

# BALKAN LIGHT 2015

## 16-19 September 2015

### Athens, Greece



INTERNATIONAL  
YEAR OF LIGHT  
2015



## АРХИТЕКТУРНО- ХУДОЖЕСТВЕННО ОСВЕТЛЕНИЕ

Н. ЯНЕВА, Т. МОНЕВ

Национален комитет по осветление в България (НКО)  
(ЕИК: 131339544)



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Архитектурно-художествено осветление

# Bioclimatic issues for natural light in museums

Eugenia Gatopoulou 1

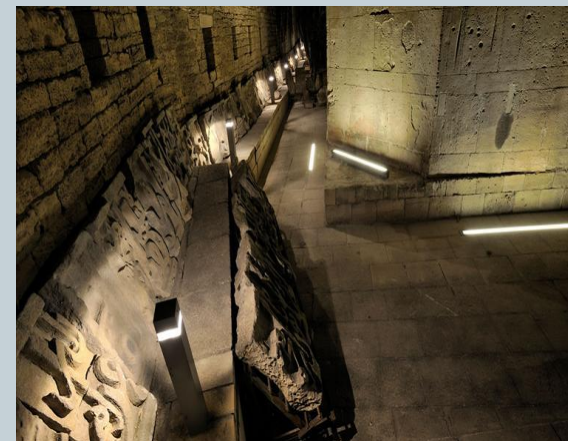
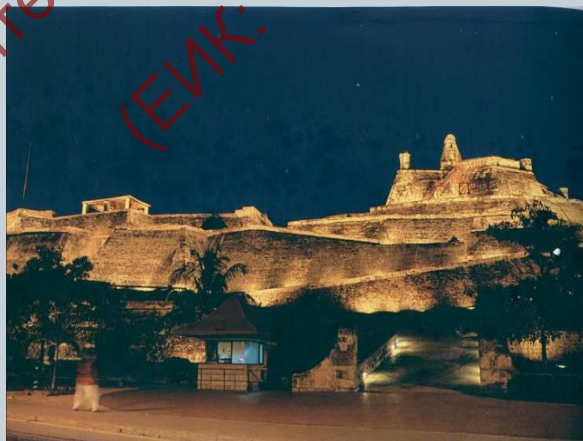
The architectural design of a museum is an issue of special interest. The two main functions of the museum are to display and to protect. Furthermore, it combines a strong architectural message appropriate for a public cultural building, with the need to preserve and conserve the works of Art and science. However, it is well known, that both natural and artificial light can cause deterioration of artworks, if these are exposed for a long period and to high illumination levels (especially the organic materials). This is why, since the 50`s, there has been almost total exclusion of natural light from the interior of museum and art galleries, since the creation of an artificial controlled environment would prevent the deterioration of the works of art. Due to the recent need for energy efficiency and environmental protection as well as the need for a more natural healthy and user friendly internal environment towards the user, the interest for bringing natural light into the building has resurfaced. After all, the smooth and coloured natural light displays the works of art in a better and more lively way. In addition to this aesthetic issue, technology is now at such a level, that daylight can be successfully controlled. In this study, we will present a series of examples of museums, which are successfully, and ingeniously daylight, by using different control elements depending on the needs and conditions of each case. The ultimate goal of this work is to suggest new strategies for successfully allowing daylight in the building, based on the previous examples..



# Aims and restrictions regarding the illumination of the Roman Emperors Route in Serbia

Aleksandra M. Cabarkapa and Lidija S. Djokic

A series of archaeological sites containing ancient Roman city remains which are constantly revealed from the past is located along the Danube river in Serbia. Even though the preservation process is timely, most of these sites have a number of visitors daily. In order to prolong the visiting hours, their illumination is extremely important. Torn between the aims and restrictions regarding the illumination of the archaeological sites belonging to the Roman Emperor's route in Serbia, this research culminated in a set of general recommendations for the illumination of such settlements. Special attention is given to the lighting of the site borders and its walls, entrances, towers, palaces, temples and monuments.





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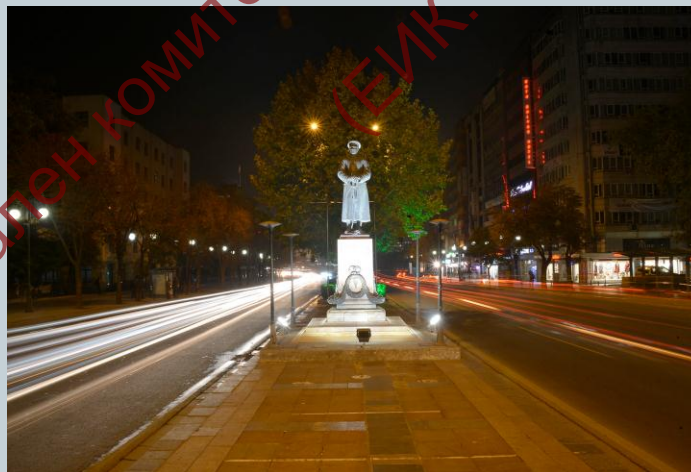


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# An Analysis of Monument Lighting: An Example from Hacettepe University Campus

Emre Dedekarginoğlu, Rıza Mendilcioğlu, Meltem Yılmaz

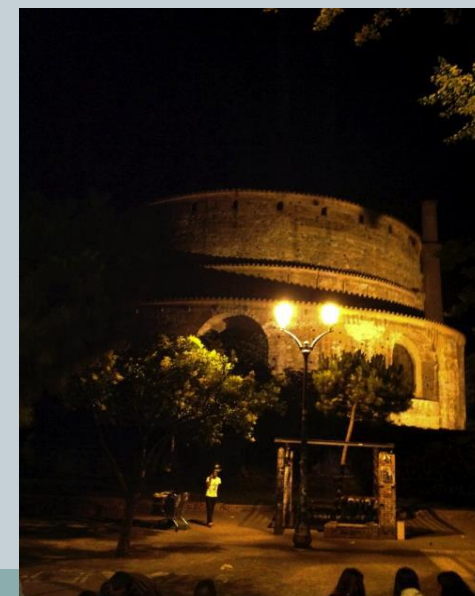
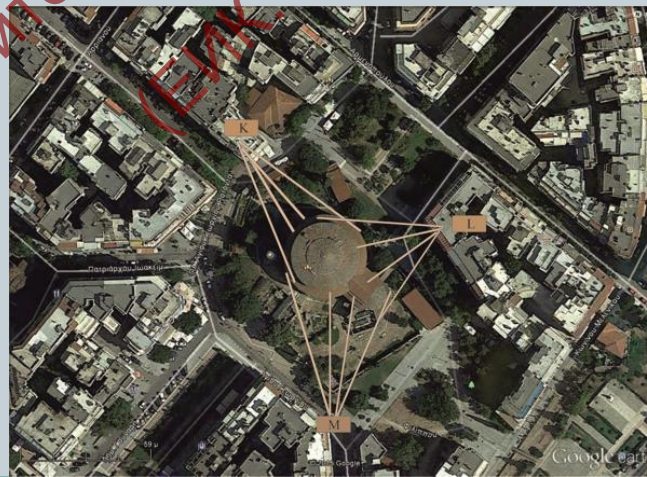
As the illumination techniques had evolved, lighting of monuments also gained an importance. In every period of history, monuments are made with ideological, religious, political or economic reasons and became important symbols of the cities they are built in. Monument lighting brought a need for conscientious design considerations, compromising the analysis of the monument's form and structure and selection and installation of the lighting fixtures with appropriate physical specifications. In order to analyze how a proper monument lighting design can be achieved, a multidisciplinary work was made in Hacettepe University. A monument was sculpted by Sculpture department and the monument's lighting design was planned and installed by Interior Architecture department. This study will provide an analysis of monument lighting in context of an example in Hacettepe University campus and provide a comparison with other important monuments in Ankara, Turkey.



# The Rotunda at Thessaloniki. The external and internal lighting proposals

Ioannis Iliades

This study presents a proposal for the external and internal lighting proposals of the Rotunda. The proposed solution has the advantages of not distorting the morphological features of the building. The external lighting solution should take several other factors into account, such as the glare of the local residents, the drivers, as well as passers by moving in several directions. The above considerations provide the basis for the specific electrical lighting scheme proposed here, which provides for the installation of floodlights on the top of the poles at the four specific points around the monuments. To reduce the glare and to retain full control of the light beams of the floodlights, a system of adjustable barn doors framing attachment was invented. For the lighting of the dome's mosaics, we suggested the instalment of two luminaries on the window sills, thus following the principle of natural lighting of the mosaics.



# Quality characteristics of artificial lighting in museums

Heiko Herzberg

Museums are obliged to use energy efficient bulbs for your lighting. Analyses show that mainly incandescent and fluorescent lamps are used, at present. The white LED is ideal for replacing conventional light sources like incandescent lamps because they have no UV radiation, a minimum of IR radiation and the efficiency is higher than the conventional light sources. LEDs are easy dimmable and the colour rendering index and colour temperature are not changed. But every white LED is different to another white LED. The quality features in museums are different to quality features for interior lighting. Some of these are good colour rendering, damage potential and IR- saving.

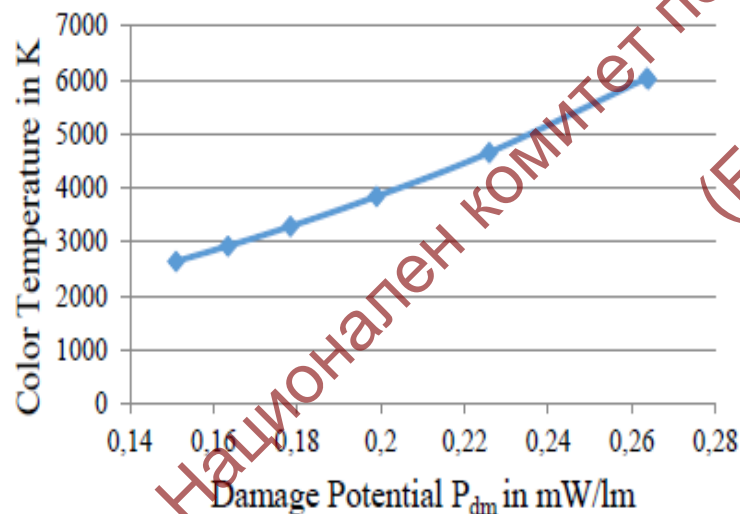


Fig. 13: Correlation between damage potential and color temperature

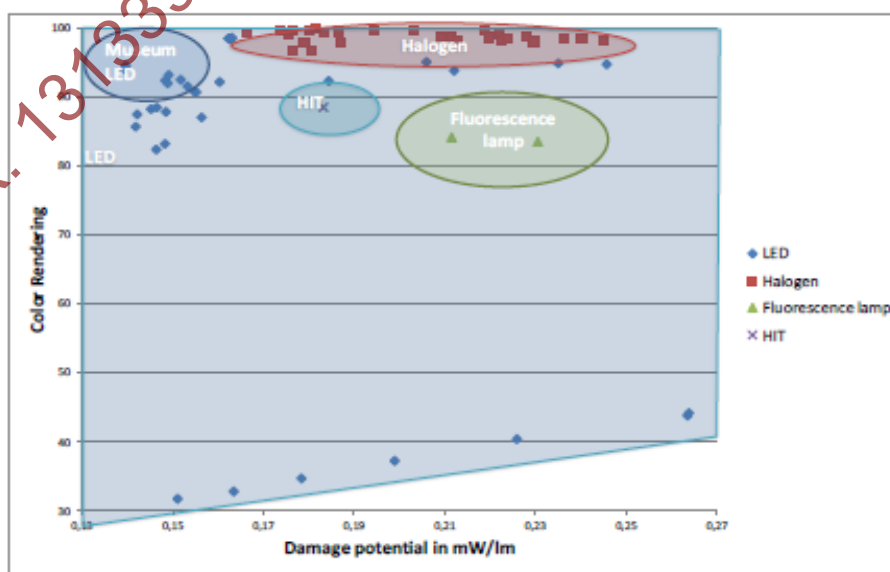
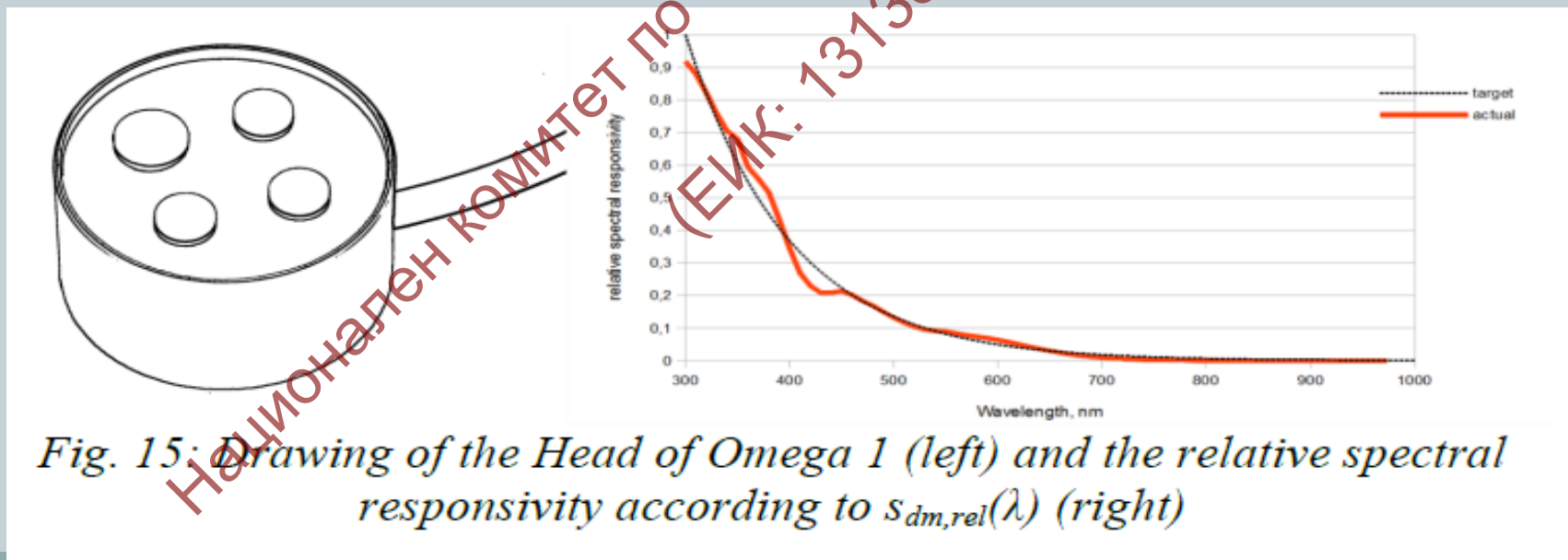


Fig. 14: Correlation of investigated light sources between color rendering and damage potential



The innovative, novel measurement technique is able to measure and monitor the effective damaging irradiation as well as the illuminance over time. The measurement system Omega 1 is based on the relative spectral responsivity model published in [23][19]. The system also allows to quantify the damage potential of a light source, which is very useful for the classification of light sources in museums. A study light sources demonstrated that LED sources can be used in museum contexts. To help museums, art owner, and other art-related institutions, a certification could be helpful.





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## Beyond the pale moonlight: Illuminating the Temple of Apollo at Corinth

K. Kissas, S. Koursoumis, S. Pouloupoulou, I. Papachristou, and A. Stratis

The temple of Apollo at Corinth is one of the earliest Doric temples in the Peloponnese and the Greek mainland. Built around 560 B.C.E., of local oolithic limestone on top of an imposing, rocky hill to the north of Acrocorinth, the archaic temple was an emblem for the Greek city of Corinth, reflecting its growth and prosperity. Today only seven out of his thirty-eight columns are preserved. The project for the illumination of the Archaic Temple was undertaken in 2012 by the ex 37<sup>th</sup> Ephorate of Prehistoric and Classical Antiquities of Corinthia (present Ephorate of Antiquities in Corinthia). The aim of the illumination was to highlight the monument and not to impose it, reveal the architecture as well as the texture and colour of the limestone. The project is expected to create new challenges as well as opportunities for the international promotion of the Greek cultural heritage.

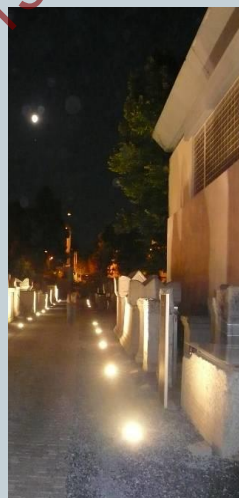




## “Light” stories in the Archaeological Museum of Thessaloniki

Maria A. Loukma, Georgios I. Tsekmes

The study focuses on the lighting design of the Archaeological Museum of Thessaloniki which was designed by the architect Patroklos Karantinos. The building complex of the museum was built in 1962 and was extended in 1980. During the period of 2001-2006, the museum was repaired and redesigned in its interior. In order to fulfil the requirements for extra space for exhibitions, the central atrium was replaced by an underground construction. Karantinos’s design gave emphasis in the use of natural lighting in the museum. Due to the development of museological principals about the mode of exposure - presentation of exhibition objects, combined with the evolution of the museum spatial requirements and the radical modernization of the building, natural lighting was reduced and the artificial was enhanced.



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# A re-evaluation in the lighting of show caves in Greece: a new methodological approach

Alexandra Oikonomou, Isidora-Chara Tourni, Maria-Amalia Toyra

In this paper we will refer to the damage caused to the caves by the artificial lightning installed in them and how we came up against this problem. Human interference in the caves, targeting to make them accessible to the public, causes a series of changes in their standard environment. These changes result in the colonization of the caves by photosynthetic organisms, growth of impressive greenery, initially around the luminaires and, at a later stage, all over the cave. Photosynthetic organisms cause a great damage to stalactites and stalagmites, that lose their natural colors, become gradually green and finally erode and crumble. The research so far shows that use of LED lightning prevents the growth of the microorganisms. Recently in the cave of Koutouki Peania in Attiki, the old lighting system of the cave was redesigned and replaced, using innovative techniques and new technologies. These new approaches seem to be, so far, very promising.



# Lighting design for ancient theatres – Lighting the monument and lighting for a performance .The example of Plevrona's ancient theatre

Asterios K. Tolidis

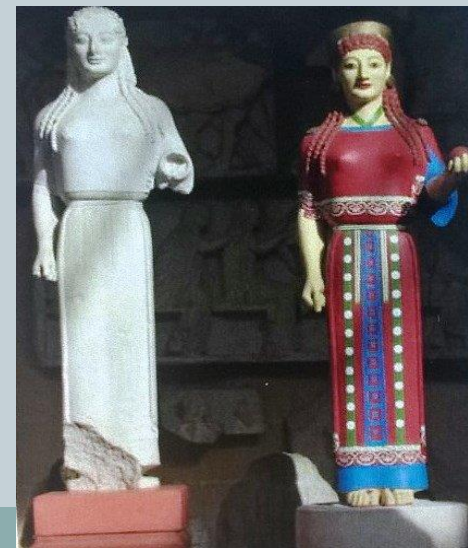
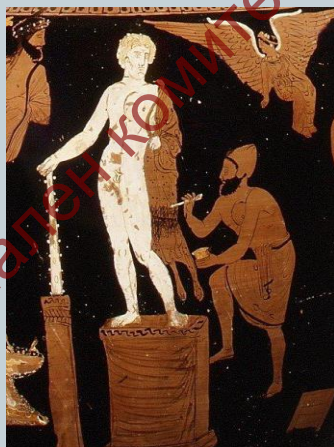
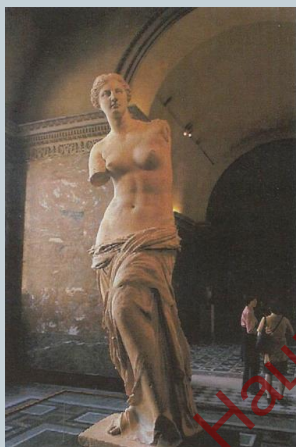
In ancient times, theatrical performances were held during daytime and there was no particular artificial lighting. Nowadays, there is a need for sophisticated lighting design, since performances in the revived ancient theatres are held after the sunset. Lighting design must take into account not only the needs of the particular play but also the special characteristics of the ancient theatre as a space. Moreover, ancient theatres should be treated with great respect to their history and sensitivity for their fragile nature, as monuments of culture. In the present paper, a case study is carried out about the lighting of the ancient theatre of Plevrona's, Aitolokarnania, Greece. The objective is to cover the basic needs primarily of the space, and secondarily of a performance. More attention is given to the infrastructure, for maximum flexibility in the lighting of a performance. The minimum permanent visible installation is proposed for the monument not to be visually intruded.



# From the conservation of the material to the restoration of the expression: The role of color in the interaction between conservation of Greek sculptures and lighting design

Sofia Gkolemi, Nikolaos Trivyzadakis

Conservation is the human interference in the materiality of ancient monuments or art works, which aims at the interception of the decay of time. Specific ethics are applied in that process discouraging supplementations and additions to the original object. On the other hand, Lighting Design has as productive cause not just the enlightenment of objects but the extraction from them of a visual effect that is expressive and sensuous. A field of interaction between Lighting Design and conservation could be ancient Greek sculpture. Conservators can nowadays spot clues of color in Greek sculptures. Restricted by ethics, they cannot restore the original colored image of the sculptures. Thus, the viewer fails to receive expressions that were originally connected with the prototype. This disadvantage could be surpassed with the use of light, the elaborated effect of which on an object could restore visually its expressive content without disturbing its materiality.



## How can the theory and study of the light “experience” in the church be shaped up in modern reality?

Eirini Skafida

Light is the main instrument that permits us to perceive our environment and therefore is a fundamental element of architectural design. It defines space, brings out the colors, the textures and decisively shapes the atmosphere. In a church, the light, along with its practical function, acquires a deeper symbolism. It delivers a sense of calmness, tranquillity, mystery and meditation that enhances the impression of the Divine to the faithful. By applying appropriate design techniques, natural light penetrates through the church structure in order to create a spiritual atmosphere. During the night, it is important that the sacred nature of the space is not distorted by the transition from natural to artificial light. With the appropriate use of artificial light, the symbolism, religious ambiance and spiritual radiance can be maintained, illuminating from the interior of the church to the outside area.

As an illustration of a contemporary approach to design with natural and artificial light, the plans of the church of Panagia Faneromeni will be presented (architectural plans/study: Didoni Paraskevi, Vouliagmeni, May 2011).





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## Monuments in light: early uses of light to project and display monuments and sites

Gianna Katsougraki

The "Sound and Light" show at Mistras was watched, apart from students, by a crowd which in a direct and live way learned the local history. The audience enjoyed the colourful text, heard from imposing voices of famous actors.

The combination of the text with the illuminated monuments of the City produced genuine emotion, unique even to Sergopoulos himself. He would afterwards confess that he was impressed by the pulse and the emotion the audience showed during that show.

The show lasted one week each year, during the "Paleologia" events. But it was so vivid as a memory to the ones attending, that even today many Spartans wonder nostalgically at it. It was also such an excellent way of presenting and understanding local history that later on Giannis Salavanos, Prefect of Laconia (1983), suggested to GTO a repetition of the "Sound and Light" show.

## Rock art of Philippi: Enhancement of the rock art sites through night lighting

Georgios I. Iliadis

In the frame of the promotion and enhancement of the rock art engravings of Philippi, apart from the protection of the monuments and the paths for safe visits, it is also possible to include a night lighting implementation. To implement this proposal, we take into consideration the following aspects: a) The good view of night landscape of the plain of Philippi and the historical Mt. Pangaion b) The proper weather conditions mainly between spring and autumn c) The rock art sites are close to the villages d) The contemporary technology on lighting techniques such as LED lamps and photovoltaic systems. The most important element in order to choose the technical specifications of the lamps is the angle of the light beam, the angle of the light incidence on the rocks and the color of light. For this reason we have taken a number of measurements and observations of the incidence of the sunlight on the rock art engravings during the day. This night lighting proposal of the rock art in the area of Philippi combined with the possibility of being visited during the night constitutes a standard model of promotion and enhancement of a monument.



# SMART CITY = SMART CITY LIGHTING - Lighting Master Plan for the Historical Centre of Sarajevo

Prof. Srdja Hrisafovic *DIA, MBS*

What makes SMART CITY smart? How can city lighting improve technologically to become SMART CITY LIGHTING? A smart city manages and distributes its resources optimally based on knowledge. It collects data and information, and thus accumulates knowledge of the citizens' behavioural patterns and needs. The city 'knows' its infrastructure and capacities. By analysing information and data, peak loads and unnecessary consumption can be identified, allowing the municipalities to manage and design the cities' resources. The big part of the Smart City is SMART CITY LIGHTING. It can enhance city life by providing accurate light effects where and when needed in accord with the day's rhythm or triggered by activity.

### What makes SMART CITY smart?

**How can city lighting improve technologically to become SMART CITY LIGHTING?**

These are the questions to which we were seeking answers while we were working on the project 'Lighting Master Plan for the Historical Centre of Sarajevo'

**SMART CITY**  
manages and distributes its resources optimally based on knowledge.

- The city collects data and information about climate, temperatures and street conditions. The city has knowledge of the citizens' behavioural patterns and needs.
- The city knows its infrastructure, capacities and bottlenecks for traffic, supply and service.
- By analysing information and data, peak loads and unnecessary consumption can be identified, allowing the municipalities to manage and design the city resources dynamically to the benefit of citizens and companies.

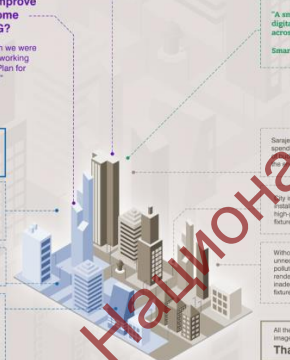
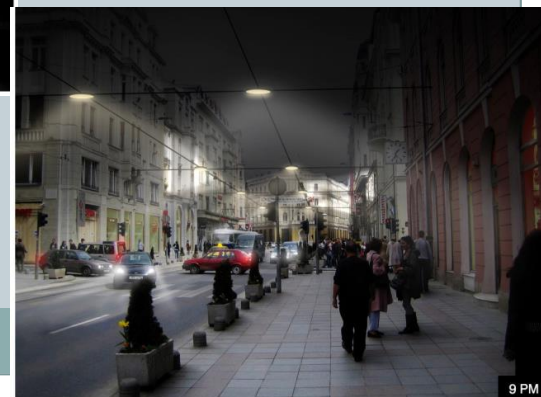
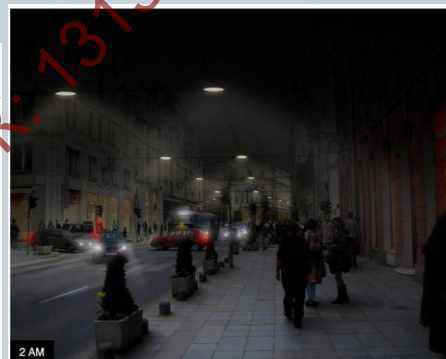
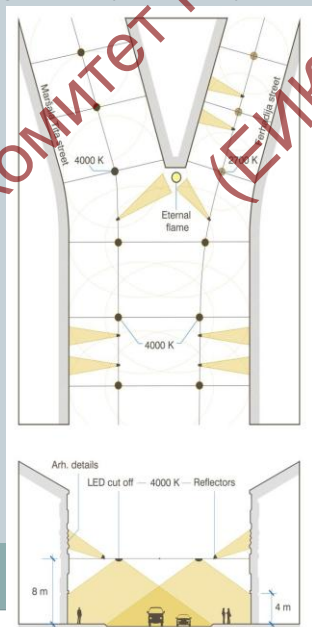
"A smart city is one that has digital technology embedded across all city functions"  
Smart Cities Council 2014

Sarajevo city of 600,000 people spends over 3 million EU dollars to consume every year for street city lighting.

Even so it with outdated lighting related 20 years ago. An old high-pressure sodium lighting fixtures are worn out.

Without optics, which results in unnecessary light dispersion polluting the night sky, bad colour rendering and colour temperature, inadequate location of the light fixtures, and huge waste of energy.

All these elements create a negative image of the city cultural scene.  
**That is not smart.**



# Designing lighting for historical buildings using a modular methodology: The case of the work of Ernst Ziller in Greece

Thanos G. Balafoutis, Stelios C. Zerefos

This study introduces a system that can provide a basis for the lighting design of historical buildings using the work of the architect Ernst Ziller as a case study. The main scope is not to direct an “optimal way” to light a specific historical building, but rather to guide the lighting designer research the lighting of the elements of the facade instead of implementing a conventional general lighting design scheme. To achieve this, a collection of the most important decorative elements on the facades of buildings designed by Ernst Ziller was compiled. Each module was lit and tested with photorealistic renderings and lighting calculations, thus creating a database with scenarios for lighting each type of module and element. The results show that the placement of the luminaires has an essential role in the final result and even a few centimetres make a huge difference on the most appropriate luminaire type to be selected.



Fig. 2. Different types of light distribution according to the lighting fixture types used in the research.

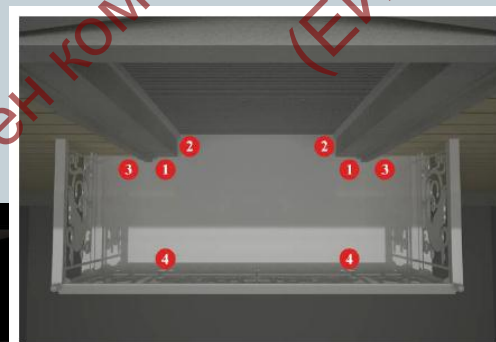


Fig. 3. Possible positions of the equipment (top view).

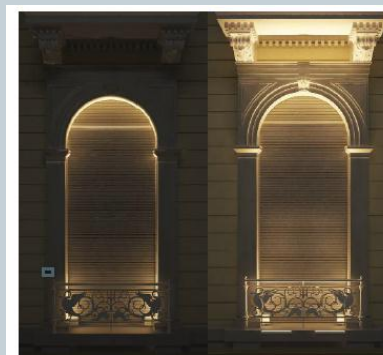


Fig. 17. Samples of lighting results - Arched natio door

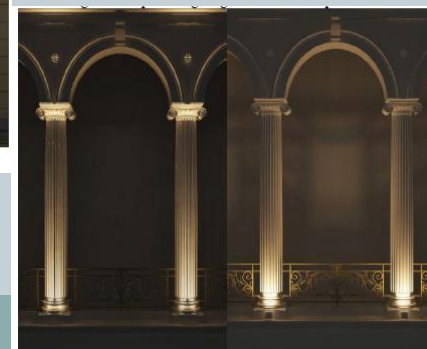


Fig. 18. Samples of lighting results - Ionic column.

# The CONCEPT in Lighting through the Design Procedure

Aristeidis M. Klonizakis

This document should be considered as a proposed procedure of conceiving Architectural Lighting through an intense study of the architectural context of the space, the building, the monument. Spatial qualities of the built environment such as forms, materials, colors and textures characterize every space which is meant to be illuminated. The study of the history and theory on which the architectural synthesis/creation is based provides with the adequate information of understanding the nature and the purpose of the architectural forms and solutions. These elements are the foundation of an innovative and a well adapted light installation. In addition, the present or future use of the lit space creates guidelines of the lighting proposal. Through its conceptual creation, optical and notional messages are emitted. No matter the scale, lighting design might represent the importance and highlight the qualities of the architectural space concerning aesthetics, psychology, meaning and psychology.



Fig. 2. The Ancient Theater of Mieza.

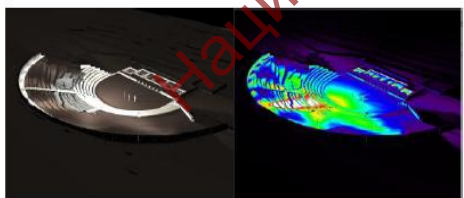


Fig. 3. Photometric representation of Ancient Theater in Mieza.

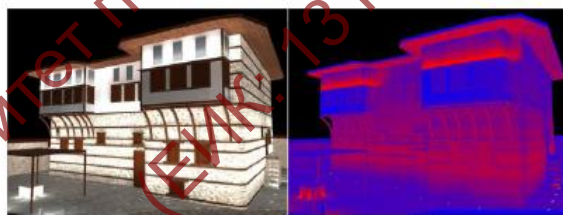


Fig. 4. Photometric representation of Poylko's Mansion in Siatista (outdoor lighting).



Fig. 5. Interior view and Lighting trials in Poylko's Mansion in Siatista.



Fig. 7 & 8. The Karela office park in Paiania.

# The Waterfront of Barceloneta: a proposal for a night approach to the sea through public art and urban light

Sofia Zygianni

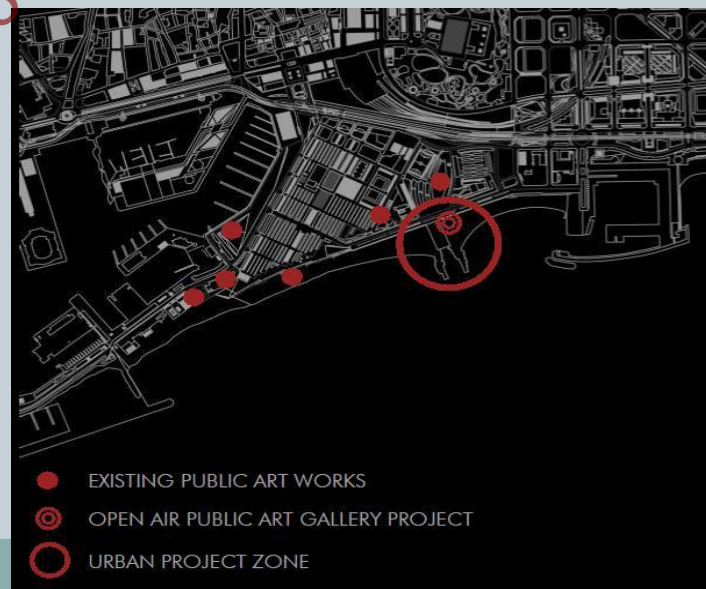
This paper has the intention to study a specific urban zone with low quality lighting system and various works of public art, highlighting possible considerations for a different lighting design approach towards the sea through public art and urban light. The concept of the lighting project is based on a theoretical schematic research over the topics of nature and human biology, light and dark adaptation, sky light pollution and social needs. The lighting project proposal consists of the Urban Project, as a schematic master plan with guidelines and lighting typologies and the Public Art Circuit Project, as proposal to partially illuminate some of the art works creating a route from the inner city up to the seashore. The result is the reconsideration of the night time relation of the city with the sea and the importance to reserve human scale night public spaces with less media pressure.



Fig. 1. Views of the Hotel Vela and the Villa Olímpica as seen from the main project area's walkway



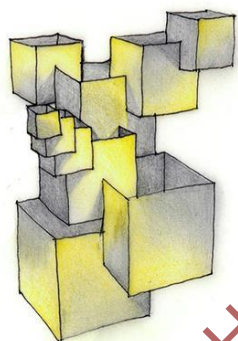
Fig. 2. Night views of the Hotel Vela and the Villa Olímpica as seen from the central beach area of the project near the breakwater zone.



## Light framing concept, for the development of a noiseless façade lighting tool.

Mariza Galani, Rania Macha

Our main research is based on the relationship between the light and the building. Lighting designers are asked to find the right balance between emotional and functional design in which citizens and visitors will identify themselves in the urban nightscape. Although there is a great variety of architectural luminaires in the market, sometimes the lighting designer will design a fixture that is going to fulfil his exact needs. Myia is a luminaire that came out of such a “problematic” situation. The lighting that we propose starts from the corner of a building surface and creates a 90° angle beam. The starting point will have strict limits to define the 90° angle and then the light will fall off smoothly. The purpose of this lighting is to frame the building's surfaces and give emphasis to the volume. Façade luminaires should redefine themselves according to the new architectural needs.



- light grazes the building's surfaces
- intergration of light in architecture
- harmonious lit volumes
- light geometry - light balance
- frame the light - light control
- light meets matter
- harsh limits - smooth gradient
- brightness - darkness
- different scale - same effect
- light follows contemporary needs of architecture
- flexibility in different movements of architecture

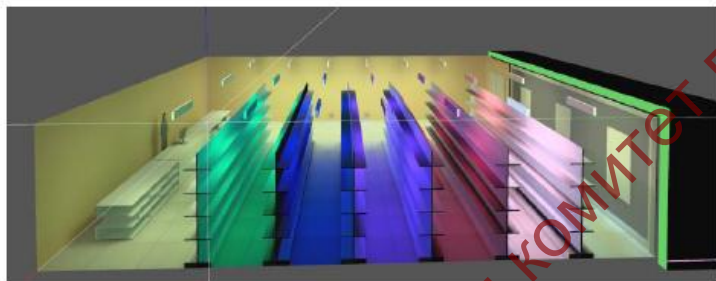
lighting concept\_aesthetical goals



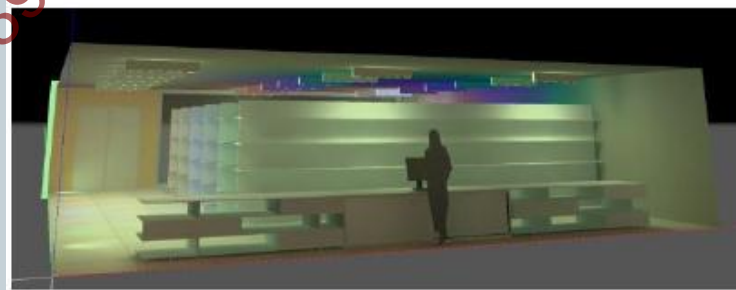
# Gestalt Theory & Marketing. A case study for the lighting design of a DVD store.

Panagiotopoulos F. Ioannis

The author tries to combine basic principles from the fields of business administration and especially marketing and advertising with main ideas from Gestalt Theory for the design of a sales store. The aim is a store of high aesthetics and functionally with the help of Gestalt principles like sparing rule and simplicity law. However, the key ideas that bridge marketing and customer's psychology are isomorphism and differentiation since they can create a simple and friendly to user- potential customer environment.



Picture 7: A photography of the interior from the top



Picture 10: The view of the employee- cashier



Picture 8: The lights in the interior

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# Designing Architectural Lighting with Low Light Pollution

Cătălin Daniel Gălățanu

Architectural lighting design takes into account primarily the desired atmosphere. If one considers the reducing of the light pollution (LP), then becomes important the role of engineering. Quantitative assessment of light pollution is achieved through the use of virtual computing surfaces. Without these virtual surfaces, the LP will remain invisible. Through these virtual surfaces one can underline even the direct reflection phenomena generated by glazing or different facades. By deepening modelling in DIALux, we can improve the light distribution control methods using obtrusive screens. In order to modify the reflected light from the facade, a micro profile is presented, to obtain an asymmetric diffuse reflection. One demonstrates that the visual effect could be improved with less light pollution. The described operation is an extension of architectural lighting made by engineers, with very significant effect in reducing the light pollution.

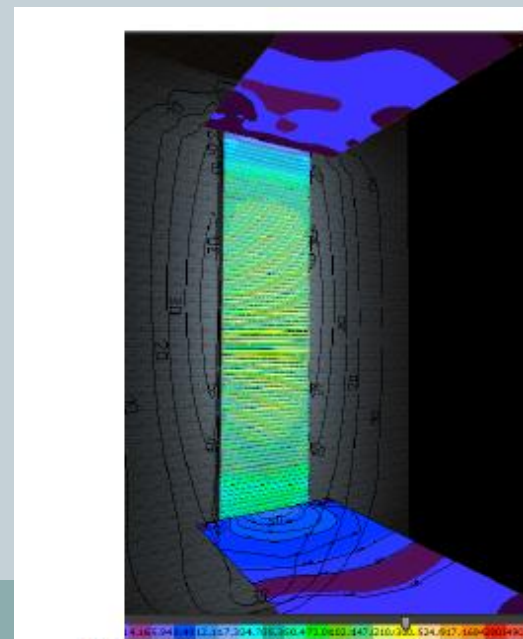
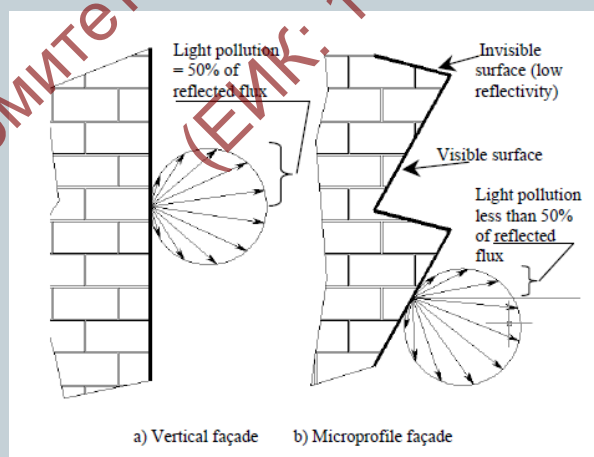
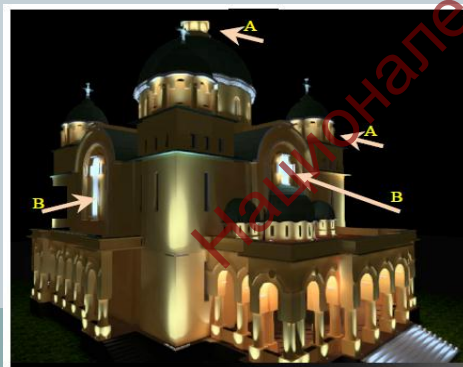
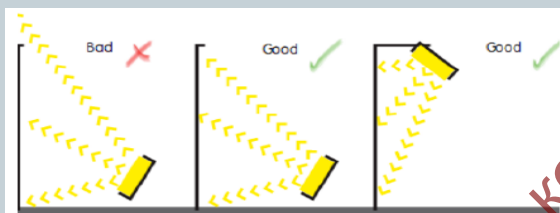


Fig. 10. The asymmetrical reflection model



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