

NOIR C'EST NOIR?

05.11.2016
23.04.2017

Ecole polytechnique
fédérale de Lausanne
ArtLab Building

Tue – Sun 11am–6pm
Thu 11am–8pm

The *Outrenoirs* of Pierre Soulages
An exhibition at the intersection of art and science

To avoid reducing these paintings to an optical phenomenon, I invented the word *Outrenoir* – beyond black, a light transmuted by black. Just as *Outre-Rhin* and *Outre-Manche* designate another country, so does *Outrenoir* designate another country, a different mental field beyond that of simple black.¹

Pierre Soulages

Pierre Soulages quotations sources

- i Pierre Soulages, "Le noir, la lumière, la peinture" (preface), in Annie Mollard-Desfour, *Le Dictionnaire des mots et expressions de couleur XX^e-XXI^e siècle. Le Noir*, Paris, CNRS, 2005, p. 14.
- ii Interview of Pierre Soulages by Patrick Vauday, "Light As Material", in "The Material, Seen and Understood", *Rue Descartes*, N° 38, December 2002, p. 114.
- iii Interview of Pierre Soulages by Pierre Encrevé, "Les éclats du noir", *Beaux-Arts Magazine*, special edition, Paris, March 1996, in Eric de Chasse and Sylvie Ramond (ed.), *Soulages XX^e siècle* (exh. cat., Lyon, Musée des Beaux-Arts, October 12, 2012 – January 28, 2013, Rome, French Academy in Rome – Villa Médicis, January 18 – May 19, 2013) *op. cit.*, p. 159., Hazan, 2012, pp. 158-159.
- iv Pierre Soulages, "Le noir, la lumière, la peinture", *op. cit.*, p. 14.
- v Interview of Pierre Soulages by Pierre Encrevé, "Les éclats du noir".
- vi Michael Papiat, *Rencontre avec Pierre Soulages*, Paris, L'Echoppe, 2004, p. 14.
- vii Pierre Encrevé, "Le noir et l'*outrenoir*", in Suzanne Pagé (dir.), *Soulages, Noir Lumière* (exh. cat., Paris, Musée d'Art moderne de la Ville de Paris, April 11 – June 23, 1996), Paris, Paris-Musées, 1996, pp. 36-37.

NOIR, C'EST NOIR?

Organized jointly by the Fondation Gandur pour l'Art (FGA) and the Ecole polytechnique fédérale de Lausanne (EPFL), the exhibition *Noir, c'est noir? The Outrenoirs of Pierre Soulages* features a strong experimental character.

Soulages, a prominent figure of abstract painting, explores the properties of the color black. Since 1979, his work has aimed to capture not merely the value of black in itself but the light that it reveals and structures through the range of nuances and aspects of the pictorial matter. By venturing into *Outrenoir*, which is to say beyond the black, the artist seeks to treat light as a material. Yet his approach, based on his long-term practice of painting and his incessant questioning of its means, in many ways resembles the scientific understanding of the phenomenon of light.

The curatorial project here does not fall within the confines of a traditional exhibition in a conventional setting, but rather integrates the specificities of a new building on a university campus — creating the conditions for an innovative convergence of art and science. Together with the FGA, five EPFL laboratories alongside startups originating from the school put their research and technologies at the service of an original approach to the *Outrenoirs*. The scenographic and scientific features of this exhibition suggest new directions in the understanding, presentation and conservation of these works.

The pilot exhibition *Noir, c'est noir?* does not limit itself to the tautological allure of its title. It hunts down and overcomes misleading evidence by joining the insights of art with the enlightenment of science.

PIERRE SOULAGES

1919

Born December 24 in Rodez, France.

1925

Sensitive to the contrast of black at a very young age, he paints a snowy landscape using China ink to reveal the whiteness of the paper.

1934

He is deeply affected by reproductions of Claude Lorrain's and Rembrandt's ink washes: Lorrain shows him how the dilution of ink stains creates a special light, while Rembrandt impresses on him the force and rhythm of the brushstrokes that, through contrast, illuminated the white of the paper. He produces his first paintings.

1937

He learns about prehistoric and parietal art, which make extensive use of black pigments (vegetal and animal carbon black, pyrolusite). He considers from here on, black to be the originating color of painting.

1946

He breaks definitively with any attempt at representation and creates his first abstract paintings. He applies walnut stain on paper and buys brushes and paint spatulas used for painting buildings —diverting them from their original function and discovering a new freedom with technique.

1947

His paintings, dominated by somber colors, stand out from the French art scene. They are composed against a bright background, so much so that the light appears to be contained in the work itself.

1960 – 1970

He covers the surface of the canvas with wide solid areas of black that, by rubbing or scraping, reveal the presence of white, ochre, blue or red which have previously been applied underneath. He explores the ability of black to illuminate, through contrast, one or more colors that he highlights or suggests.

1979

A major turning-point takes place in his work: he paints canvases entirely in black in order to undo the opposition between form and content and to produce a play of light according to the surface conditions of the paint layer.

Thus begins the period he himself has described as "*noir lumière*" (black-as-light) and then, since 1990, "*outrenoir*." The resulting paintings are all experiments with light envisaged as a material.

1984 – 1987

He begins producing monumental polyptychs that introduce an additional discontinuity to the surface, that of the chassis. Their format requires the movement of the viewer which thereby offers a new point of view on the painting.

1987

He receives a public commission to create the stained glass windows of Sainte-Foy de Conques, an abbey that had left a lasting impression on him in his childhood. The work, extending over eight years, constitutes one of his most important fields of experimentation.

He creates a translucent, colorless glass that allows a diffuse transmission of light while respecting its changing spectrum.

2004

He abandons oil to work exclusively with acrylic. This technique has the advantage of drying quickly, making it possible to vary the thickness of the paint layer and to fade the black into a multitude of shades.

2014

Inauguration of the Musée Soulages in Rodez, an institution that houses the largest collection of the painter's works.

PIERRE SOULAGES' OUTRENOIRS UNDER THE LIGHT OF SCIENCE

In the pictorial experience of Pierre Soulages, there is a remarkable coherence related to a precocious fascination with the color black – its complex interactions with light, its nuances and its contrasts. Although made from a single black pigment, ivory black¹, the *Outrenoirs* created since 1979 by the painter differ radically from monochrome. Due to the infinite variations in ambient light, these “single pigment paintings of chromatic versatility”² cover a palette ranging from deep black to gray to white, even taking on hues of blue when displayed close to the sea. The artist coined the term *Outrenoir* precisely to designate this “black-as-light” which has been the subject of his relentless pursuit for close to forty years.

Such is the paradox of black in the work of Soulages. Despite the fact that since Isaac Newton’s color theory black has been considered a non-color that absorbs all light, the painter has instead seized it as the very means by which to pursue and reveal light. The artist’s works feature changing

surface conditions depending on the technique used – oil mixed with acrylic resin, or, since 2004, exclusively with acrylic – the thickness, and especially the pictorial layer of paint. He plays with juxtapositions of mat with gloss and solid with stripes that are produced by using tools specifically designed for the task. Indeed, the powerful structure of the paint layer contributes significantly to the capture of light, whose intensity alternately vibrates or subsides. The interaction between an *Outrenoir* and incident ambient light of infinite variations – natural or artificial light, surrounding reflections – models the space that extends between the painting and the viewer. The experience of the canvas thereby plays a part in a triangular relationship between painting, lighting and point of view that is constantly renewed according to the movement of the viewer. The specific apprehension of an *Outrenoir*, which is linked to the diffusion of a light field reflected by the canvas and depends on the angle from which it is viewed, includes the public as an active participant in creating the oeuvre. In this process of light being transformed in space, everything ultimately contributes to turning light into a material itself.

This novel presentation of Pierre Soulages’ *Outrenoirs* on the Ecole polytechnique fédérale de Lausanne (EPFL) campus nevertheless contains an element of the obvious. The painter has indeed repeatedly stressed not only his friendships with scien-

¹ This pigment, a deep and velvety black, is derived from the carbonisation of either ivory, bone or antlers without contact to air. At the end of the 19th century, as ivory black became increasingly rare and expensive, it was replaced by bone black. With today’s severe restriction of the ivory trade, production of the pigment has almost ceased entirely. See François Perego, *Dictionnaire des matériaux du peintre*, Paris, Belin, 2007, pp. 499-500.

² Pierre Encrevé, “Le noir et l’*outrenoir*”, in Suzanne Pagé (dir.), *Soulages, Noir Lumière* (exh. cat. , Paris, Musée d’Art moderne de la Ville de Paris, April 11 – June 23, 1996), Paris, Paris-Musées, 1996, p. 37.

**I consider light, the way I use it,
as a material."**

tists but also his passion for research and knowledge. He shares with researchers a taste for questioning and discovery as well as an unfailing and exacting determination. Moreover, his exploration of light aligns with the modern scientific definition of the phenomenon in space as a visible part of the electromagnetic field interacting with matter. Because the *Outrenoirs* illustrate optical phenomena – such as diffuse and specular reflection, as well as absorption and transmission – they could be considered as technical processing devices of the visible light spectrum.

The exhibition *Noir, c'est noir?* proves itself to be an experimental challenge. Young EPFL researchers and designers are taking advantage of sophisticated technologies to offer an original perspective into the *Outrenoirs* of Pierre Soulages. Among the scientists involved, Mark Pauly (an EPFL professor and a specialist in computer graphics) is the one whose approach bears the closest resemblance to that of Soulages. They both have the ambition to work in detail on surfaces as a means of taming light in a space. The artist streaks the paint surface using wide, coarse- or fine-haired paintbrushes, or blades, to process ambient light. The scientist likewise resorts to computer-controlled machines to engrave surfaces that, when lit, shape light to produce extremely precise images. Pauly's investigations focus on caustics, the complex and dancing curves of

light that are projected, for example, on a table behind a glass of water in the sun. The mechanism at work is the refraction of light, commonly illustrated by the image of the stick broken in water. Indeed, on the surface between two transparent media, the propagation direction of light rays changes. Soulages explores the reflection of light on his black paintings in contrasting surface conditions; Pauly focuses on light's refraction between air and a transparent medium.

Although their language, means and perspective differ, both agree on a common purpose: to explore how surface details at the limit of the visible interact with light. With this exhibition both invite us to a perceptual experience situated on the edge of art and science.

Eveline Notter
Artistic Curator
Fondation Gandur pour l'Art

Joël Chevrier
Scientific Co-Curator
Université Grenoble Alpes

THE COLORS OF BLACK

Talking about the black in the paintings of Pierre Soulages is an undertaking that the painter himself has described as impossible: "What I do is not in the domain of language. [...] I will take the most basic example of all: when you say black, you don't say whether it is large or small. [...] Moreover, when saying black, we do not say whether it is round or square, angular or soft. [...] That takes care of quantity and form. But then there is also density and texture. Black can be transparent or opaque [...], it can be shiny or mat, smooth or grainy – and that changes everything."¹

However, various theorists on painting – from Antiquity (Pliny the Elder and Vitruvius) to the 19th century (Jean François Léonor Mérimée), including the Renaissance (Cennino Cennini) – have incessantly

sought the recipes for the ideal black: bone, ivory, carbon or smoke black. This quest for the ultimate black, according to the properties of the pigment itself, continues to this day, given that the artist Anish Kapoor has just bought the patent for "absolute black," Vantablack. This black, produced by the company Surrey NanoSystems by lining up a dense array of carbon nanotubes on the microscopic level, does not bring us to the end of the journey but rather to its heart, where black circles back to the darkness it originated from.

Scientists also do not distinguish between a black body and darkness: a surface is called black if it is able to retain all the visible light it receives and to transform it into heat. In physics, a black surface is invisible, which is its principal source of interest.²

¹ Interviews of Pierre Soulages by Françoise Jaunin, *Pierre Soulages. Outrenoir*, Lausanne, La Bibliothèque des Arts, 2012, pp. 12-13.

² At room temperature, science's "black body" hardly emits anything but the slightest of infrared radiation, a phenomenon of particular relevance to the military.

Investigations into its contours and boundaries, therefore, raise the highest passions.

The diversity in the black surface claimed by Soulages comes from deviations from this ideal darkness. An *Outrenoir* reflects approximately 20% of the visible light it receives, and this brilliant characteristic is unexceptional since the pigment layer is sufficiently dense and smooth. "In reality, I do not paint so much with black as with the light reflected by the finish of the black surface."³

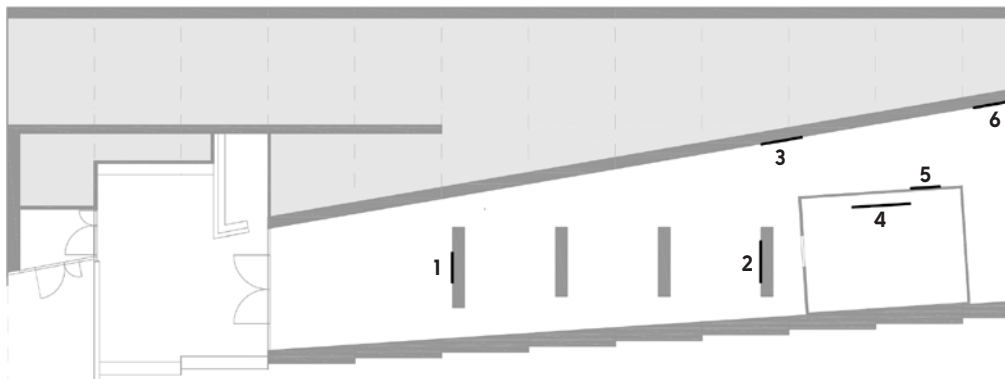
Libero Zuppiroli
Honorary Professor at EPFL, co-author
of *Traité des couleurs*⁴ and *Traité de la lumière*⁵

3 Interviews of Pierre Soulages by Françoise Jaunin, *op. cit.*, p. 90.

4 Libero Zuppiroli, Marie-Noëlle Bussac, *Traité des couleurs*, Lausanne, PPUR, 2001.

5 Libero Zuppiroli, Marie-Noëlle Bussac, *Traité de la lumière*, Lausanne, PPUR, 2009.

EXHIBITION FLOOR PLAN



1

Peinture 162 x 130 cm, 15 novembre 2011
Acrylic on canvas
162 x 130 cm
Private collection
Courtesy Galerie Alice Pauli, Lausanne

2

Peinture 232 x 181 cm, 5 avril 1999
Oil on canvas
Triptych (1 element of 71 x 181 cm, 1 element of 90 x 181 cm and 1 element of 71 x 181 cm, one above the other)
Private collection
Courtesy Galerie Alice Pauli, Lausanne

3

Peinture 244 x 181 cm, 25 avril 2011
Acrylic on canvas
Triptych (3 elements of 81 x 181 cm, one above the other)
Private collection
Courtesy Galerie Alice Pauli, Lausanne

4

Peinture 202 x 255 cm, 18 octobre 1984
Oil on canvas
202 x 255 cm
Fondation Gandur pour l'Art, Genève
Inv. FGA-BA-SOULA-0005

5

Peinture 81 x 130 cm, 24 janvier 1987
Oil on canvas
81 x 130 cm
Private collection
Courtesy Galerie Alice Pauli, Lausanne

10

6

Peinture 222 x 175 cm, 18 avril 1989
Oil on canvas
222 x 175 cm
Collection Galerie Alice Pauli, Lausanne

7

Peinture 324 x 362 cm, 1987
Oil on canvas
Polyptych J (4 elements of 81 x 362 cm, one above the other)
Musée cantonal des Beaux-Arts de Lausanne
Deposit from the Fondation Alice et Olivier Pauli, 1999
Inv. 1999-063

8

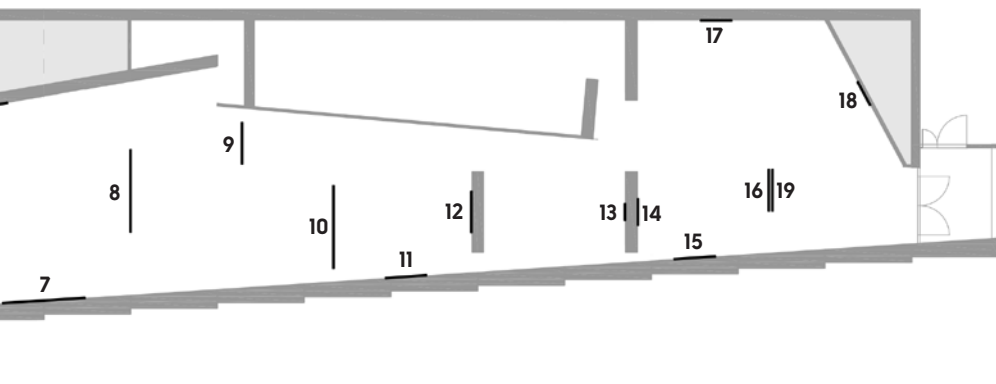
Peinture 324 x 362 cm, 1985
Oil on canvas
Polyptych A (4 elements of 81 x 362 cm, one above the other)
Property of the painter

9

Peinture 326 x 181 cm, 14 mars 2009
Acrylic on canvas
Polyptych (4 elements: 1 element of 71 x 181 cm, 1 element of 112 x 181 cm, 1 element of 81 x 181 cm and 1 element of 62 x 181 cm, one above the other)
Property of the painter

10

Peinture 324 x 362 cm, 1985
Oil on canvas
Polyptych E (4 elements of 81 x 362 cm, one above the other)
Property of the painter



11

Peinture 233 x 181 cm, 14 février 2000
Acrylic on canvas (with two glued strips)
Triptych (1 element of 71 x 181 cm and 2 elements of 81 x 181 cm, one above the other)
Private collection
Courtesy Galerie Alice Pauli, Lausanne

12

Peinture 181 x 244 cm, 2 mai 2011
Acrylic on canvas
Triptych (3 elements of 181 x 81 cm, juxtaposed)
Private collection
Courtesy Galerie Alice Pauli, Lausanne

13

Peinture 72,5 x 81 cm, 3 mai 1985
Oil on canvas
72,5 x 81 cm
Collection Galerie Alice Pauli, Lausanne

14

Peinture 117 x 165 cm, 13 mars 2008
Acrylic on canvas
117 x 165 cm
Collection Galerie Alice Pauli, Lausanne

15

Peinture 181 x 143 cm, 13 novembre 2006
Acrylic on canvas
Diptych (2 elements of 181 x 71,5 cm, juxtaposed)
Private collection
Courtesy Galerie Alice Pauli, Lausanne

16

Peinture 324 x 181 cm, 19 février 2005
Acrylic on canvas
Polyptych (4 elements: 2 elements of 81 x 181 cm, 1 element of 91 x 181 cm and 1 element of 71 x 181 cm, one above the other)
Property of the painter

17

Peinture 137 x 222 cm, 18 octobre 2011
Acrylic on canvas
137 x 222 cm
Private collection
Courtesy Galerie Alice Pauli, Lausanne

18

Peinture 117 x 165 cm, 6 janvier 1990
Oil on canvas
117 x 165 cm
Collection Galerie Alice Pauli, Lausanne

19

Peinture 324 x 181 cm, 17 novembre 2008
Acrylic on canvas
Polyptych (4 elements: 1 element of 52 x 181 cm, 1 element of 91 x 181 cm, 1 element of 128 x 181 cm and 1 element of 52 x 181 cm, one above the other)
Property of the painter

My paintings have nothing to do with monochrome. If one finds them to be only black, it is because one is not looking at them with the eyes but with what is in one's mind.¹¹

INTO THE BLACK: VIRTUAL REALITY AND MEDIATION

EPFL+ECAL Lab (Tommaso Colombo, Joëlle Aeschlimann, Marius Aeberli, Delphine Ribes, Nicolas Le Moigne, Nicolas Henchoz) and Yves Kalberer

As an introduction to *Noir, c'est noir?*, EPFL+ECAL Lab invites the public to engage with the content of the exhibition in an interactive and immersive experience. It uses now ever more present virtual reality headsets, whose technical performance is for the most part – with notable exceptions in gaming – still looking for appropriate content. The installation explores how interactive virtual immersion via 3D computer graphics can expand the understanding and appreciation of an exhibition. The design of the device is also central: virtual reality glasses mounted on a fixed pedestal recall the familiar stationary binoculars for tourists.

As part of a comprehensive study into the uses of virtual reality, *Into the Black* offers a unique and sensory way of engaging with curatorial content.

epfl-ecal-lab.ch

ON THE PERCEPTION OF BLACK

In the practice of restoring modern and contemporary art, retouching requires meticulous research into the pigment closest to the original pictorial surface. This approach begins with historical and technical investigations into the materials known to have been used by the artist. Once the original pigment seems to have been identified, what follows are adjustments of its granularity, value and saturation using fillers or co-pigment dopants that make the black, for example, more or less gray, reddish, greenish or blueish¹. The final product of the retouching strikes a delicate balance between pigment and binder, and will, in turn, respect the more or less glossy appearance of the original.

Thus, restoring a loss in a monochromatic black layer of paint, as on a Pierre Soulages painting, is not an easy task, given the hundred or so of blacks (pigments, dyes and materials) referenced in the materials dictionaries. The restorer must therefore rigorously collect black pigments and test them, especially as the color characteristics of a black also depend on its structure. The blacks that come from the carbonization of coconut shells or coal, for example, retain their porous nature, much as the black of coffee retains its smoothness and silky texture². In other words, the shape of the particles of each black has an effect on the absorption of light and thus on its perceived shade. "In practice, it is admitted that any surface that reflects less than .3% of incident visible light energy appears as black."³

The paintings of Soulages sometimes constitute light-traps, veritable sensory trompe l'oeil: the viewer believes he is distinguishing between different black pigments where there is only one, with variations depending solely on whether the pictorial material is applied in a layer that is more or less smooth, structured or saturated.

The creation of a library of thirty-two black pigments and their breakdown into smooth (mat and glossy) or structured painted surfaces makes it possible to experience the nuances offered by these pigments and to understand the specific light effects in the works of this artist. The vibrational alchemy of light in the *Outrenoir* then shows itself to be less obscure to the viewer.

Pierre-Antoine Héritier
Conservator-Restorer

1 As with ivory black with indigo added. See François Perego, *Dictionnaire des matériaux du peintre*, Paris, Belin, 2007, p. 497.

2 *Ibidem*.

3 Jean Petit, Jacques Roire, Henri Valot, *Encyclopédie de la peinture : formuler, fabriquer, appliquer*, Puteaux, Erec, 2005, tome III, p. 101. A color is only made visible from its reflection or absorption of light energy coming from a light source; white is 100% reflected light, black is 100% of absorbed energy.

THE "CHROMATIC VERSATILITY" OF BLACK

EPFL+ECAL Lab (Joëlle Aeschlimann, Tommaso Colombo, Delphine Ribes, Nicolas Henchoz)

Signal Processing Laboratory LTS5 (Jean-Philippe Thiran)

Gamaya (Luca Baldassarre, Manuel Cubero-Castan, Ellen Czaika, Vlad Lapadatescu, Dragos Constantin)

Egli Studio (Yann Mathys, Thibault Dussex)

Atelier Héritier, Geneva (Pierre-Antoine Héritier, conservator-restorer)

The library of thirty-two black pigments prepared by the conservator-restorer Pierre-Antoine Héritier offers a glimpse into the extraordinary diversity of the types of pigments that can enter into a painting's composition. Organic, mineral or synthetic in origin, each one has subtle variations in tone and shading. The perception of black changes according to their properties (including the refractive index, coverage, morphology), their particle size (blackness is even lesser when the pigment is more finely ground) and their smooth or structured appearance (determined by the binder and the mode of application).

The experience created by EPFL+ECAL Lab seeks to reveal the "chromatic versatility of the single pigment paintings"¹ of Pierre Soulages. This project, supported by the Signal Processing Laboratory LTS5 and the startup Gamaya, makes use of a hyperspectral camera – a piece of equipment typically used in aerial photography for agriculture, to examine the condition of fields and crops – that is able to simultaneously capture different colors comprising the light spectrum.

While the human eye perceives visible light as white, the hyperspectral camera separately captures the flow of visible light reflected by an *Outrenoir*, color by color. EPFL+ECAL Lab then translates the collected data into an interactive installation that exhibits a "hyperspectral map" of the painting in question. This visual representation corresponds to a constantly evolving digital surface that evokes not only the interaction between the light and the work, variations in energy depending on the color of light, but also the changes that occur as soon as the visitor moves, or with changes in ambient lighting.

In featuring an innovative perception of the different colors of light that animate an *Outrenoir*, this installation creates a striking and evocative contrast that enables the public to approach the work entirely without artifice.

epfl-ecal-lab.ch

lts5www.epfl.ch

gamaya.com

¹ Pierre Encrevé, "Le noir et l'*outrenoir*", in Suzanne Pagé (dir.), *Soulages, Noir Lumière* (exh. cat., Paris, Musée d'Art moderne de la Ville de Paris, April 11 – June 23, 1996, p. 37.

My instrument is not black but this secret light that comes from black – even more intense because it emanates from the greatest absence of light.^{IV}

The light coming from the painting towards the viewer creates a space in front of the canvas, and the viewer exists in this space. There is an immediacy of vision for each point of view; if one changes that viewpoint, the first vision disappears – erased – for the appearance of another. The painting is present in that instant when it is seen.^V

BRINGING AN OUTRENOIR TO LIGHT

Signal Processing Laboratory LTS2 (Maximilien Cuony, Fabien Willemin, Johan Paratte, Pierre Vandergheynst)
Fragment.in (Marc Dubois, Laura Perrenoud, Simon de Diesbach)

Constantly renewing our perception of an *Outrenoir* according to variations in ambient light – natural or artificial – and our positioning relative to the painting is the project that unites the Signal Processing Laboratory LTS2 with the Fragment.in design studio, coming out of the Lausanne University of Art and Design (ECAL).

The project team has created a specifically developed installation that allows for a novel perception of the paintings, turning the viewer into an actor in the creation of the artwork. Through a system that is able to detect our position and movements in front of the painting, it is possible to adjust the lighting of an *Outrenoir* and thus to experiment physically with our relationship to the artwork. The canvas is surrounded by an animated light installation that offers, under the same hanging conditions, several types of lighting (frontal illumination, oblique or directional) in a succession of programmed modes, both scripted and interactive.

The experience particularly shows differences in the treatment of the pictorial layer of the exhibited painting. The opposition between striations and flat areas engages light in a particular play between vibration and absorption. The monumental size of the painting encourages movement in a place where artificial lighting is no longer a static given but a variable that enriches the perception of the work.

lts2.epfl.ch
fragment.in

ULTRA-HIGH DEFINITION ACQUISITION AND INTERACTIVE VISUALIZATION OF AN *OUTRENOIR*

Matter, texture – the solids, reliefs, streaks – change the value of this unique black. The viewer moving in front of the painting witnesses the work being created with the light, as it changes and is constructed in front of his eyes.^{VI}

Audiovisual Communications Laboratory LCAV (Martin Vetterli)

ARTMYN (Loïc Baboulaz, Julien Lalande, Alexandre Catsicas, Matthieu Rudelle)

Photography, including in the digital age, has up to now never managed to accurately render the material reality of an *Outrenoir*. By establishing only a single point of view, it crushes the light reflected by the black pictorial surface.

Now however, the startup ARTMYN, which arose out of the Audiovisual Communications Laboratory LCAV, can reproduce artworks with unprecedented accuracy. Through a clean capture structure (a hemisphere studded with close to 60 light sources connected to a camera), ARTMYN not only photographs the work, but also generates a reconstruction of it in which perspective can be explored through an interactive visualization in 5D. In addition to the three known dimensions, it is indeed possible to digitally alter the emission angle of the light¹ that illuminates the painting.

The reproduction achieved – a kind of topography of the painting – offers the viewer, by using a touch-screen, the ability to visualize the surface of the painting from different angles and to explore the play of light in even the smallest details of the pictorial layer.

This technology thus makes it possible to exceed the traditional boundaries of photographic reproduction regarding acquisition accuracy, while also paving the way for new opportunities in mediation and conservation.

lcav.epfl.ch

artmyn.com

¹ The latitude and longitude of light being two additional dimensions.

CAUSTICS OR MASTERING LIGHT

The canvas functions in its black, textured materiality like a machine producing an infinite variation of its own luminous image to suit the paths of both the light and the gaze.^{VII}

**Computer Graphics and Geometry Laboratory LGG (Mark Pauly)
Rayform (Mark Pauly, Yuliy Schwartzburg, Romain Testuz)**

Caustics refer to the envelope of light rays undergoing a reflection or refraction on a surface or a curve, for instance light patterns that emerge when light passes through a glass of water or on the bottom of a pool lit by the sun. Growing out of Mark Pauly's Computer Graphics and Geometry Lab LGG, the startup Rayform is dedicated entirely to the application of computing technologies for controlling caustics. Indeed, a shared fascination with the behavior of light in interaction with surface conditions connects Pierre Soulages with these EPFL researchers.

LGG and Rayform have managed to control the random patterns produced by light by using a series of computer algorithms developed at EPFL. The startup calculates and produces complex shaped surfaces which deflect the light passing through them to project highly detailed images.

Mark Pauly and his colleagues propose an installation comprised of four caustic surfaces (high-precision sculpted plexiglass plates), illustrating the close relationship maintained between the *Outrenoirs* and light. These transparent "tableaus" reveal their content when a visitor shines a pocket flashlight through them.

- The first device reveals a digital scan of an *Outrenoir* carried out by the startup ARTMYN. The painting is represented here as if a part of its materiality had been extracted from it, leaving only a luminescent evocation of the artwork.
- The second is paradoxical – the illumination of a transparent square produces a black circle – questioning the duality of the presence/absence of light in our perception of the world.
- The third represents a sketch by the painter and man of science Leonardo da Vinci, who was one of the pioneers in the exploration of the relationship between light and matter. The drawing illustrates the reflection of light on a concave mirror (*Codex Arundel MS 263*, 1478-1518, British Library, London, folio 86 verso).
- The last device, auto-illuminated and rotating, indicates the importance of visual perspective in the perception of an *Outrenoir*.

NOIR, C'EST NOIR ? THE OUTRENOIRS OF PIERRE SOULAGES

**The exhibition *Noir, c'est noir ?*
The Outrenoirs of Pierre Soulages is
the result of a collaboration between
the Fondation Gandur pour l'Art (FGA)
and the Ecole polytechnique fédérale
de Lausanne (EPFL).**

Fondation Gandur pour l'Art

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President: Patrick Aebischer

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EXHIBITION

- Artistic Director: Yan Schubert (FGA)
- Scientific Director: Luc Meier (EPFL)
- Artistic Curator: Eveline Notter (FGA)
- Scientific Co-Curators: Joël Chevrier (Université Grenoble Alpes), Nicolas Henchoz (EPFL+ECAL Lab), Mark Pauly (EPFL), Pierre Vanderghyest (EPFL)

EPFL Laboratories

- EPFL+ECAL Lab (Nicolas Henchoz)
Tommaso Colombo, Joëlle Aeschlimann,
Delphine Ribes, Marius Aeberli, Nicolas
Le Moigne, Yves Kalberer
- Signal Processing Laboratory LTS5
(Jean-Philippe Thiran)
- Signal Processing Laboratory LTS2
(Pierre Vanderghyest)
Maximilien Cuony, Fabien Willemin,
Johan Paratte
- Audiovisual Communications Laboratory LCAV
(Martin Vetterli)
Loïc Baboulaz, Julien Lalande

- Computer Graphics and Geometry Laboratory
LGG (Mark Pauly)
Yuliy Schwartzburg, Romain Testuz
- EPFL Honorary Professor Libero Zuppiroli

Startups

- Gamaya: Luca Baldassarre,
Manuel Cubero-Castan, Ellen Czaika,
Vlad Lapadatescu, Dragos Constantin
- ARTMYN: Loïc Baboulaz, Julien Lalande,
Alexandre Catsicas, Matthieu Rudelle
- Rayform: Mark Pauly, Yuliy Schwartzburg,
Romain Testuz
- Egli Studio: Yann Mathys, Thibault Dussex
- Atelier Héritier Sàrl: Pierre-Antoine Héritier,
Maria-Fernanda Héritier
- Fragment.in: Marc Dubois, Laura Perrenoud,
Simon de Diesbach

FGA Coordination

- Exhibition Coordination: Sylvain Rochat
- Registrar: Jacques Besson
- Documentation: Adeline Lafontaine
- Administration: Lara Broillet
- Communication: Karen Saddler with Aurélie
Charlet and Philippe Eberhard (Cabinet Privé
de Conseils)
- Proofreading: Fabienne Fravalo
- Website: Gilles Humbel, Adeline Lafontaine
with Maxime Pégatoquet/microtxt

EPFL Coordination

- ArtLab Office: Anne-Gaëlle Lardeau, Magali
Goby, Vincent Jaccoud, Vincent Kappeler,
Isabelle Tuor
- Real Estate and Infrastructures Department:
Pierre Gerster, Barry Stanton, Denis Monney,
Gjavit Llabjani, and the collaborators of the
Poste de Commandes Centralisées

- Safety, Prevention and Health Domain: Eric Du Pasquier, France Hammel
- Press, Communication and Events: Madeleine von Holzen, Maureen Décosterd, Valérie Kaltenrieder, Sandy Evangelista, Lionel Pousaz
- Strategic Purchasing Office: David Pisacane
- Cultural and Artistic Affairs: Béatrix Boillat and collaborators
- Science Outreach Department: Farnaz Moser and collaborators
- Technology Transfer Office: Gabriel Clerc and collaborators
- Financial Service: Bertold Walther and collaborators
- Operational support: Nils Rinaldi
- Vice Presidency for Academic Affairs: Isabelle Cahour, Rossana Papaux
- ArtLab website: Virginie Martin Nunez

PRODUCTION

- Exhibition design: In Situ Conseils (Patricia Abel)
 - Artwork installation: Expositions Natural Le Coultre (Roland Marichy, Frédéric Bernard, Fabrice Duret, Bertrand Sallet), Dan McEnroe
 - Conservation and restoration: Atelier Héritier Sàrl (Pierre-Antoine Héritier, Anita Durand Médecin), Musée cantonal des Beaux-Arts, Lausanne (Françoise Delavy), Alexia Soldano
 - Caustics plates hanging: G.T.M. Technique Montage (Gérard Gaillard)
 - Walls: kub2 Ausstellungswände GmbH
 - Carpentry: Ebénisterie Savoretti SA
 - Fabrics: Borella & Fils Décoration
 - Paint: Renov-Immeuble
 - Ironwork: Serrurerie des z'Ateliers
-
- Graphic design: monokini graphistes libres (Nathalie Imhof, Ludivine Cornaglia)
 - Proofreading: Thierry Maurice
 - Translation: Paperboy (Michael David Mitchell)
 - Exhibition text printing: Atelier Richard
 - Leaflet printing: Reprographie EPFL
 - Poster printing: Uldry SA
 - Flyer printing: Imprimerie Verstraete

- Video production: Audiovisual Services EPFL (Christophe Barras, Marc Delachaux, Olivier Porchet), Sandy Evangelista
- Artwork transport: Expositions Natural Le Coultre (Gérard Morgante, Albano Fonseca, Bertrand Sallet, Ludivine Touati, Cinzia Garcia), Crown Fine Art (Alexandra Badaoui, Sofiane Merah, Medhi Soobhany, Mathieu Tamou, Aïssa Lekbir, Lucie Delhomme, Johanna Perier), Art Services (Jean-Michel and Philippe Badoux)
- Insurance: XL Catlin (Pascal Matthey), BCDT & Associés (Anne Joyet Petitpierre)

SPECIAL THANKS

- Pierre and Colette Soulages, Sète
 - Dan McEnroe, Paris
 - Alice Pauli, Lausanne
 - Heidi Joye, Galerie Alice Pauli, Lausanne
 - The lenders who have wished to remain anonymous.
 - The Musée cantonal des Beaux-Arts, Lausanne: Director Bernard Fibicher, Chief Curator Catherine Lepdor, Registrar Sébastien Dizerens, Nora Rupp (photography and reproduction rights)
 - Kremer Pigmente GmbH & Co. KG, Aichstetten
 - BASF France, Levallois-Perret
-
- EPFL ATME Workshop (Romain Baumer and Maxime Raton)
 - ISS (Stéphane Sèbe)
 - Securitas SA

NOIR, C'EST NOIR ? THE OUTRENOIRS OF PIERRE SOULAGES

05.11.2016 – 23.04.2017

EPFL

ArtLab Building

Tuesday – Sunday 11am–6pm

Thursday 11am–8pm

Additional information and related programs:
outrenoir.fg-art.org
artlab.epfl.ch

