

CLAUDIA DAFFARA – CV SCIENTIFIC ACTIVITY 23/09/2025

MAIN DATA

Titles

- Laurea in Fisica [Master Degree in Physics], Summa cum laude, Università degli Studi di Padova
(Theoretical physics – Cosmology)
- Dottorato di Ricerca in Fisica [PhD in Physics], Università degli Studi di Bologna
(Applied Physics – radiation transport modelling)

Academic Position

since 2/5/2019

Associate Professor - Università degli Studi di VERONA, Dipartimento di Informatica
SSD 02/B3 - FIS/07 - Applied Physics

from 1/11/2011 to 1/5/2019

Ricercatore universitario [Assistant Professor] - Università degli Studi di VERONA,
Dipartimento di Informatica
SSD 02/B3 - FIS/07 - Applied Physics

Previous Positions

Applied Physics:

- Researcher CNR-INO (Istituto Nazionale di Ottica), Firenze (Italy) – from 1/9/2008 to 31/10/2011
- Research fellow CNR-INO – from 1/2/2004 to 31/8/2008
- PHD Student Università di Bologna / ENEA – 1999-2002
- Research grant CNR-ICTIMA, Padova (Italy)/Consorzio PD Ricerche – from 1/2/1998 to 30/4/1999

BRIEF PROFILE

C. Daffara is Associate Professor in Applied Physics at the Dept. of Computer Science of the Univ. of Verona (Italy).

She leads the research of the laboratory “OpDATECH” (Optical Devices and Advanced Techniques for Environment & Cultural Heritage), supervising an interdisciplinary group.

She obtained a Degree in Theoretical Physics from Univ. of Padova (Italy) with a thesis in relativistic cosmology, and a Ph.D. in Physics at Univ. of Bologna (Italy) working in Monte Carlo modelling of radiation transport.

Before University, she held research positions in Applied Physics, working for 10 years in applications to Cultural Heritage within several National and EU projects (2 in FP4, 1 in FP6, 1 in FP7 programs): Researcher (2008-2011) and Postdoctoral Researcher (2004-2008) at INO-CNR National Institute of Optics; Doctoral Researcher (1999-2003) at ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development; Contract Researcher (1998-1999) at ICTIMA-CNR Institute of Chemistry and Inorganic Technologies and Advanced Materials.

Since 2011, she teaches courses of General Physics at Univ. of Verona, where she is being supervisor of thesis, research grants, and PHD students.

She has been invited lecturer in main conferences on physics for Cultural Heritage.

She is author of more than 100 scientific publications on the Applied Physics field and inventor in a European patent.

She has been funded as Principal Investigator in 8 National projects and in the EU project Scan4Reco (2015-2018).

She has interdisciplinary collaborations with the humanistic and the medical departments.

She is member of the LAMEDAN Lab (heritage science) of the Dept. CuCi at Univ of Verona.

She is co-founder (with Riccardo Muradore, Dept. DIMI) of the group ThermalX (biomedical devices).

She organizes and participates in third mission activities on sustainability and scientific dissemination issues.

She is part of the RUS Commission (“Network of Universities for Sustainable Development”) of the Univ. of Verona, since its establishment in 2020, where she is the contact person for the “Climate Change” Working Group.

RESEARCH INTERESTS

Primary field of research is optics applied to cultural heritage and environment with three main research lines: infrared methods, spectral imaging, laser surface metrology.

Aim of the research is the development of advanced techniques for nondestructive analysis of surface and materials. Activities include the modelling and the implementation of optical devices based on coherent/incoherent methods, i.e.: scanning methods, multispectral imaging, infrared and thermal techniques, laser profilometry, speckle methods.

She has pioneered (2012) the new technique “Thermal Quasi-Refectography” recognized by major scientific associations and currently applied to artwork diagnostics.

In the field of medical applications, she has patented (2019) with the group ThermalX the “thermal endoscope for surgical applications”, which has been rewarded (2022) with a funding by the National Technology Transfer Hub for Robotics.

Further research interests are optics simulation and experiments for quantum computing and modern physics teaching.

SCIENTIFIC RESEARCH TITLES

1) PARTECIPATION TO RESEARCH PROJECTS (COMPETITIVE)

- AS SCIENTIFIC RESPONSIBLE

- PRIN (Bando 2022 PNRR), 2023-2025: Artificial Intelligence and Physics for Art Diagnostics (AIPAD): the killer application of the historical manuscripts and palimpsests – MESI 24 (RESP. NAZIONALE)
- PRIN (Bando 2022), 2023-2025: AMATI Vi(H)olin (Advanced Multimodal Analysis based on noninvasive fullfield physics Techniques for Innovative Violins Holistic inspection) – MESI 24
- National Technology Transfer Hub for Robotics 2022: Thermal Endoscope for surgery: proof of concept – M 12 (CO-RESPONSIBLE)
- National/Regional POR-FESR, 2020-2022: D3VERO (La stampa 3D nel settore del VETro artistico per Rilanciare ed innOvare la filiera produttiva) – M 24
- National/Regional POR-FESR, 2017-2020: TEMART (Tecnologie e materiali per la manifattura artistica, i Beni Culturali, l'arredo, il decoro architettonico e urbano e il design del futuro) – M 36 (CO-RESPONSIBLE)
- European Horizon 2020, 2015-2018: SCAN4RECO (Multimodal Scanning of Cultural Heritage Assets for their multilayered digitization and preventive conservation via spatiotemporal 4D Reconstruction and 3D Printing) – M 36
- National/Regional POR-FSE 2017: Thermal imaging for outodoor and indoor monitoring – M 12 (CO-RESPONSIBLE)
- National/Regional POR-FSE 2016: Development of advanced system based on laser micropprofilometry and optical microscopy for cleanings of artworks surface – M 12
- National/Regional POR-FSE 2014: Optical techniques for advanced diagnostics of artwork in situ – M 12

- AS RESEARCHER

- Fondazione Cariverona 2011: AdOpTeCH - Advanced Optical Techniques for Cultural Heritage
- European FP7 n. 228330, 2009-2014: CHARISMA (Cultural Heritage Advanced Research Infrastructures: Synergy for a Multidisciplinary Approach to Conservation/Restoration)
- European FP6 n. RII3-CT-2004-5061171, 2004-2009: EU-ARTECH (Access Research and Technology for the conservation of the European Cultural Heritage)
- National/Regional START (Scienze e tecnologie per il patrimonio artistico, architettonico ed archeologico toscano)
- National ENEA NUME (Nuclear physics applications in medical therapy and diagnostics), MURST 2001
- European FP4 n. ENV4-CT95-0092, 1996-1999: ARCHEO (Archeometric study to reconstruct the pollution of the past and their effects on Cultural Heritage)
- European FP4 n. ENV4-CT95-0088, 1996-1999: AER (Assessment of Environmental Risk Related to Unsound Use of Technologies and Mass Tourism)

2) OTHER PROJECTS AS SCIENTIFIC RESPONSIBLE

- 2018: Comune di Milano, "Monitoring the laser cleaning of Leonardo painting with scanning 3D and 2D techniques (Castello Sforzesco, Milano)
- 2017: Save Venice Inc., "Scannning the pictorial layers of Tintoretto"
- 2015-2016: Save Venice Inc., "The Sibyls by Veronese in the Church of San Sebastiano in Venice, Italy"
- 2014-2015: Comune di Milano, "Noninvasive diagnostics of fresco by Leonardo in Sala delle Asse (Castello Sforzesco, Milano) with Thermal Quasi-Reflectography"
- 2014: Italian Ministry for Cultural Heritage, "Multispectral IR scanning on Veronese"
- 2013-2014: Save Venice Inc., "NIR-MIR and UV imaging of Veronese frescoes (Chiesa di San Sebastiano)"
- 2011-2016 Research convention "UNIVR - Soprintendenza of Venice"

3) PARTECIPATION TO INTERNATIONAL CONFERENCES

- INVITED TALK AND INVITED LECTURES

- 2019 – *The physical data acquired in coherent and non-coherent optical techniques for cultural heritage* (30 min),
ICIAM 2019 International Congress on Industrial and Applied Mathematics, symposium: Mathematical Imaging Models for Cultural Heritage Conservation – VALENCIA, SP, 19 July 2019
- 2013 - *Thermal Quasi Reflectography: current research and applications* (45 min),
New techniques for the non-invasive investigation of the surface and subsurface structure of heritage objects (Charisma Event), Nicolaus Copernicus University – TORUN, PL, 25-26 June 2013
- 2011 - *Wide-band IR imaging in the NIR-MIR-FIR regions for in situ analysis of frescoes* (30 min),
Conference SPIE Optical Metrology – MUNICH, D, 26 May 2011
- 2010 - *Characterization of painting technique by multispectral IR reflectography* (45 min),
EMAS Regional Workshop on: "Electron Probe Microanalysis of Materials Today", Netherlands Institute for Cultural Heritage - AMSTERDAM, NL, 25-28 April 2010
- 2010 - *Dual band IR thermography for analysis of support structure and superficial layer in the mural painting 'Resurrezione' by Piero della Francesca* (30 min),
In situ technical imaging for art and archaeology: a symposium in conservation science, The British Museum, LONDON, UK, 15 July 2010
- 2008 - *Imaging analysis of artworks with 2D and 3D optical techniques: towards a new definition of the "cultural text"* (8 hours),
State University of Moscow MGChPA im. Stroganova - MOSCOW, Russia, 3-7 March 2008

- TALK

- 2025 – *Artificial intelligence and physics for art diagnostics: first results from "AIPAD" project*,
SPIE Optics for Arts, Architecture, and Archaeology X, Jun 23-25 2025, Munich, D
- 2025 – Speckle-based imaging techniques for the diagnostics of historical violins,
"Lasers in the Conservation of Artworks (LACONA) XIV", Sep 9-12 2025, Bucharest
- 2023 – *Optical surface metrology for heritage science: proof of concept and critical-constructive discussion*,
SPIE Optics for Arts, Architecture, and Archaeology IX, Jun 26-27 2023, Munich, D
- 2021 – *A simple method for artworks monitoring by simultaneous speckle interferometry (ESPI) and speckle photography*,
SPIE Optics for Arts, Architecture, and Archaeology VIII, Jun 21-25 2021, Virtual
- 2021 – *Thermal imaging in the 3-5 micron range for precise localization of defects: application on frescoes at the Sforza Castle*,
SPIE Optics for Arts, Architecture, and Archaeology VIII, Jun 21-25 2021, Virtual
- 2019 – *VIS-IR Imaging and spectrometry of artworks: a teaching plan on applied optics*,
GIREP 2019 International Conference - Teaching-learning contemporary physics, from research to practice, Jul 1-5, 2018, Budapest, H
- 2019 – (Poster Talk) *A formative intervention for building quantum mechanics concepts using Mach-Zehnder interferometry*,
GIREP 2019 International Conference - Teaching-learning contemporary physics, from research to practice, Jul 1-5 2018, Budapest, H
- 2019 – *Smartphone diagnostics for cultural heritage*,
SPIE Optics for Arts, Architecture, and Archaeology VII, Jun 24-26 2019, Munich, D
- 2018 - *3D Metrology based on micro-surface data in support of chemical and laser cleaning of a canvas painting by Tintoretto*,
LACONA XII. Lasers in the Conservation of Artworks, Sep 10-14 2018, Paris, F

- 2018 - *Infrared vision of artworks based on web cameras: a cross-disciplinary laboratory of optics*,
GIREP 2018 International Conference - International Research Group on Physics Teaching, Jul 9-13 2018, San Sebastian, E
- 2017 - *Conoscopic laser microprofilometry for 3D digital reconstruction of surfaces with sub-millimeter resolution*,
17th IEEE International Conference on Environment and Electrical Engineering and 2017 1st IEEE Industrial and Commercial Power Systems Europe, EEEIC / I and CPS Europe 2017, Jun 6-19 2017, Milan, I
- 2016 - *Surface micro-profilometry for the assessment of the effects of traditional and innovative cleaning treatments of silver*,
LACONA XI. Lasers in the Conservation of Artworks, 20-23 September 2016, Kraków, PL
- 2015 - (Poster Talk) *Impostazione termodinamica ai processi termici con ICT nella formazione iniziale degli insegnanti*,
54-esimo Congresso Nazionale AIF, 21-25 ott 2015, Trento, I
- 2013 - *Thermal Quasi-Reflectography (TQR): current research and potential applications*,
SPIE Optics for Arts, Architecture, and Archaeology IV, May 15-16 2013, Munich, D
- 2012 - (Poster Talk) *Direct, trans-irradiation and multispectral infrared imaging of a Titian canvas*,
3rd International Topical Meeting of Optical Sensing and Artificial Vision: OSAV'12 May 14-17 2012, Saint Petersburg, Russia
- 2012 - *Mid-infrared reflectography for the analysis of pictorial surface layers in artworks*,
3rd International Topical Meeting of Optical Sensing and Artificial Vision: OSAV'12, May 14-17 2012, Saint Petersburg, Russia
- 2011 - *Autofocus laser system for multi-NIR scanning imaging of painting surfaces*,
SPIE Conference O3A - Optics for Arts, Architecture, and Archaeology III, May 25-26 2011, Munich, D
- 2011 - *Optical techniques for the characterization of surface-subsurface defects in painted layers*,
SPIE Conference O3A - Optics for Arts, Architecture, and Archaeology III, May 25-26 2011, Munich, D
- 2011 - *Multi-band scanning imaging for in situ analysis of paintings in the VIS-NIR range Thermal imaging for the examination and conservation of contemporary mural paintings*,
ART'11 - 10th International Conference on non-destructive investigations and microanalysis for the diagnostics and conservation of cultural and environmental heritage, 13-15 Apr 2011, Firenze, I
- 2011 - (Poster Talk) *An integrated instrument for real-time profilometry and multispectral infrared reflectography for the analysis of deformations on paintings*,
LACONA IX Lasers in the Conservation of Artworks, Sep 7-10 2011, London, UK
- 2009 - *Highlights and outputs from EU-ARTECH. New instrumentation: Scanning Multispectral IR Reflectography SMIRR, an advanced tool for art diagnostics*
Cultural Heritage Advanced Research Infrastructures: Synergy for a Multidisciplinary Approach to Conservation/Restoration - CHARISMA Kick-off Congress, Palais du Louvre, 10-11 Dec 2009, Paris, F
- 2009 - *NIR confocal laser scanning microscope for the analysis of paintings*,
SPIE Optical Metrology - O3A: Optics for Arts, Architecture, and Archeology II, 14-18 Jun 2009, Monaco, D
- 2009 - *Imaging data integration for painting diagnostics*,
SPIE Optical Metrology - O3A: Optics for Arts, Architecture, and Archeology II, 14-18 Jun 2009, Monaco, D
- 2009 - *Multispectral IR Imaging*,
Access, Research and Technology for the conservation of the European Cultural Heritage - Eu-ARTECH Final Congress, Instituut Collectie Nederland, May 12-13 2009, Amsterdam, NL

- CONFERENCE ORGANIZATION

- Since 2019 – Scientific Commette of SPIE Conference Optical Metrology “Optics for Arts, Architecture, and Archaeology” – Munich (*biennal*)
- 2025 – Organization of Special Session “Non-destructive imaging and interferometric techniques for cultural heritage diagnostics and metrology” for 2025 IMEKO TC-26 International Conference on Metrology for Archaeology and Cultural Heritage (Metro Archaeo) – Bergamo

- 2024 – Organization of Special Session “Non-destructive imaging and interferometric techniques for cultural heritage diagnostics and metrology” for 2024 IEEE International Conference on Metrology for Archaeology and Cultural Heritage (Metro Archaeo) – Malta
- 2017 – Organization of Special Session “Advanced technology for Cultural Heritage” for 17th IEEE – Milano

4) AWARDS FOR THE SCIENTIFIC ACTIVITY

The research activity carried out in optics for Cultural Heritage is recognized by the international scientific society with mention of merit, invitations at conferences, best paper awards, and highlights from scientific association and media.

- **2020 Best Paper Award on Archaeological Computing:**
“Optical micro-profilometry for surface analysis and 3D printed replica of archeological artefacts”, International Conference on Metrology for Archaeology and Cultural Heritage, IMEKO TC-4 2020, Virtual
- **2018 Best Paper Award:**
“Digital Cultural Heritage Imaging via Osmosis Filtering”, International Conference on Image and Signal Processing, ICISP 2018, Cherbourg, France
- **2017 Best Paper Award:**
“Multispectral RTI analysis of heterogeneous artworks”, EUROGRAPHICS Workshop on Graphics and Cultural Heritage, EG GCH 2017, Graz, Austria
- **2015 – SPIE Invited:**
“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”, Conf. SPIE - O3A Optics for Arts, Architecture, and Archaeology, Monaco
- **2012 – Mention of merit OSA (Optical Society of America):**
“for the high impact of the paper “Thermal quasi-reflectography: a new imaging tool in art conservation” published in Optics Express (2012)”.
- **2012 – Nature “Highlights”:**
Nature Photonics 6, 572 (2012) doi:10.1038/nphoton.2012.222 highlighting the paper “Thermal quasi-reflectography: a new imaging tool in art conservation”
- **2011 – SPIE Invited:**
“Wide-band IR imaging in the NIR-MIR-FIR regions for in situ analysis of frescoes”, Conf. SPIE - O3A Optics for Arts, Architecture, and Archaeology, Monaco
- **2007 – Mention of merit CNR:**
“[Attestato di lodevole servizio] for the research activity carried out at the CNR National Institute of Optics in the period 2003-2007”

5) OTHER POSITIONS

- Head of the Laboratory OpDATeCH (Optical Devices and Advanced Techniques for Cultural Heritage), Dip. di Informatica, Univ. of Verona
- Member RUS - GdL “Cambiamenti Climatici”, Univ. of Verona
- Institute association: CNR-ISASI
- Scientific Society member: SPIE, SIOF Società Italiana di Ottica e Fotonica; SIF Società Italiana di Fisica; OSA Optical Society America

6) SCIENTIFIC DIVULGATION & MEDIA

- C. Daffara is active in scientific divulgation of physics and applications to cultural heritage. She partecipated for Univ of Verona to the event **Notte dei Ricercatori 2016**. She partecipated to the televisive broadcasts **MEMEX GALILEO RAI Scuola 2018**, with an interview on laser holography, and to **I LUOGHI DELLA SCIENZA Rai Scuola 2017**, filmed within the laboratory OPDATECH. The RAI national broadcasting dedicated a cycle of 5 interview to the techniques for artwork analysis developed by the laboratory **MEMEX GALILEO RAI Scuola 2018**.

PUBLICATIONS – CLAUDIA DAFFARA

<http://www.di.univr.it/?ent=persona&id=8757&lang=en#ProdottiRicerca>

GOOGLE SCHOLAR

<https://scholar.google.it/citations?user=SqaX6RYAAAAJ&hl=it>