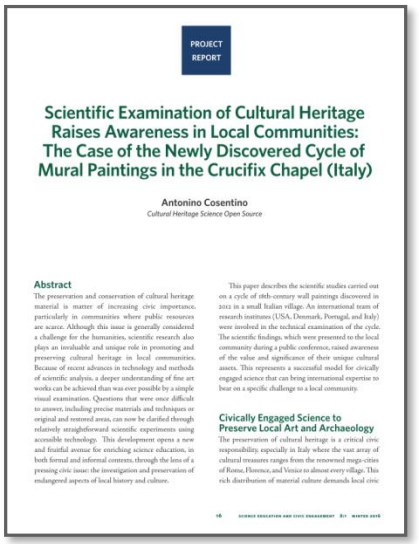
Onsite, non-invasive and non-destructive Technical Examination for Wall paintings

Virtual tours

"Scientific examination of Cultural Heritage raises awareness in local communities"


PROJECT REPORT

Scientific Examination of Cultural Heritage Raises Awareness in Local Communities: The Case of the Newly Discovered Cycle of Mural Paintings in the Crucifix Chapel (Italy)

Antonino Cosentino

Cultural Heritage Science Open Source

Abstract

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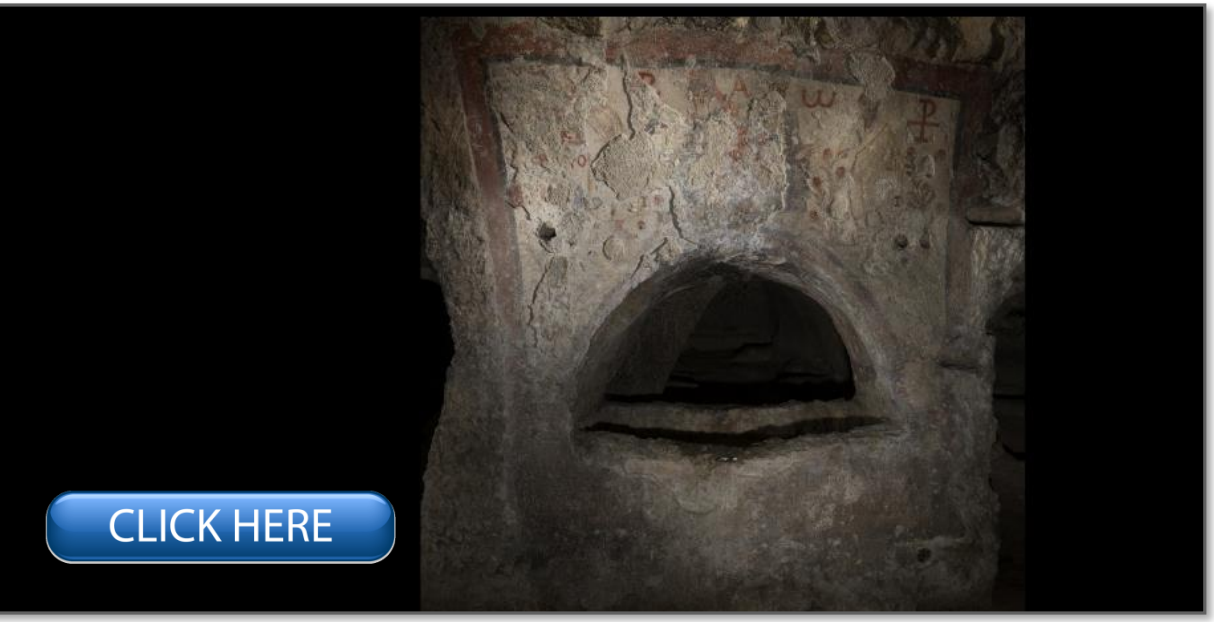

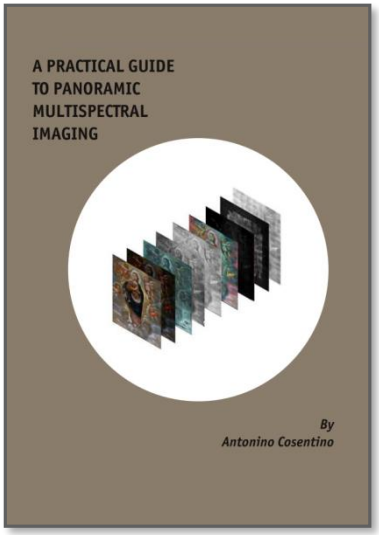

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High resolution documentation of large wall paintings

3D modeling

"Innovative Imaging Techniques for Examination and Documentation of mural paintings and historical graffiti in the catacombs of San Giovanni, Syracuse"

INTERNATIONAL JOURNAL OF CONSERVATION SCIENCE

ISSN: 2067-533X Volume 6, Issue 1, January-March 2015: 23-34 www.ijcs.uaic.ro

INNOVATIVE IMAGING TECHNIQUES FOR EXAMINATION AND DOCUMENTATION OF MURAL PAINTINGS AND HISTORICAL GRAFFITI IN THE CATACOMBS OF SAN GIOVANNI, SYRACUSE

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[2] Materials Science and Engineering, and the Center of Interdisciplinary Science for Art, Architecture, and Archaeology (CISA3), University of California, San Diego. 9500 Gilman Dr., La Jolla, CA, 92093-0418, USA.
[3] Pontificia Commissione di Archeologia Sacra, via August von Platen, 34, 96100, Siracusa, Italy

Abstract

This paper presents scientific and technical examination of two mural paintings and their historical graffiti located in the catacombs of San Giovanni in Syracuse, Sicily. Reflectance Transformation Imaging (RTI), Infrared Photography, 3D Photomodeling are presented as innovative imaging techniques used to capture significant details of the palimpsest, along with XRF non-invasive point analysis. These methods were performed on the Philadelphia palimpsest and on the arcosolium of the Madonna. RTI technique was tested as a valid tool to enhance the readability and documentation of the numerous historical graffiti covering some of the murals, which are of high interest to scholars since they are useful to reconstruct the cultural history of the site. The results of the infrared RTI were particularly powerful in their ability to document graffiti on deteriorated surfaces painted with earth pigments. 3D Photomodeling also proved to be a successful and handy tool to document the position of paintings and graffiti in context with one another. The examination of the two paintings was integrated with an analytical study of the palette realized with non-invasive XRF.

Keywords: Reflectance Transformation Imaging; Infrared photography; 3D Photomodeling; XRF; frescoes; catacombs; graffiti.

Introduction

This paper presents the technical and scientific examination of two mural paintings and some of their historical graffiti in the catacombs of San Giovanni (St. John the Evangelist) in Syracuse, Sicily. RTI (Reflectance Transformation Imaging) was tested and applied in order to enhance the readability and documentation of some of the historical graffiti covering one of the paintings. Scholars have a keen interest in the study of historical graffiti [1, 2] since they provide unique information on the uses and frequentations of the site over the centuries, and thus they become documentation used to reconstruct the cultural history of these catacombs. Some of the graffiti of the catacombs of San Giovanni are contemporary with the epoch of the paintings that bear them. They mainly comprise funerary or devotional texts and symbols that

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Photomodeling allows rapid and low-cost 3D modeling for the web

Reflectance Transformation Imaging (RTI)

"Innovative Imaging Techniques for Examination and Documentation of mural paintings and historical graffiti in the catacombs of San Giovanni, Syracuse"

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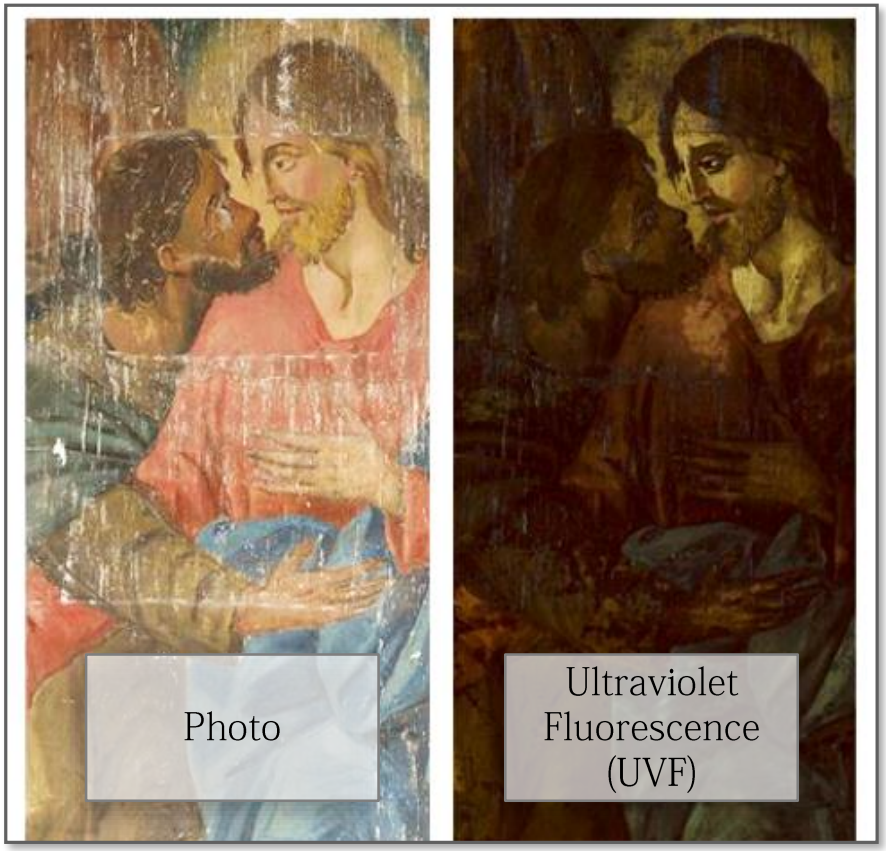
RTI (Reflectance Transformation Imaging) allows a high quality documentation of historical graffiti

Ultraviolet Fluorescence (UVF)



"Practical notes on ultraviolet technical photography for art examination"

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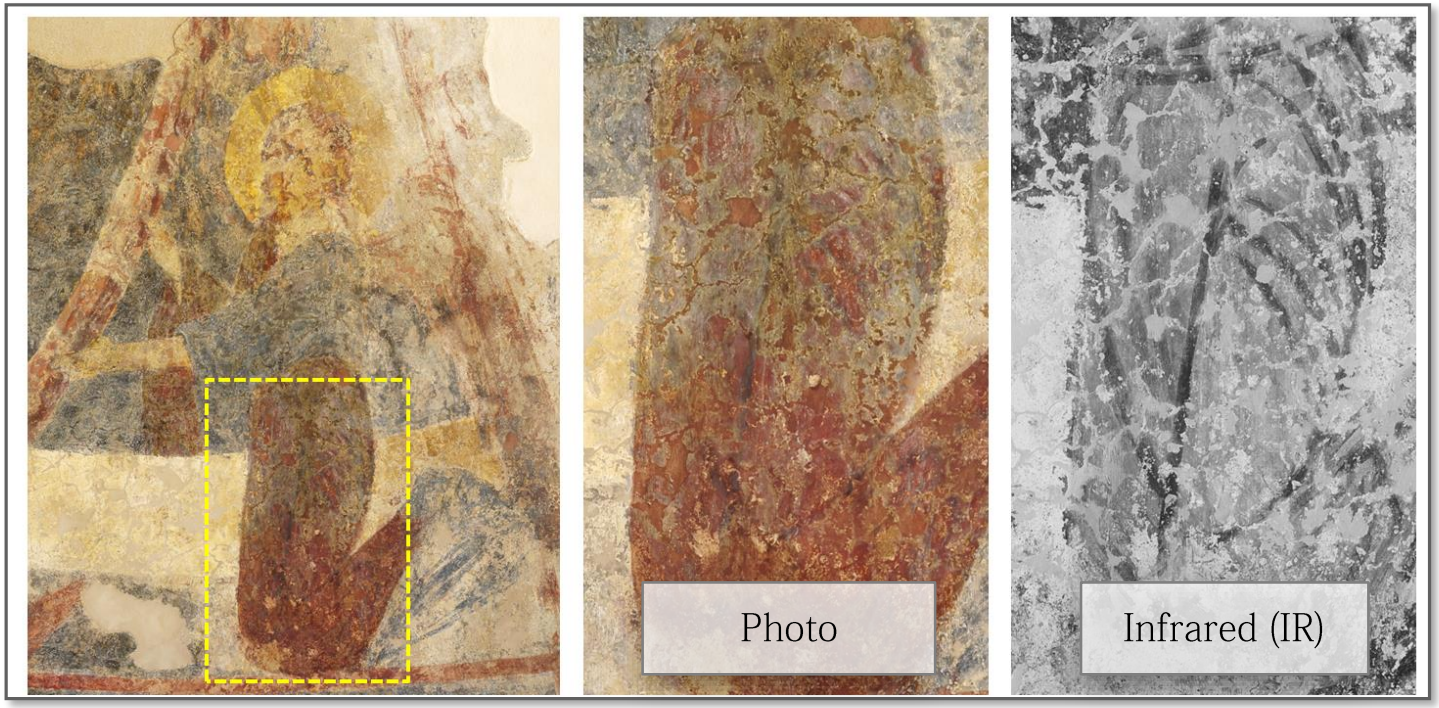
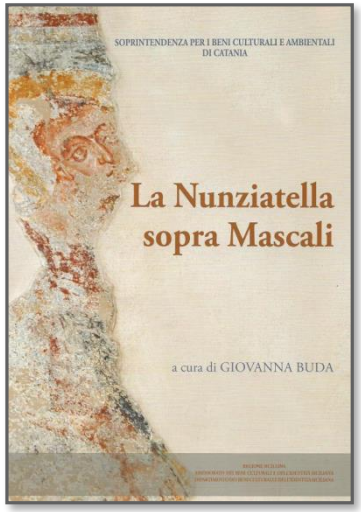
Ultraviolet photography documents inpaints and organic materials , consolidants and binders.

Infrared photography (IR)

"Indagine diagnostica multispettrale sugli affreschi"





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Infrared photography makes visible underdrawing and changes (*pentimenti)*

Infrared False Color (IRFC)

"Infrared Technical Photography for Art Examination"

INFRARED TECHNICAL PHOTOGRAPHY FOR ART EXAMINATION

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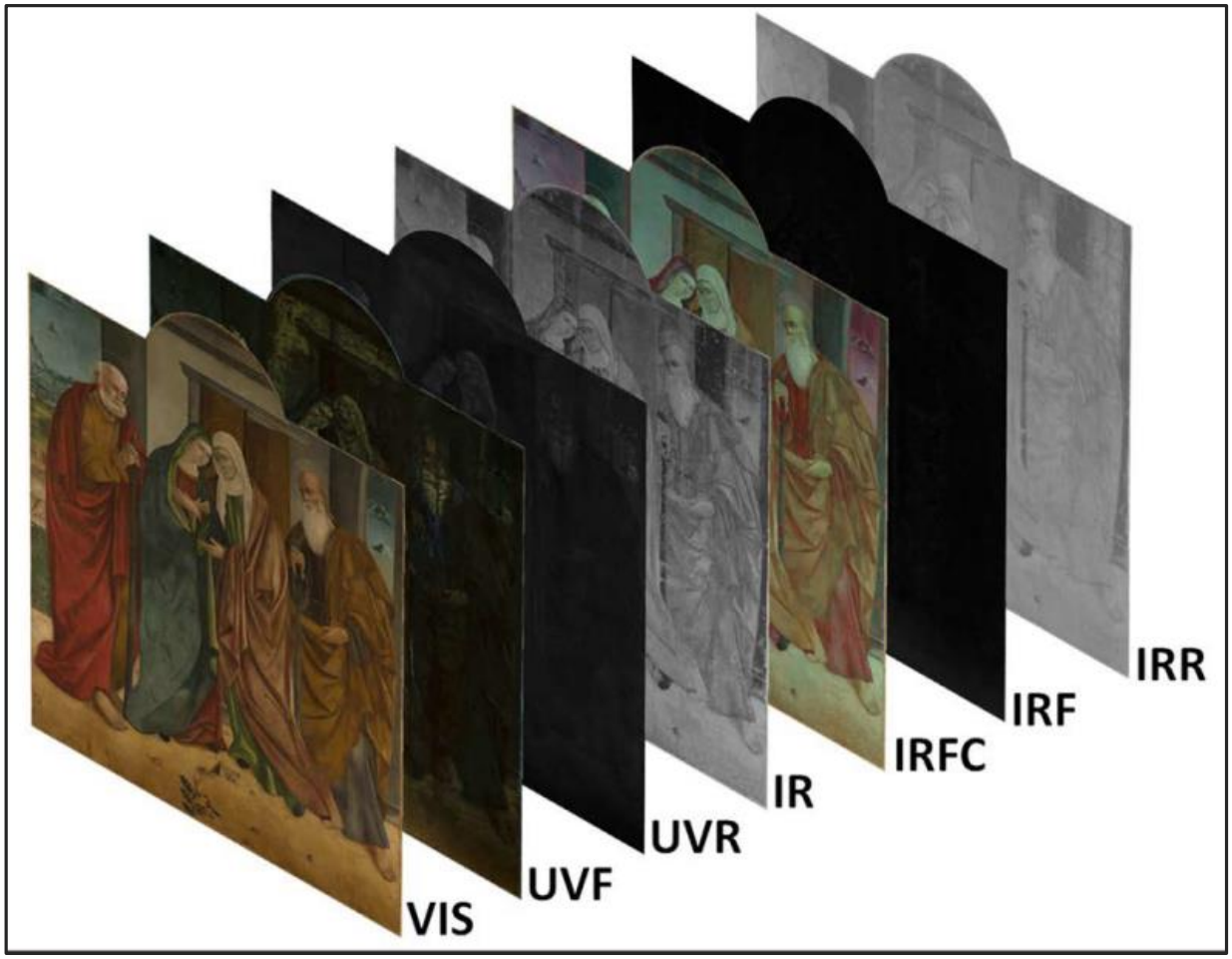
Infrared False Color photography locates inpaints with modern pigments

Technical Photography




Identification of pigments by multispectral imaging; a flowchart method

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A complete Technical Photography (TP) documentation allows a preliminary identification of pigments

CHSOS Technical Photography kit

We designed a Technical Photography kit specifically for art professionals and educational institutions.

It's the best compromise among Quality, Adaptability and Costs and it allows to realize a complete set of 7 technical photo documentation methods: VIS (visible photography), UVF (Ultraviolet Fluorescence), UVR (Reflected Ultraviolet), IR (Infrared), IRF (Infrared Fluorescence), IRFC (Infrared False Color), IRT (Infrared Transmitted)
This is a kit for art professionals: conservators, art appraisers, archaeologists, art historians.
Use it for fast and informative examination of easel paintings, wall paintings, manuscripts and historical documents.

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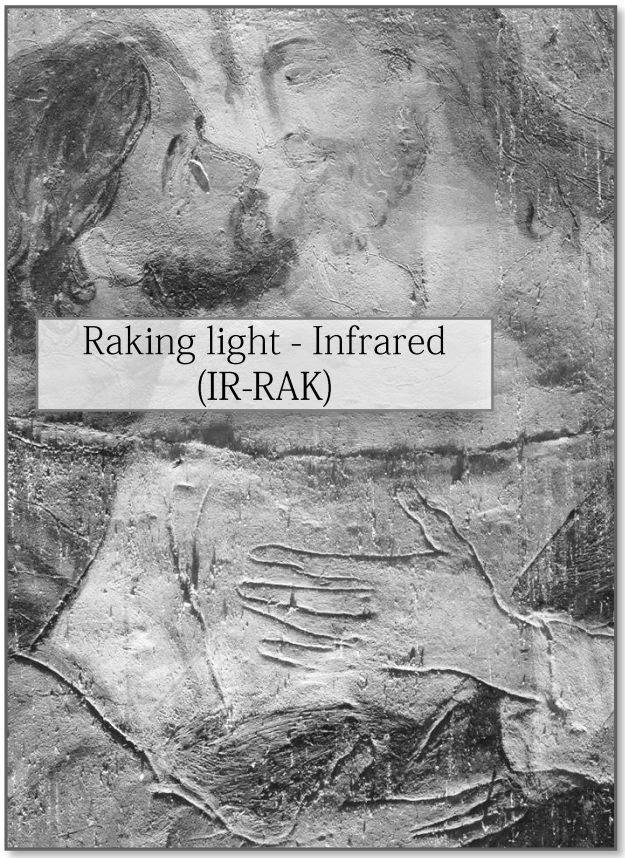
Raking light photography

"Technical Photography for mural paintings:"



Technical photography for mural paintings: the newly discovered frescoes in Aci Sant'Antonio (Sicily, Italy)

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Raking Light photography documents incisions which are indicative of the painting techniques.

Multispectral Imaging

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Pigments can be mapped with multispectral imaging to locate inpaints and differentiate among pigments with the same hue and tone but different chemical composition.

Antonello – Multispectral Imaging system for Art

Antonello is a simple MSI system composed of 18 bandpass filters and a full spectrum DSLR camera, covering the 400-925 nm spectral range.

Conservators and art historians need non-invasive methodologies to identify and map pigments on works of art and archaeology. These tools allow them to select appropriate conservation procedures, acquire information on the workshop practices, distinguish original sections from inpaints and to enhance visualization of faded pigments and inks.

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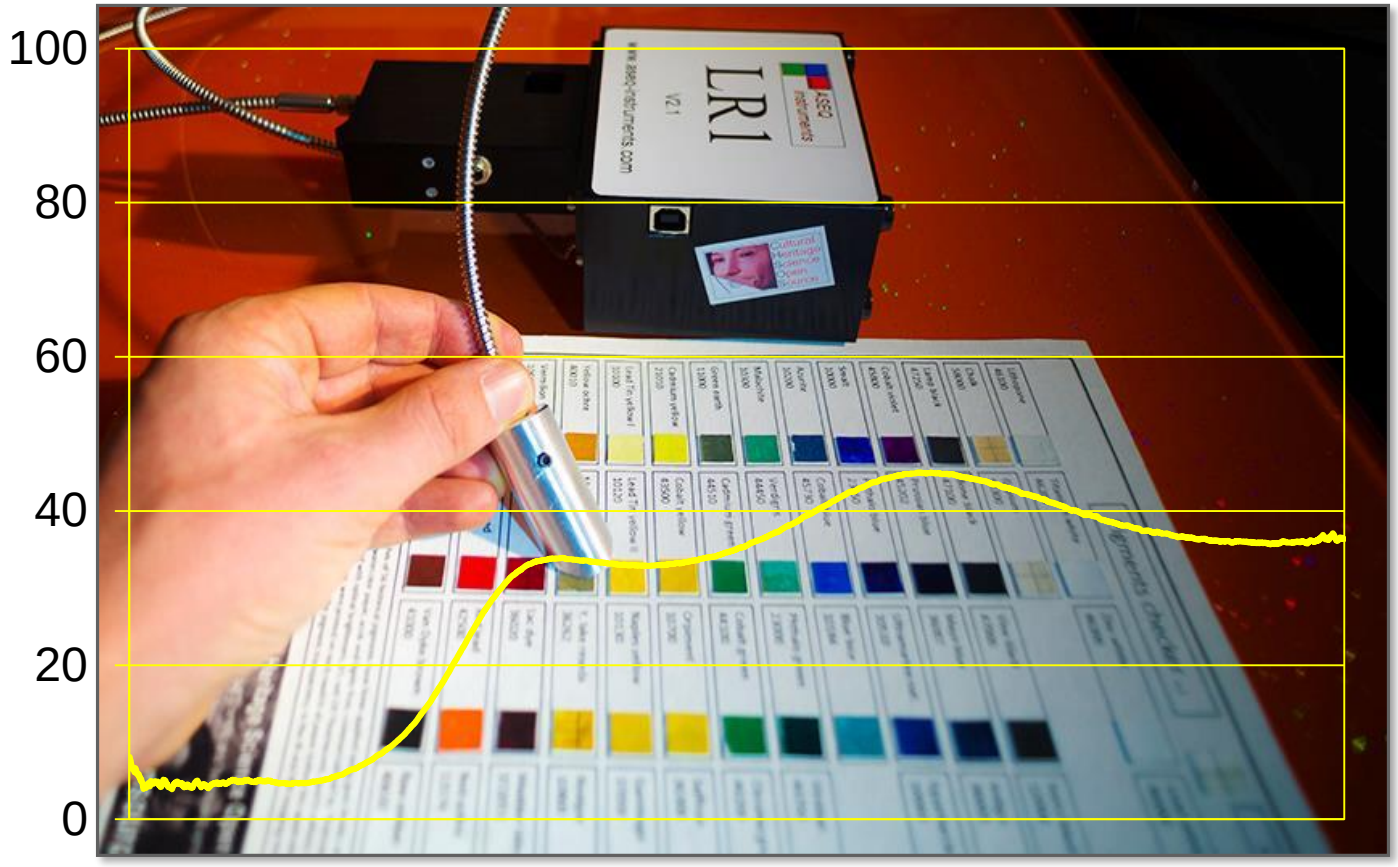
Reflectance Spectroscopy



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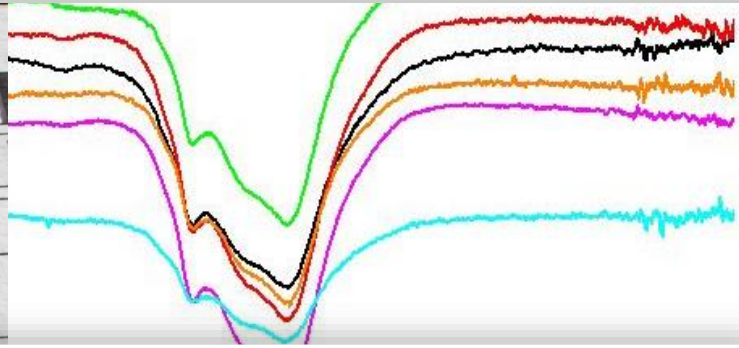
Pigments identification with onsite, non-invasive and non-destructive Reflectance Spectroscopy (RS).

Gorgias – Reflectance Spectrometer for Art



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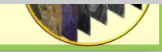
On-site

We provide these methods on-site with our traveling equipment

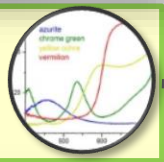
Off-site

We take tiny samples to analyze them in our Studio

- (IP)
- Multispectral Imaging (MSI)
- Infrared Reflectography (IRR)
- RTI, Reflectance Transformation Imaging
- Reflectance Spectroscopy (RS)
- 360 virtual tours 3D modeling
- Raman Spectroscopy (RS)
- Cross-section Optical microscopy (OM)








- UVF (Ultraviolet Fluorescence)
- IRFC (Infrared False Color)
- UVR (Reflected Ultraviolet)
- IRF (Infrared Fluorescence)
- IR (Infrared)
- IRT (Transmitted Infrared)
- Mapping Pigments
- Detect Underdrawing
- Detect incisions, graffiti, giornate
- Preliminary Pigments Identification
- Pigments Identification
- Visualize paint layers, preparation and ground

- Detect inpaints, map consolidants and binders
- Mapping Zinc white, Titanium white
- Mapping Cadmium pigments, Egyptian blue
- Detect underdrawing

CHSOS – art examination methods

On-site

on-site with traveling equipment

Off-site

tiny samples to analyze them

- Technical Photography (TP)
  - RAK (Raking light) → Brush strokes
  - UVF (Ultraviolet Fluorescence) → Detect inpaints
  - IRFC (Infrared False Color) → Detect inpaints
  - UVR (Reflected Ultraviolet) → Mapping Zinc white, Titanium white
  - IRF (Infrared Fluorescence) → Mapping Cadmium pigments, Egyptian blue
  - IR (Infrared) → Mapping Cadmium pigments, Egyptian blue
  - IRT (Transmitted Infrared) → Detect underdrawing
  - Mapping Pigments
- Multispectral Imaging (MSI) → Detect Underdrawing
- Infrared Reflectography (IRR) → Detect incisions, virtual tours, high resolution
- Reflectance Transformation I. (RTI) → Detect incisions, virtual tours, high resolution
- Reflectance Spectroscopy (RS) → Preliminary Pigments Identification
- Raman Spectroscopy (RS) → Pigments Identification
- Cross-section Optical microscopy (OM) → Visualize paint layers, preparation and ground

Any questions?

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