

# **Non-invasive study of 16th century Northern European chiaroscuro woodcuts**

Kilian Laclavetine

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Clotilde Boust

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Laurence Clivet

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Ariane de La Chapelle

*Département des Arts graphiques, Musée du Louvre, Paris, France*

Victoria Fernandez

*Département des Arts graphiques, Musée du Louvre, Paris, France*

Anne-Solenn Le Hô

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Eric Laval

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Rémi Mathis

*Département des Estampes et de la photographie, Bibliothèque nationale de France (BnF), Paris, France*

Michel Menu

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Eric Pagliano

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Xavier Salmon

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Vanessa Selbach

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

Caroline Vrand

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

## Séverine Lepape

*Centre de recherche et de restauration des musées de France (C2RMF), Paris, France*

This archaeometric study of color prints from chiaroscuro woodcuts is of particular interest for those artworks still unfamiliar with this type of approach [1-4]. The aim of this research is to analyze the ink and paper chemical composition, and to define the sequence of printed layers in order to understand how the artists and their workshop achieved visual effects.

The methodology, entirely non-invasive and non-destructive, consists in the complementary use of imaging and spectroscopic techniques. On one hand, imaging techniques provide microscopic and macroscopic observations of the color prints. Together with false color infrared photography (IRFC), they allow a first evaluation of the pigments and dyes used in the inks. The study of their sequence of application is completed with the observation of watermarks by transmitted light which provides information about the origin of the paper. On the other hand, X-ray fluorescence spectroscopy (XRF), Raman spectroscopy, X-ray diffraction (XRD) and fiber optics reflectance spectroscopy (FORS) in visible and infrared ranges allow the detection of presence of paper treatments and the characterization of pigments and in some cases dyes.

We shall see the great potentiality and ability of the imaging and spectroscopic methodology, totally non-invasive, and the results on the chiaroscuro woodcuts produced in Northern Europe between the 16th and 17th century.

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