Energia
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DII research group
Fotometria e Illuminotecnica
Photometry and Light Engineering

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This study was carried out in collaboration with ing. Elena Pedrotti and ing. Alessandro Scroccaro.

The research topics are realised also in collaboration with:

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Università degli Studi di Padova
Dipartimento di Fisica e Astronomia "Galileo Galilei"

Università degli Studi di Padova
Dipartimento Di Psicologia Generale

OSRAM

Main research topics:

- Measurement and calibration of light sources and radiant sources
- Analysis of reflecting properties of surfaces
- Study of colour rendering of light sources and applications to the lighting of works of art
- Use of ultraviolet source in water purification

Analysis of Tintoretto's paintings in the Scuola Grande di San Rocco by an Image Spectrometer

The Scuola di San Rocco is a confraternity established in Venice in 1478 by a group of wealthy Venetian citizens. The walls of their seat are covered by Tintoretto's painting. The lighting systems consisted of halogen spot lights which allow a very low lighting of the painting and of the halls themselves and do not take into consideration the colorimetric characteristics of the surface to be lit.
A new lighting system was required and should be based on the analysis of the colorimetric characteristic of the paintings.
As colours are a perception which depends on the impinging light and on the object ability of reflecting light , to define the light source, we need to measure the spectral reflectance function of the paintings, in many points. We have to characterize wide areas without touching the precious works.
An image spectrometer was ad hoc composed by a scientific CCD camera and a lens; tunable filters to identify different wavelengths in the visible range were applied, a source emitting radiation in all visible range lit the paintings; a set of various chromatic samples was inserted into the scene as a reference; an acquisition system allowed the managing of a huge amount of recorded data.
The shapes of most of the reflectance functions are similar, this confirms the visual appearance of the paintings which present mainly red, yellowish, and brownish nuances.
The estimate of the overall measurement uncertainty suggests a value about 7% of the measured value plus a bias of 1% caused by the acquisition noise.
The measurements is the basis for the new lighting system for the Tintoretto painting in the "Scuola Grande di San Rocco", it allows the appearance of the painting is as close as possible to the one under the ideal light source, reducing the risk of deterioration of the painting due to the radiation, as it uses the less power.