aurélie Bugeau, **LaBRI**, University of Bordeaux, FR
- 25/09-15/12/2017: VMV Programme, **Isaac Newton Institute**, University of Cambridge, UK
- 18-22/06/2013, 19-31/03/2017, 07-19/10/2017: Prof Simon Masnou, **University Lyon 1**, FR

STUDENT SUPERVISION AND TEACHING ACTIVITIES

- 2017: Supervisor for **Linear Analysis** (Part II, 12 students), University of Cambridge, UK
- 2015-2016-2017: Supervisor for **Optimization & Control** (Part II, 17 students), University of Cambridge, UK
- 2016: Co-supervisor in the **Summer Undergraduate Research Program**, University of Cambridge, UK
Project title: "Classification of Ancient Pottery by Machine Learning and Geometric Analysis". Student: V. Vankov
- 12/2010: **High school teacher** (temporary cover). Liceo Scientifico San Giuseppe, Verona, IT

COMMUNICATION ACTIVITIES

- 2019-today: webmaster of [Mathematics for Applications in Cultural Heritage](#) (MACH)
- 2019: Science on YouTube: "[Making stuff disappear using applied maths](#)" with **Prof S. Siltanen** and **Prof C.-B. Schönlieb**
- 2016: webmaster of [SIAM-IMA Cambridge Student Chapter](#)
- 2017: Member in Panel Discussion "Art, Architecture, AI", Emmanuel College, Cambridge, UK

ACADEMIC RELATED ACTIVITIES

- 2018: **Submission helper**, Computer-Aided Teaching of All Mathematics (CATAM) course, University of Cambridge, UK
- 2015: **Mark Checker** and **Script Sorter** for Prof Richard Weber, University of Cambridge, UK

IT AND CODING SKILLS

- **MATLAB, Python 3, C, Github, TeX, Microsoft Office;**
- Expertise as webmaster in HTML, CSS, MyPHP, Joomla, **Wordpress**; Expertise in Adobe Lightroom, Adobe Photoshop;
- Scientific computing in HPC (MPI, OpenACC, CUDA) and Python 3 (all trained at **CINECA**, Bologna, IT).

LANGUAGES

- **Italian** (Mother tongue), **English** (7.0 IELTS)

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- Publication list (updated December 2020) -

JOURNAL PUBLICATIONS (PEER-REVIEWED)

- S. Parisotto, S. Masnou, C.B. Schönlieb and J. Lellmann. **Higher-order Total Directional Variation: Imaging Application.** SIAM Journal of Imaging Science, Vol. 13, Pages 2063–2104, 2020, DOI: [10.1137/19M1239209](https://doi.org/10.1137/19M1239209)
Companion code <https://github.com/simoneparisotto/TDV-for-image-denoising>
- S. Parisotto, L. Calatroni, A. Bugeau, N. Papadakis and C.B. Schönlieb. **Variational Osmosis for Non-Linear Image Fusion.** IEEE Transaction on Image Processing, 2020, DOI: [10.1109/TIP.2020.2983537](https://doi.org/10.1109/TIP.2020.2983537)
Companion code: <https://github.com/simoneparisotto/Variational-Osmosis-for-Non-Linear-Image-Fusion>
- S. Parisotto, S. Masnou and C.B. Schönlieb. **Higher-order Total Directional Variation: Analysis.** SIAM Journal of Imaging Science, Vol. 13, Pages 474-496, 2020, DOI: [10.1137/19M1239210](https://doi.org/10.1137/19M1239210)
- S. Parisotto, L. Calatroni, M. Calari, C.B. Schönlieb and J. Weickert. **Anisotropic osmosis filtering for shadow removal in images.** Inverse Problems, Volume 35(5), IOP Publishing, 2019, DOI: [10.1088/1361-6420/ab08d2](https://doi.org/10.1088/1361-6420/ab08d2)
Companion code: <https://github.com/simoneparisotto/anisotropic-osmosis-filter>
- L. Calatroni, M. d’Autume, R. Hocking, S. Panayotova, S. Parisotto, P. Ricciardi and C.B. Schönlieb. **Unveiling the invisible - mathematical methods for restoring and interpreting illuminated manuscripts.** Heritage Science, Volume 6 (54), Springer, 2018, DOI: [10.1186/s40494-018-0216-z](https://doi.org/10.1186/s40494-018-0216-z)
Companion code: <https://github.com/simoneparisotto/Manuscripts-restoration>
- C. Daffara, S. Parisotto and D. Ambrosini. **Multipurpose, dual-mode imaging in the 3–5 μm range (MWIR) for artwork diagnostics: A systematic approach.** Optics and Lasers in Engineering, Volume 104, Pages 266-273, 2018, DOI: [10.1016/j.optlaseng.2017.10.006](https://doi.org/10.1016/j.optlaseng.2017.10.006)

CONFERENCE PROCEEDINGS (PEER-REVIEWED)

- N. Leone, S. Parisotto, K. Targonska-Hadzibabic, S. Bucklow, A. Launaro, S. Reynolds, C.-B. Schönlieb. **Art Speaks Maths, Maths Speaks Art.** Bridges 2020 Conference Proceedings, Pages 481-484, Tessellations Publishing, 2020.
- S. Parisotto, S. Masnou, C.B. Schönlieb. **Total directional variation for video denoising.** Lecture notes in Computer Science (LNCS) 11603, Pages 1-14. DOI: [10.1007/978-3-030-22368-7_41](https://doi.org/10.1007/978-3-030-22368-7_41) **Oral Presentation**
Supplementary material: www.simoneparisotto.com/TDV4videodenoising
- S. Parisotto, L. Calatroni and C. Daffara. **Mathematical osmosis imaging for multi-modal and multi-spectral applications in Cultural Heritage conservation.** In: Image Processing for Art Investigation, Ghent, 2018.
- S. Parisotto, L. Calatroni and C. Daffara. **Digital Cultural Heritage imaging via osmosis filtering.** ICISP 2018: Image and Signal Processing, 2018, DOI: [10.1007/978-3-319-94211-7_44](https://doi.org/10.1007/978-3-319-94211-7_44) **Best paper award**
- L. Calatroni, C. Estatico, N. Garibaldi and S. Parisotto. **Alternating direction implicit (ADI) schemes for a PDE-based image osmosis model.** Journal of Physics: Conference Series, 904(1):012014, 2017, DOI: [10.1088/1742-6596/904/1/012014](https://doi.org/10.1088/1742-6596/904/1/012014)
- C. Daffara, S. Parisotto and P.I. Mariotti. **Mid-infrared thermal imaging for an effective mapping of surface materials and sub-surface detachments in mural paintings: integration of thermography and thermal quasi-reflectography.** Optics for Arts, Architecture, and Archaeology V: Proc. of SPIE Vol. 9527, 95270I, 2015, DOI: [10.1117/12.2184836](https://doi.org/10.1117/12.2184836)

BOOKS & CHAPTERS

- S. Parisotto, P. Vitoria, C. Ballester, A. Bugeau, S. Reynolds and C.B. Schönlieb. **The Art of Inpainting: A monograph on Mathematical Methods for the Virtual Restoration of Illuminated Manuscripts.** (book, submitted and under review)
- C. Daffara, S. Parisotto and P.I. Mariotti. **Infrared Analysis and Thermal Quasi-Reflectography.** In: “Leonardo Da Vinci, The Sala delle Asse of the Sforza Castle, Diagnostic Testing and Restoration of the Monochrome”, Silvana Editoriale, 2017.

THESIS

- S. Parisotto. **Anisotropic variational models and PDEs for inverse imaging problems.** PhD Thesis, Univ. of Cambridge, UK, DOI: [10.17863/CAM.38240](https://doi.org/10.17863/CAM.38240)
- S. Parisotto. **Variational methods in Image Processing for Inpainting and Shadow Removal.** MSc Thesis, Univ. of Verona, IT
- S. Parisotto. **Nonequispaced Fast Fourier Transform and Applications.** BSc Thesis, University of Verona, IT

ARTICLES IN PREPARATION

- S. Parisotto A. Launaro, N. Leone and C.-B. Schönlieb. **Unsupervised clustering of Roman pottery profiles from their SSAE**

representation. ArXiv: 2006.03156

- M. Burger, Y. Korolev, S. Parisotto and C.B. Schönlieb. **Total Variation Regularisation with Spatially Variable Lipschitz Constraints**. ArXiv: 1912.02768.
Companion code: <https://github.com/simoneparisotto/TVpwL>

SOFTWARE (IN ADDITION TO THE COMPANION SOFTWARE OF THE PUBLISHED PAPERS)

- S. Parisotto, **INLUMINA (Inpainting of iLLUminated MINIatures App)**. Zenodo, DOI: [10.5281/zenodo.4320604](https://doi.org/10.5281/zenodo.4320604)
- S. Parisotto and C.B. Schönlieb, **MATLAB/Python Codes for the Image Inpainting Problem**. Zenodo, GitHub repository, MATLAB Central File Exchange, DOI: [10.5281/zenodo.4315173](https://doi.org/10.5281/zenodo.4315173)

DATASETS

- S. Parisotto, S. Panayotova, S. Reynolds and C.-B. Schönlieb, **INLUMINA (Inpainting of iLLUminated MINIatures App) Dataset**. Zenodo, DOI: [10.5281/zenodo.4320633](https://doi.org/10.5281/zenodo.4320633)
- S. Parisotto, A. Launaro, N. Leone and C.-B. Schönlieb, **ROCOPOT (Roman COMmonware POTtery) Dataset**. Zenodo, DOI: [10.5281/zenodo.4311296](https://doi.org/10.5281/zenodo.4311296)

POSTERS AT INTERNATIONAL CONFERENCES

- 2018 **Anisotropic image osmosis filtering for visual computing**. SIAM IS 18, Bologna, IT
- 2017 **ADI splitting schemes for image osmosis problems**. NCMIP, Cachan, FR

PRESENTATIONS AT INTERNATIONAL CONFERENCES

18.11.2020 **From Inpainting to Shape Matching: Mathematics for Cultural Heritage Challenges**. MACH20, Cambridge, UK (online)
14.07.2020 **Variational Osmosis for image fusion in Cultural Heritage**. SIAM IS20, Toronto, CA (online)
17.07.2019 **Anisotropic osmosis filter for shadow removal in images**. ICIAM 2019, Valencia, ES
01.07.2019 **Total Directional Variation for Video Denoising**. SSVM 2019, Hofgeismar, DE
03.06.2019 **Unveiling the invisible: a mathematical touch to challenges in CH**. Do Not Touch? 3D in Museums, Cambridge, UK
22.09.2018 **Mathematical osmosis imaging for multi-modal, multi-spectral applications in Cultural Heritage**. IP4AI, Ghent, BE
06.06.2018 **(Higher order) Total directional variation with imaging applications**. SIAM IS 18, Bologna, IT
06.06.2018 **Generalized Image Osmosis Filtering with shadow removal imaging applications**. SIAM IS 18, Bologna, IT
06.12.2017 **Common-ware Roman Pottery from excavation to digital features classification**. VMV - INI, Cambridge, UK
01.09.2016 **Anisotropic Surface Inpainting**. First Joint Meeting Brazil-Italy in Mathematics. Rio de Janeiro, BR
08.04.2016 **Anisotropic Surface Inpainting**. British Applied Mathematics Colloquium (BAMC), Oxford, UK

INVITED ACADEMIC SEMINARS

27.11.2020 **Mathematical Applications in Cultural Heritage**. OpDATECH Lab, Università degli Studi di Verona, IT (online)
23.10.2020 **Mathematical Challenges in Cultural Heritage**. Université Côte d'Azur, FR (online)
07.02.2020 **Unveiling the invisible: From thermal analysis on frescoes to virtual restoration of manuscripts**. Hercules Lab, Évora, PT
01.06.2018 **Generalized Image Osmosis Filtering with shadow removal imaging applications**. Università degli Studi di Verona, IT
01.03.2017 **Panel Discussion - Gesamtkunstwerk: ART, ARCHITECTURE & AI**. Emmanuel College, Cambridge, UK
16.12.2014 **Variational Methods in Image Processing**. Università degli Studi di Verona, IT
24.04.2013 **Parallel Calculus**. Università degli Studi di Verona, IT