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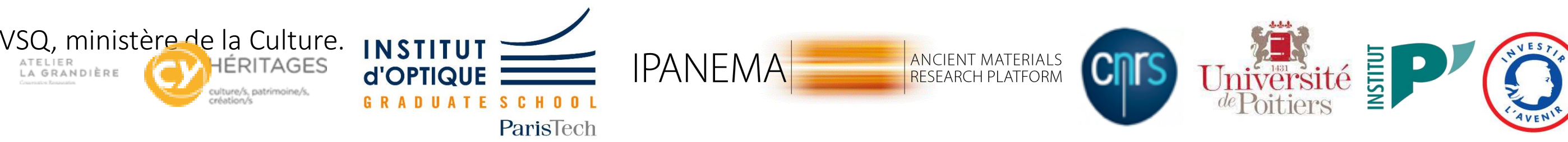
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Gloss mapping for the evaluation of surface conditions of paintings - case study on the paintings of Pierre Soulages -

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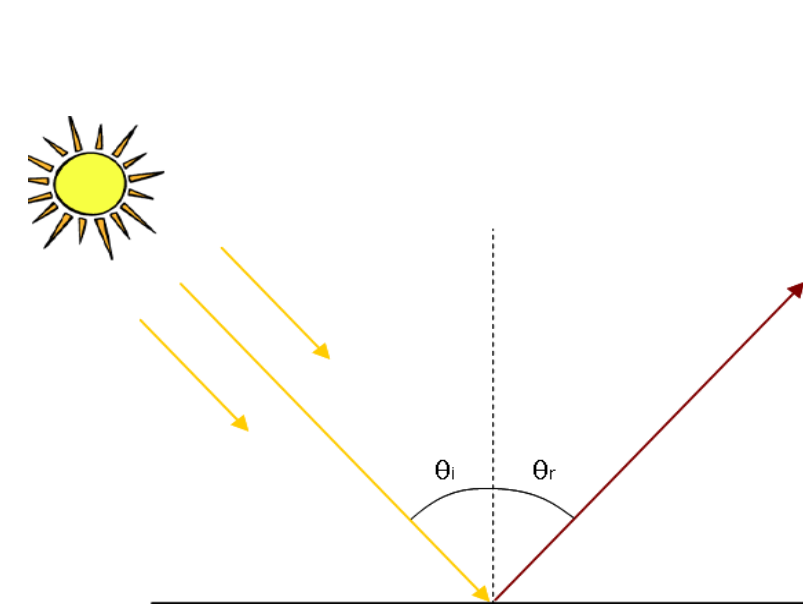


Pierre Soulages, *Peinture 162 x 724 cm, mars 1986. Polyptyque H*, Musée Fabre, Montpellier, during its installation on cables in a room where floor, ceiling and walls were black. The lighting was directed towards a white wall in front of the work (exhibition in 2014 in Musée Soulages, Rodez).

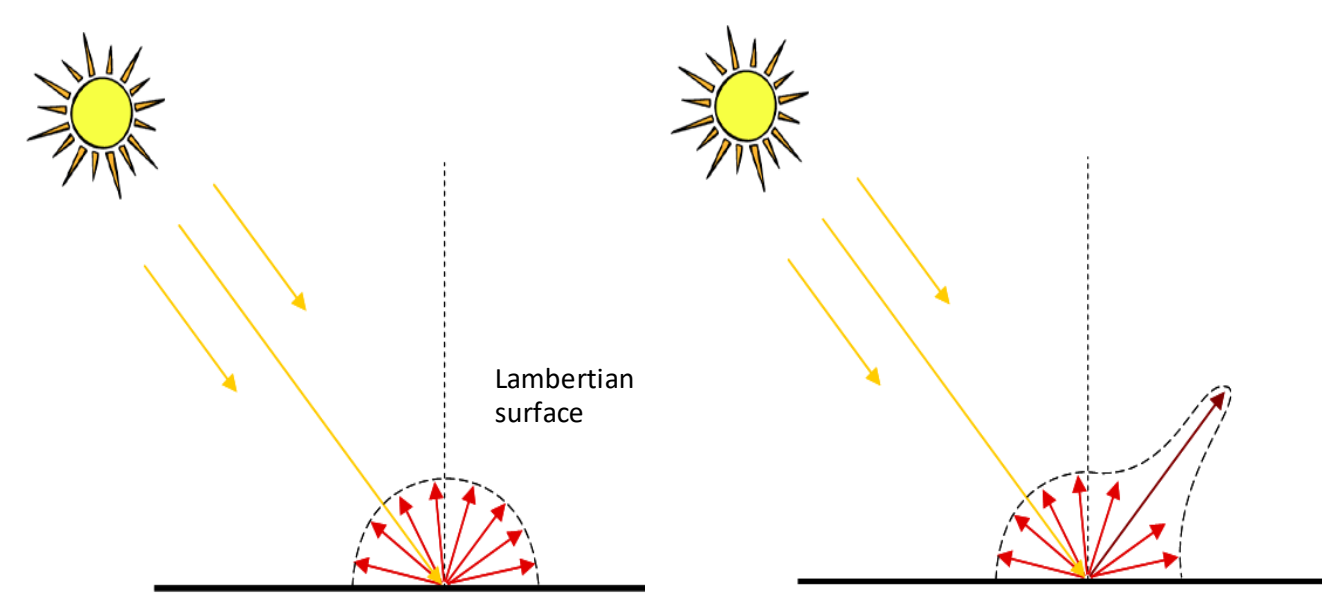
What is gloss?

Gloss is one of the main visual attributes associated with the visual perception of objects by humans (together with color, translucency, shape or texture).

It is correlated with the reflection of the surrounding light by the external surface of the object, and come from an analysis of the geometrical correspondence between the reflected light patterns and the surrounding light sources. The movement of the light patterns with respect to the position of the observer generally participate to the gloss assessment.



Specular reflection, or regular reflection, is the mirror-like reflection of waves, such as light, from a surface



Diffuse reflection is the reflection of light from a surface such that a ray incident on the surface is scattered at many angles rather than at just one angle as in the case of specular reflection

The gloss depends on the height of the specular peak (specular gloss), but also on its width (haze) and the contrast with the diffuse contribution (gloss contrast).

How much does the gloss matter in artwork?

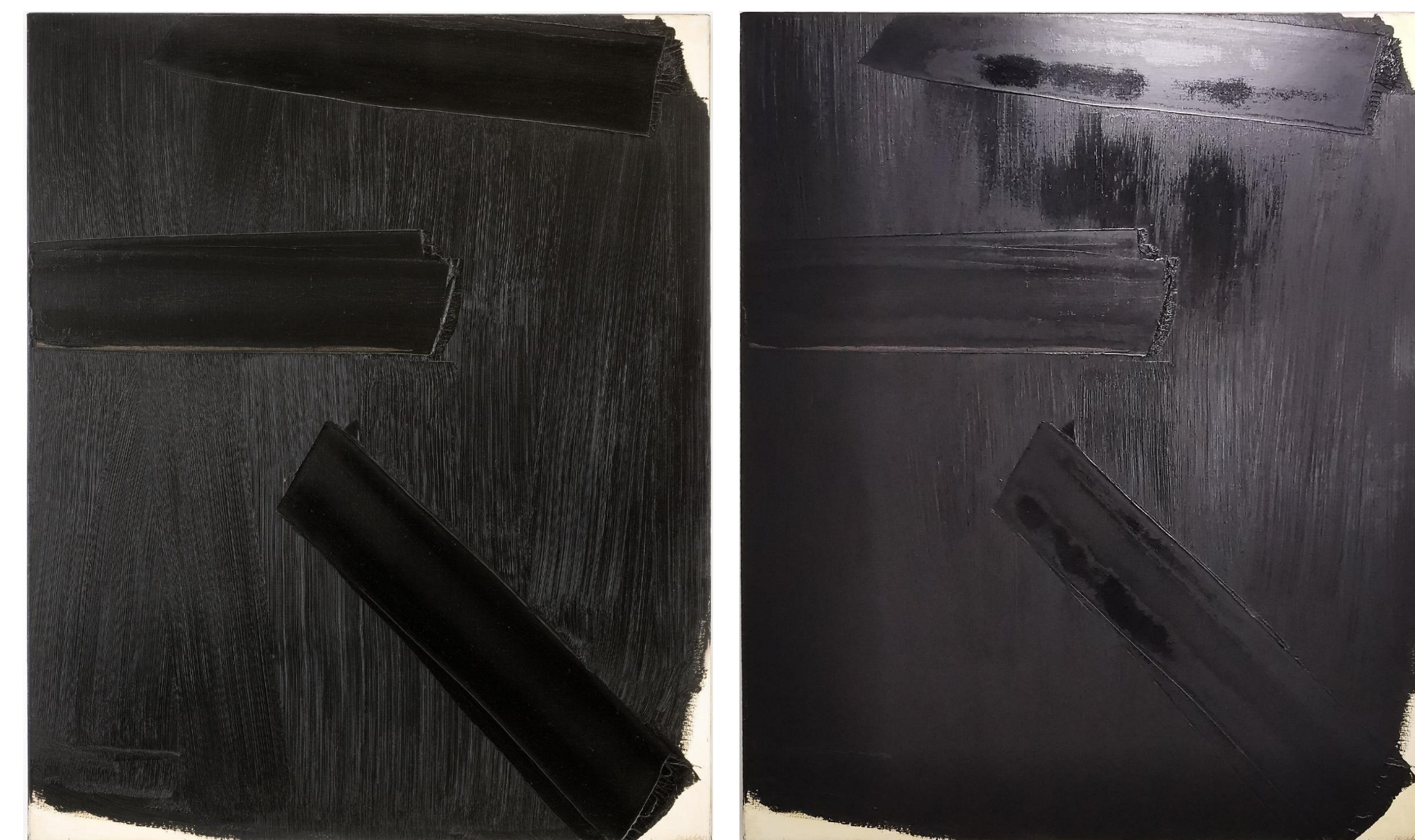
Since the Impressionists, varnishing is no longer a common practice. This is also true for abstract painters, who may even avoid it expressly in order to respect the "natural luminosity of the colors". The visual aspect of the paintings is therefore strongly impacted, as well as their conservation. This "natural" brightness poses a real challenge to the restorer: to preserve the brightness intended by the artist.

Pierre Soulages (born in 1919) is a prolific painter, with an extended career. His paintings have changed over the decades, but he has always worked his colors to remain the trace of the tools, without varnish, with an important place given to a final opaque black impasto. In 1979, he began his single-pigment paintings, which played with reflected light through variations in their black surfaces. Since 2004, he abandoned oil paint for an acrylic medium, which allowed him to further enhance the contrasts between gloss and matte of the "same" black color.

Here, **reflection of light is an expression of the artist's intent**. Changes of the painting properties over time can be used to probe early stages of degradation.

Based on an interdisciplinary approach, the PhD "NOIRœS"* proposes to re-evaluate conservation processes and brings together physicists and optics engineers to develop new tools taking into account the reflections of the works, among others.

*Nouveaux Outils Interdisciplinaires pour la Restauration des œuvres de Soulages.
PhD presented by Pauline de La Grandière, directed by Thierry Sarmant, co-supervised by Mathieu Thoury and Lionel Simonot. The Ph.D is supported by the Ecole Universitaire de recherche PSGS HCH Humanities, Creation, Heritage, Investissement d'Avenir ANR-17-EURE-0021, Cy-Paris Université



Soulages, *Peinture, 162 x 114 cm, 27 février 1979* (Musée Fabre) ©Jaulmes & Hérou-de La Grandière
The same painting under different points of view (the right image was taken to highlight gloss defects)

Soulages : the unvarnished truth of his black colors

To measure the surface aspect of a work (matte or glossy), despite its variations in texture (striations, tool marks, etc.), without touching the fragile surface of the work of art, no technique was available. In our case of the study of the evolution of a degradation in progress, this measurement appeared essential, so the construction of a device was proposed to students from Institut d'Optique.



Students from Institut d'Optique working *in situ* for the development of a gloss-imager in Saint Etienne



Pierre Soulages, *Peinture 130 x 162 cm, 18 avril 1959*
Musée d'art moderne et contemporain de Saint-Etienne Métropole



This gloss-mapping offers future possibilities for tracking gloss variations in paintings over time thanks to the objective information recorded at different dates, and thus put forward the study of gloss in the restoration of works of art.

Limitations: the size of the recorded zones is still small (25 cm²) and the handling of the system can be improved.

Benefits: This non contact device offers the ability to quantify the gloss in a zone. Then, the comparison between zones, between works and over time is possible. In the future, a best knowledge of the "intentional gloss" of a work opens great perspectives for a better knowledge of the works and for their conservation.

Aknowledgements

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We warmly thank the museums that welcomed us for the *in situ* measurements : the Musée d'art moderne de Paris, the Musée d'art moderne et contemporain de Saint-Etienne Métropole , the Musée Fabre of Montpellier and Les Abattoirs in Toulouse.

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