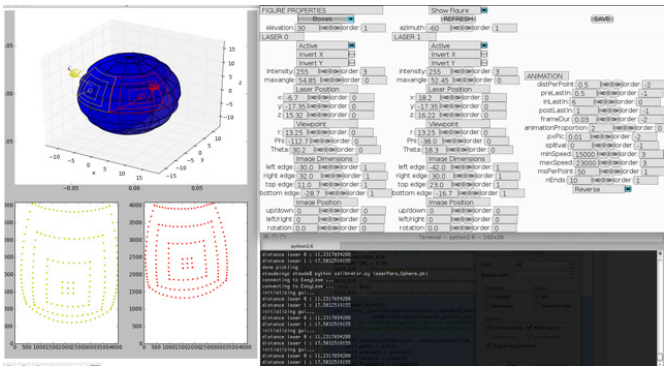
When a point is emitting unpolarized and homogeneous undulations equally in all directions, its state may be defined by two numbers; as, for instance by the wavelength of the undulations and their amplitude at a certain distance from the point. If the light is not homogeneous, indefinitely more numbers will be required to define it. But when a point upon the retina is illuminated, just three numbers are in every case requisite to define the sensation produced. In other words, light is a triple sensation.
Charles Sanders Peirce 1878 [1]

Bright green waves pulsed in the autumns 2010 and 2011 over the facades of the Palazzo Franchetti in Venice, the Maryland Science Center in Baltimore and over the giant sphere of the Hayden Planetarium at the American Museum of Natural History in New York City. The animated wave patterns which provoke anthropomorphic associations with a heart beat, a brain wave or the recent stock exchange rate, are the visible part of *From the Distant Past*, which reflects for the very first time spectra of distant celestial objects in an art project in public space. In collaboration with the Space Telescope Science Institute the artist Tim Otto Roth focuses not only the oldest colours in the universe, he also reminds to the birth of modern astrophysics: Around 200 years ago the German optician Joseph Fraunhofer not only revolutionized astronomy by his discovery of black gaps in the spectrum of dispersed sunlight. This was a milestone for the general understanding of light and colour describing the composition of light as a diagram of colour itensities. *From the Distant Past* reflects that intelligible colour concept in the sciences by the means of concept art using laser light as minimalist tool of graphical notation.

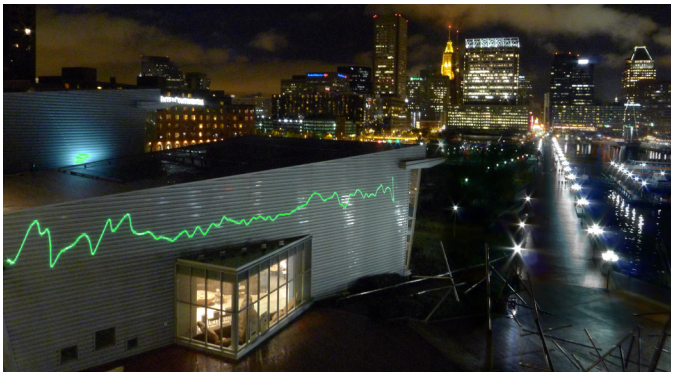


3D display of the Python based control software with a model of the Hayden-Planetarium in New York

Minimalist reminescence to vector graphics
This minimalism includes the direct translation of the spectral data into the movement of the laser animation by a specially developed control software. So the lasers were used as kind of oscilloscope – a reminescence to vector graphics. Technically this solution allowed in autumn 2011 to compose out of two lasers a consistent animation on the spherical surface of the Hayden Planetarium in New York City – a solution second to none.

New pixel dimension
From the Distant Past relates to the prior project *I see what I see not* having presented in 2003/04 pixelated astronomic pictures from the depths of the universe at the Art Facade in Munich. Complementary to that project awarded in 2004 by the International Media Art Award by ZKM Karlruhe *From the Distant Past* puts a new accent reflecting pictures not as a minimalist pixel matrix but enlarging the dimensionality of a single pixel. Although most of the celestial objects can only be depicted as a point, their light information dispersed by a prism or a diffraction grating adds with the resulting spectra formally but also scientifically a new dimension: The colour intensity plots of spectra tell us something about the physical state and the chemical composition of the celestial objects.

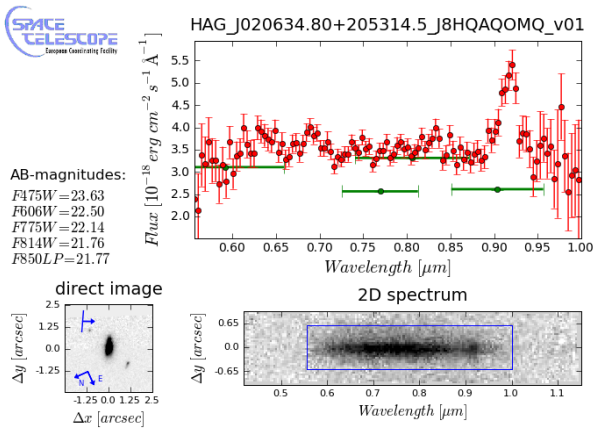
From the Distant Past, September 2010, Palazzo Franchetti, Istituto Veneto di Scienze, Lettere ed Arti, Venice



From the Distant Past, September 2011, Maryland Sciecne Center, Baltimore

Beyond pretty pictures

From the Distant Past shows, that the Hubble Space Telescope, but also other terrestrial telescopes, not only produce the popular „pretty“ pictures of the sky. In fact fifty percent of Hubble‘s observation time is used for spectroscopic surveys. *From the Distant Past*



Hubble data file including a 2D spectrum (bottom right) , which is typical for the grism technology. The coordinates of the resulting colour intensity plot (top right) were used to control the lasers.

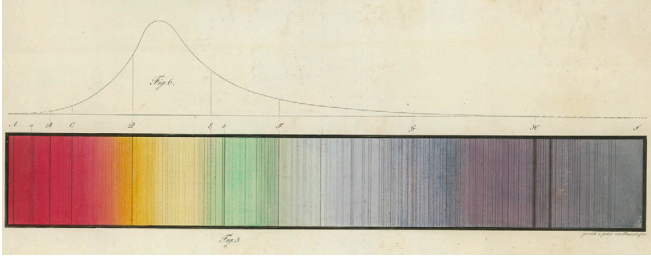
shows a selection of 47.000 recent spectra recorded with a special technique. With the help of the so called grism technology very faint and distant objects from an early stage of the universe can be detected. But this slitless technology implies statistical variations in the interpretation of the data – colour as *terrain vague*.

From the Distant Past, November 2011, Hayden-Planetarium, American Museum of Natural History, New York City

Colour bridging two cultures

As an immediate physical effect, spectra challenge our concepts of image and visualization. Art has often referred to light dispersed into its spectral rainbow colours. But interestingly spectra as a non-continuous colour phenomenon interrupted by „black gaps“ or appearing as discrete color bands has never been the core of an artistic reflection.

From the Distant Past aims to bring the two cultures of art and science together again by a reconceiving the concept of colour. C. P. Snow‘s postulated split of the two cultures goes back in a way to a historic confrontation of two color concepts in physics and art. For Johann Wolfgang von Goethe (1749–1832) color was a battlefield to defend art against science, which ended up in heavy polemics against Newton‘s spectral experiments. But even by the end of Goethe‘s lifetime

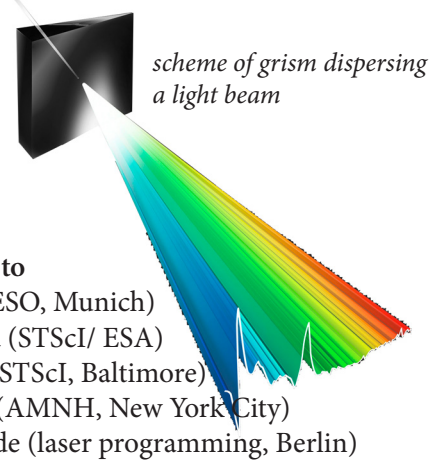


Fraunhofer‘s original drawing of a solar spectrum. Image: DM

his „Farbenlehre“ was proved to be obsolete by Joseph Fraunhofer‘s (1787–1826) discovery of the black gaps in the solar spectrum. The absorption lines in the Fraunhofer spectrum reveal a much more intelligible concept of colour which can‘t be explained any more by Goethe‘s purely sensational theory. Nevertheless, until now Goethe‘s „philosophical and mystical ruminations on the phenomena of color“ [2] are still dominant in the art culture, which finally reduces colour phenomena to – as Charles Sander Peirce (1839–1914) would say – a triple sensation [1].

Here *From the Distant Past* shows that a differentiated look into the sky similar to experiencing a painting cannot be reduced just to the tricolour aesthetic of a photographic print. In the end *From the Distant Past* reveals the inherent intelligible power as well as the sublime aspects of celestial and terrestrial colours.

[1] Peirce, Charles S.: Photometric Researches, Leipzig 1878.
[2] Waldman, Diane: Ellsworth Kelly, München 1997, S. 32.



scheme of grism dispersing a light beam

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