# INFRARED

Philippe Rahm
Portraits of 21st century

**Exhibition open from 11 February to 29 August 2021**

**Press release**

Downloadable at www.cameramuseum.ch

Pezo von Ellrichshausen, 2020. Picture Philippe Rahm

The infrared image is one of the visual signatures of our time. It is disturbing, strange, hyper-technological. It can detect cases of fever in a pandemic or see if a building is well insulated. It is as much a surveillance tool as it is a diagnostic tool. Its colours are too bright and have nothing real. Its strident reds, blues or yellows, however, reveal a reality that escapes the human eye.

Architect Philippe Rahm uses a thermal camera in his practice, concerned about sustainable development. He also uses the camera to take portraits of relatives, colleagues, artists, personalities and anonymous people. He also captures urban or natural scenes. The utilitarian image is diverted towards a creative, aesthetic, resolutely empathetic goal. The heat waves at the source of the infrared technique become, for the occasion, warmful.

Philippe Rahm's camera superimposes a thermographic image on a real image. The first is dependent on the infrared radiation emitted by the bodies and objects photographed. It shows temperature gradients embodied by symbolic colours: the coldest is translated into dark blue, the warmest into red, then white. Originally, the thermal image is monochrome. However, the human eye is designed in such a way that it distinguishes differences in intensity better with colours than with greys.

The resulting image remains understandable thanks to the real photo taken by the camera, in parallel with the thermography. This visible image gives recognisable contours to faces, objects and architecture. It identifies silhouettes, highlights accessories such as glasses or masks, and preserves eyes and physical features. A tension is established between the traditional photo and the infrared image, between the visible and the invisible, presence and absence, the language of emotions and the computational capacities of digital imaging.

**PHILIPPE RAHM**

A Lausanne architect trained at the EPFL, Philippe Rahm (1967) holds a doctorate in architecture from the University of Paris-Saclay. His agency Philippe Rahm architectes has been established since 2008 in Paris with urban planner Irene D'Agostino. His work, internationally recognised, is focused on sustainable development. His practice extends the field of architecture to physiology and meteorology.

Philippe Rahm designed with Catherine Mosbach & Ricky Liu the Taichung Central Park in Taiwan, a 70-hectare green space inaugurated in December 2020. In 2017, he won the competition with Nicolas Dorval-Bory for the design of the Agora of the Maison de Radio-France in Paris. In 2019, he won the competition for the urban redevelopment of the Farini district (62 hectares) in Milan with OMA (Rem Koolhaas) and Laboratorio Permanente.

Philippe Rahm has taught at Princeton, Harvard, Columbia University and Cornell. He is a lecturer at the Ecole nationale supérieure d'architecture de Versailles and associate professor at the HEAD-Geneva.

Philippe Rahm has taken part in numerous architecture and art biennials. He signed the scenography for the *Systematically Open ?* exhibition at the Luma Foundation during the Rencontres internationales de la photographie d'Arles in 2016.

He is the author of several books, including *Météorologie des sentiments* (ed. Les Petits Matins) published in 2015, republished in 2020. Philippe Rahm published *Le jardin météorologique* (ed. B2) and *Ecrits climatiques* (ed. B2) in 2020. *The Natural History of Architecture* exhibition at the Pavillon de l'Arsenal in Paris (24 October 2020 - 11 April 2021) is an adaptation of his doctoral thesis, defended in 2019. The exhibition is subtitled *How climate, epidemics and energy have shaped the city and buildings*. A catalogue, edited by the Pavillon de l'Arsenal, was published on this occasion.

**INFRARED**

Infrared is an electromagnetic radiation of the same nature as visible light. It lies below red in the solar spectrum, hence its name (infra-red = below red). This radiation has a longer wavelength than visible light, so the human eye is not able to see it. But the human being can feel it on his skin: infrared is a thermal energy, a heat radiation. Heat is emitted by all bodies whose temperature is above absolute zero (0° Kelvin or -273° Celsius). Thus, even an ice pack produces infrared rays.

Infrared has a shorter wavelength than microwaves or radio waves. It is divided into near, medium and far infrared. Infrared photography takes advantage of the near infrared, whereas thermal cameras take advantage of the far infrared.

In the 17th century, Isaac Newton sensed the existence of radiation below the visible spectrum, next to red. Infrared was discovered in 1800 by William Herschel. The English astronomer wanted to find out whether light has different temperatures in different colours of the visible spectrum, between violet and red. He uses a prism to divide the light rays, then places a thermometer on each colour to measure its temperature. William Herschel finds that the heat received is highest on the red. Surprisingly, however, it is even higher on the red side, in an area where no light is visible. The astronomer concludes that there are «calorific rays*. In other words, his experiment shows that heat is transmitted by radiation of the same nature as visible light.

Note that William Herschel's son, John Herschel, also an astronomer and physicist, popularised the use of the word 'photography', as well as the terms «negative» and «positive».

## INFRARED PHOTOGRAPHY

One of the main functions of photography has always been to see what the eye does not see. Like the infinitely small, the infinitely large or the four horseshoes of a galloping horse. Photography has a much greater spectral sensitivity than the eye. This ability enables it to capture images using electromagnetic waves other than visible light: X-rays, ultraviolet or infrared. These invisible radiations give visual information that would not otherwise be possible.

The progress of photosensitive emulsions in the second half of the 19th century made it possible to capture infrared radiation. William de Wiveleslie Abney photographed the infrared spectrum of the Sun in 1877. In 1910, Robert Wood took the first infrared photographs of daytime landscapes. In black and white images, skies appear black, clouds and vegetation appear milky white. This is the «Wood effect». This strange effect has an explanation: near-infrared rays are not absorbed or reflected by substances in the same way as visible light waves.

The first commercial black and white infrared films appeared in the 1930s. The technology was soon supported by the military industry, which saw the potential of these films for reconnaissance missions, particularly aerial ones. Infrared allows a better view through atmospheric mists and improves the rendering of details on the ground. During the Vietnam War, Kodak developed a colour infrared film for the American army: the film was capable of distinguishing troops camouflaged under tropical vegetation. The colours obtained are transposed, unnatural. Using a filter, the green of the vegetation is transformed into a bright pinkish-red. Many photographers and artists, as early as the psychedelic wave of the 1960s, took advantage of this intriguing transposition of colours.

At the time, infrared photography was commonly used for scientific or documentary purposes. It is capable of capturing images in the dark for surveillance purposes. In a police investigation, it can detect traces of gunpowder on a suit, fingerprints on a surface or writing erased by a forger. Under the skin, she finds a poorly oxygenated venous network, in an agricultural crop, she distinguishes healthy vegetation from diseased plants or discerns a repentance in an oil painting.

The applications of the infrared image are even more numerous today thanks to digital sensors. In a digital camera, the sensors are adapted to our vision limited to the visible spectrum (400 to 800 nanometres). They are indeed capable of recording infrared radiation, but a filter blocks these same thermal rays. Some professional models are still available without an infrared filter for astronomical or medical applications.

## THE THERMAL CAMERA

A traditional camera captures visible light. The thermal camera extends this capability to near and far infrared. It is thus able to record the heat emitted by an object or living being.

The first electronic thermal images date back to the inter-war period, mainly for military air surveillance and night vision applications. The system developed during the Cold War, and even more so in the 1980s with the appearance of digital sensors. Today, a thermal camera is equipped with a sensor in which each pixel records a temperature in place of a colour. It is preceded by an infrared detector and followed by a processor that converts the data into an image. This image displays a range of symbolic false colours, from the coldest (dark blue) to the warmest (red, then white).

The applications of the thermal camera are nowadays innumerable. New uses are continually emerging. They range from defence to surveillance, from industry to security, from science to agriculture, from the navy to the automobile, from telephony to drones and leisure. In building diagnostics, for example, the thermal imaging camera can do almost anything. Starting with visualising energy losses. It also identifies the absence of good insulation, locates air, water or gas leaks, pipe and air-conditioning faults, as well as electrical and construction problems. The method is non-invasive, non-contact and often preventive. It gives a global or specific picture of a situation. Even early in the event of a fire breaking out. It is almost supernatural in its ability to see in total darkness, in bad weather, through fog and smoke.

Because of its technique, and even though its rendering is constantly improving, digital thermography produces a low-resolution image. The camera usually merges two images: a conventional photo and a thermal image.

Today, the thermal camera represents a market worth several billion francs. This market is dominated by Flir. The American company offers a wide range of cameras for various applications, trades and research fields. There are now inexpensive models available from several brands. Miniature models can be connected to smartphones. Mobile phone models are also available with an integrated thermographic function.

Philippe Rahm uses a small Flir C3 camera in his architectural practice as well as in his portrait series at the Swiss Camera Museum.

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Photo captions :

1. Pezo von Ellrichshausen, 2020. Picture Philippe Rahm
2. Autoportrait, 2020. Picture Philippe Rahm
3. Climatic Apparel/About A Worker, 2020. Picture Philippe Rahm
4. Samuel Gross, 2020. Picture Philippe Rahm
5. Lolita Chammah, 2020. Picture Philippe Rahm

Short text approx. 800 characters

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Architect Philippe Rahm uses a thermal camera in his practice, concerned about sustainable development. He also uses infrared technology to take portraits or urban scenes. The utilitarian image is diverted towards an artistic, especially empathetic goal.
Philippe Rahm, a Lausanne native, trained at the EPFL, holds a doctorate in architecture and lives and works in Paris. He is internationally renowned for his climatic approach to his art, between physiology and meteorology. He teaches in Switzerland, France and in the United States.

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