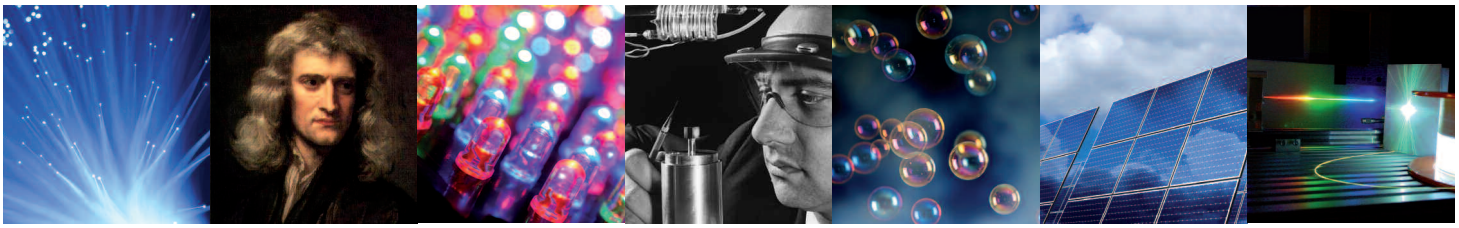
# PROSPECTUS

## An International

# Year of Light



**Science of Light – Tools for the Future – Pioneers of Light – Light for Development**

European Physical Society

more than ideas

This Prospectus describes a project to request the
**Proclamation of an International Year of Light**
by the United Nations General Assembly.

The project is coordinated by the European Physical Society
in cooperation with many other international partners.

This prospectus provides background information in support of the endorsement motion to be considered by the General Assembly of the International Union of Pure and Applied Physics (IUPAP) in 2011.

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The rainbow occupies a central place in cultures throughout the world, yet its beauty is even greater when the underlying science explaining its origin is appreciated. The rainbow is a natural choice as the symbol of the International Year of Light.

# Mission

The International Year of Light is a global initiative which will highlight to the citizens of the world the importance of light and optical technologies in their lives, for their futures, and for the development of society.

The International Year of Light will consist of coordinated activities in science, education and development. These will ensure that people of all ages and all backgrounds from all countries appreciate the central role of light as the key cross-cutting scientific discipline of the 21st century.

We are proposing the International Year of Light for the year 2015.

# Background & Partners

The International Year of Light project was initiated by the European Physical Society in 2009, and is now supported by a large number of international societies and related organizations. The partners have extensive and successful track records in international outreach and joint ventures such as the 2005 International Year of Physics and long-term educational programmes in developing countries.

## Partner Societies & Commissions

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|---|---|
| AfPS | African Physical Society |
| APS | American Physical Society |
| AAPPS | Association of Asia Pacific Physical Societies |
| AOS | Australian Optical Society |
| EOS | European Optical Society |
| EAS | European Astronomical Society |
| EPS | European Physical Society |
| ICO | International Commission on Optics |
| IEEE | IEEE Photonics Society |
| OSA | The Optical Society |
| SPIE | International Society for Optics and Photonics |

## Partner Platforms & Centers

Diamond Light Source
Education and Training in Optics Conference (ETOP)
International Center for Theoretical Physics (ICTP)
European Technology Platform Photonics 21
European Centers for Outreach in Photonics (ECOP)

# Motivation

Light plays a central role in human activities. On the most fundamental level, light is necessary to the existence of life itself, and the many applications of light have revolutionized society through medicine, communications, entertainment and culture. Industries based on light are major economic drivers, and **light-based technologies directly respond to the needs of humankind** by providing access to information, promoting sustainable development, and increasing societal well-being. As light becomes the key cross-cutting discipline of science and engineering in the 21st century, it is essential that the brightest young minds continue to be attracted into careers in this field.

**All fields of science** are based on the theories of light and its interaction with matter, and light is the main messenger in our understanding of the Universe. The history of the study of light spans centuries, and has involved virtually all the major figures of science. And it was the 20th century that saw the birth of the modern theory of light, the widespread deployment of light technology to improve society, and the full appreciation of the fundamental place that light occupies in the fabric of space and time. The spectrum of light from X-rays to infrared lasers provides technologies that underpin our lives, and light and photonics are poised to become the key enabling technologies of the future.

Light is the means by which human beings see themselves, each other, and their place in the Universe. An International Year of Light is the ideal instrument to ensure the necessary **increased global awareness of the central role of light** in the present and in the future of us all.

# Goals

An International Year of Light will coordinate international and national activities in order to achieve the following goals.

- Improve the **public understanding** of how light and light-based technologies touch the daily lives of everybody, and are central to the future development of the global society.
- Build **worldwide educational capacity** through activities focused on science for young people, addressing issues of gender balance, and focusing especially on developing countries and emerging economies.
- Enhance **international cooperation** by acting as a central information resource for activities coordinated by learned societies, educational establishments and industry.
- Focus on particular discoveries in the first decades of the twentieth century that have shown the **fundamental centrality of light in science**.
- Promote the importance of lighting technology in **sustainable development**, and for improving quality of life in the developing world.
- Highlight, explain and widely develop the use of optical technology to **preserve cultural heritage**.
- **Maintain these goals and achievements** in the future beyond the International Year of Light.

In the particular context of physics, **the project is fully in accord with the IUPAP mission** “to assist in the worldwide development of physics, to foster international cooperation in physics, and to help in the application of physics toward solving problems of concern to humanity”.

# Themes

We focus on four themes that will structure the yearlong activities.

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|---|---|
| **Science of Light** | Addressing how studying the fundamental scientific properties of light impacts widely on all fields of science, technology and engineering. |
| **Tools for the Future** | Highlighting particular examples of light as an enabling technology in medicine, communications and energy, as well as exciting emerging applications in the study and preservation of cultural heritage. |
| **Light for Development** | Promoting low carbon emission lighting to address environmental sustainability; promoting low cost solar-powered lighting to improve the quality of daily life in the developing world; applying modern photonic devices to applications such as agriculture, disease prevention, and water purification. |
| **Pioneers of Light** | The history of the study of light has involved virtually all the major figures of science. Highlighting their human stories as well as their associated science contributions will be a central educational and outreach activity. |

# Activities

Each theme will include outreach and educational activities at all levels: international, national and local. A Steering Committee will provide oversight and ensure coordination. Detailed activity planning will begin in 2012, but it is useful to illustrate the broad scope of an International Year of Light by providing examples of planned activities.

### A Year of Pioneers

A twelve month calendar will associate each month with a particular scientist, and his or her contribution to the science of light. Classroom kits for schools will provide biographical and scientific information.

### Light in the Universe

Particular celebrations will focus on the advances of 1815, 1865, 1915 and 1965 that established light's place at the centre of modern science. 200 years of the wave theory of light, 150 years of the theory of electrodynamics, 100 years of general relativity and 50 years since the discovery of the Cosmic Microwave Background will provide key scientific focal points.

### A LightDay for Earth

As part of the Light for Development theme, one particular day of the year will focus internationally on energy-efficient lighting, light conservation, and means of reducing light pollution. We will coordinate with existing annual events of this nature.

### Light for Change

The availability of inexpensive and energy-efficient lighting can revolutionize the quality of life in the developing world. Partners will support and develop initiatives promoting lighting of this sort worldwide.

### Bright Futures

A yearlong program of educational activities linking specifically to careers in science. Addressing gender issues and promoting science careers for women in developing countries will be a priority.

### The Light Touch - Hands-On Optics

Building on existing partner activities, we will develop educational kits illustrating the principles of optics appropriate to the needs of institutions in both the developed and developing world.

### The Daily Scientist

Volunteer scientists - from PhD to Professors - will communicate their day-to-day experiences to the public at large using social media such as blogs, Facebook, YouTube. This will place a very human face on the scientific and engineering community.

### Capturing Light

Nature provides many beautiful and inspiring examples of optical effects such as mirages, rainbows and so on. A year-long international competition amongst schools will solicit photographs of natural optical phenomena that will be posted on a centralized website. Winners will be announced monthly.

# 2015

The year 2015 is a natural candidate for the International Year of Light, commemorating a number of important milestones in the history of the science of light dating back 50, 100, 150, 200 years and even further.

In 1815, Fresnel published his first work introducing the theory of light as a wave and in 1865, Maxwell rigorously described the dynamic electro-magnetic theory of light. In 1915, the theory of General Relativity developed by Hilbert and Einstein showed how light was at the centre of the very structure of space and time. In 1965, Penzias and Wilson discovered the Cosmic Microwave Background, an electromagnetic echo of the very creation of the universe.

These discoveries changed physics profoundly when they were made, and continue to have tremendous impact on science and technology. The wave theory of light and the laws of electrodynamics have led to developments ranging from lasers and DVDs to mobile phones to wireless internet to radio astronomy. The laws of general relativity and the study of the cosmic microwave background have impacted on areas from the design of the global GPS satellite system to fundamental questions concerning the origin of the universe.

In more general terms, the year 2015 also represents 400 years since the invention of the first solar powered technology through the 1615 invention of a prototype solar-driven engine in France. Highlighting this pioneering invention will provide a valuable educational and historical perspective to activities relating to sustainable development.

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Einstein, Albert (1915). Die Feldgleichungen der Gravitation. Königlich Preussische Akademie der Wissenschaften: 844-847.

Hilbert, David (1915). Die Grundlagen der Physik (Erste Mitteilung) Nachrichten von der Gesellschaft der Wissenschaften zu Gottingen, Mathematisch-physikalische Klasse (1915): 395-407.

Penzias, Arno and Wilson, Robert (1965). A Measurement Of Excess Antenna Temperature At 4080 Mc/s. Astrophysical Journal Letters 142: 419–421.

De Caus, Salomon (1615). Les Raisons des forces mouvantes, avec diverses machines tant utiles que plaisantes, Jan Norton, Francfort.

# Committees

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# Getting Involved

If you wish to participate in this project as a partner, please contact us via the Project Secretariat : john.dudley@univ-fcomte.fr or light@eps.org

We will be delighted to welcome you into this exciting venture.

Important support you can provide now is to assist in our IUPAP presentation for November 2011.

National IUPAP Liaisons www.iupap.org/members.html

IUPAP Commissions C13 on Physics Development, C14 on Physics Education, C15 on Atomic, Molecular, and Optical Physics, C17 on Quantum Electronics: www.iupap.org/commissions/iupap-commissions.html

At a later stage, please contact your National Committee or Delegation to UNESCO to express your support. http://tinyurl.com/unescodelegations

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