

Report about the Opening Ceremony of the International Year of Light (IYL2015) UNESCO, Paris. 19 & 20 January 2015.

In 2013 at its 68th session, the United Nations General Assembly (UNGA) proclaimed 2015 as the [International Year of Light and Light-based Technologies \(IYL2015\)](#) to recognise the importance of light-based technologies in meeting the needs of humankind.

The year will celebrate the anniversaries of important milestones in the history of science that occur in 2015 and dating back 1,000, 200, 150, 100 and 50 years. Included will be important aspects of education and development, focusing specifically on how the science of light can improve the quality of life in the developing world and in emerging economies.

As a taster see a short video summary video entitled [year of light psa](#)

The project involves many international partners representing major international scientific societies from all branches of physics and working under the auspices of UNESCO. [Professor John M Dudley](#) was appointed as Chairman of the IYL 2015 Steering Committee. When promoting the event he said that: *“an International Year of Light is a tremendous opportunity to ensure that international policymakers and stakeholders are made aware of the problem-solving potential of light technology. We now have a unique opportunity to raise global awareness of this.”*

Many organisations have seized this opportunity, including [The International Light Association \(ILA\)](#) which as a ‘Bronze’ level sponsor of the International Year of Light 2015 (IYL) and was offered one place for an official representative to attend the Opening Ceremony at the UNESCO headquarters building in Paris on the 19 - 20th January 2015. The board of IYL nominated Pauline Allen to attend. At the last moment IYL offered three more places to reserve delegates who unfortunately were all unable to attend due to the short notice but Phil Stickland was able to join Pauline as a secondary delegate at his own expense.

The ILA produced an A5 flyer to promote the ILA and the Tallin conference, a copy of which was included in every conference delegate’s bag as well as made available on display. Pauline also printed a business card to promote the ILA which she gave to all the delegates with whom she made contact.

The two day ceremony was held in the main hall (Salle 1) of the UNESCO building and the auditorium was packed with over 1000 attendees. UNESCO say it was one of their most attended events. Hopefully the [Latest News](#) and [Event Programme](#) sections of the IYL website will be the source of much more information during the year. For full details of the Session Timings, Presentation Titles, Presenter’s Names, Biographies, Performers, Arts Exhibits and Partners and Sponsors see the [Opening Ceremony Programme](#). See below a view of the packed hall.



A packed hall at the International Year of Light and Light-based Technologies (IYL2015) opening ceremony.

Source: http://en.kingabdulazizcenter.com/sites/default/files/styles/image960x600/public/Screen%20Shot%202015-01-20%20at%2016.12.22%20%282%29_0.png?itok=ZwhJ3X0v

IYL 2015 aims to raise awareness of how light and optical technologies promote sustainable development and provide solutions to worldwide challenges in energy, education, agriculture, communications and health. It aims to educate by promoting improved public and political understanding of the central role of light in human activities in science, technology and culture in the modern world. It is also intended to celebrate noteworthy anniversaries in 2015 about early discoveries in optics, astronomy, theoretical science and technological developments that revolutionised the 20th century in many areas. These include medicine, international communication via the Internet, advances in lighting and solar energy which are considered crucial for future sustainable development. Technological applications of light based research have opened up and are central to linking cultural, economic and political aspects of the global society. During 2015 there will be a specific focus on how the science of light can improve the quality of life in the developing world and in emerging economies. The word ‘photonics’ is going to feature prominently in the news.

There were many high level policy makers at the two day ceremony and the enthusiasm generated by the opening event augers well that the aims of IYL will be achieved. Certainly in his closing speech Maciej Nalecz, Director of the Division of Science Policy and Capacity Building, UNESCO was pleased to announce that the Chairman of the UNESCO Executive Board had organised a special information meeting for the Executive Board members the following day to utilise the knowledge of many of the high level attendees at the opening ceremony in order to promote science and send suitable messages to policy makers.

Most presentations were in English with translation available in French. Unknown to us there was a live streaming of the Opening Ceremony online but those links are no longer active

In correspondence with John Dudley we established that the UNESCO links below will enable you to follow the whole of the proceedings. Although the quality is not great UNESCO are working on getting better ones up soon and there are a number of individual presentations findable on YouTube or other sites.

English:

mms://stream.unesco.org/vod/IYL_1_en.wmv

mms://stream.unesco.org/vod/IYL_2_en.wmv

mms://stream.unesco.org/vod/IYL_3_en.wmv

mms://stream.unesco.org/vod/IYL_4_en.wmv

French:

mms://stream.unesco.org/vod/IYL_1_fr.wmv

mms://stream.unesco.org/vod/IYL_2_fr.wmv

mms://stream.unesco.org/vod/IYL_3_fr.wmv

mms://stream.unesco.org/vod/IYL_4_fr.wmv

Five Nobel Prize laureates gave lectures:

Ahmed Zewail (“Light and Life”);

Steven Chu (“Energy and Climate Change: Challenges and Opportunities”);

William Phillips (“Einstein, Time and Light”);

Serge Haroche (“Light and the Quantum”)

Zhores Alferov (“Efficient Light Conversion and Generation”).

There were a number of thematic sessions on various topics, such as the role of optical technologies in development, the future of light-based technologies and the practical solutions they can provide.

For the complete lectures over the two days see the UNESCO links above or for short sample videos search YouTube and elsewhere on the internet, using the details of title and presenters names provided in the [Opening Ceremony Programme](#).

Some highlights

[Ibn Al-Haytham](#) was strongly featured throughout the event. He was the 11th century pioneer who wrote many scientific works including his seminal *Kitab al-Manazir* (Book of Optics) around 1015. Its 1000th anniversary is listed in the United Nations resolution as a focal point of celebration of the International Year of Light. UNESCO Director-General *Irina Bokova* announced ([see video](#)) that the [The King Abdulaziz Center for World Culture](#) has launched a global campaign titled “[1001 Inventions and the World of Ibn Al-Haytham](#)” to celebrate his scientific achievements. Video displays included a 13 minute educational film [1001 Inventions and The Library of Secrets – starring Sir Ben Kingsley as Al-Jazari](#).

Other early Muslim scholars featured included Mariam “Al-Astrolabiya” Al-Ijliya a female maker of [astrolabes](#) (a historical instrument used to predict the position of the sun, moon, planet, and stars).

An interesting publication is ‘*1001 Inventions: The Enduring Legacy of Muslim Civilization*’ ISBN: 978-1-4262-0947-5 by National Geographic.

There was also a large “Albeit Almuzlim” or “*camera obscura*” in the shape of a turban. Unfortunately there were some problems with its focusing apparatus and it did not perform very well.



Outside the “Albeit Almuzlim” or “camera obscura” at the International Year of Light and Light-based Technologies (IYL2015) opening ceremony exhibition.

More information and links can be found at: <http://www.1001inventions.com/unesco>

Plenary Lectures at (IYL2015)

Many presenters made the point that pure science and blue sky research is important not only for its own sake but because it is impossible to know what important technology might be based upon the results of basic research in the future. This was emphasised in all five Nobel Plenary Lectures.

Who for instance, would have predicted the uses of light and physics when [Einstein](#) published five papers on light in 1905 or that the iPhone would contain the applications derived from the basic science work of between 25 – 30 Nobel Prize winning scientists? Who also would have considered using photonics devices to monitor the quality of fruit and vegetables?

An article in this vein is [‘How curiosity begat Curiosity’ Scientific breakthroughs come from investing in science education and basic research. August 19, 2012](#) by [Professor Ahmed Zewail](#) presenter of the first Plenary Lecture [‘Light and Life’](#). Professor Zewail also originated the concept of the [Zewail City of Science and Technology](#) in Egypt following the award of his Nobel prize in 1999. He is passionate about dealing with the three issues he called ‘the not knowing’ (education), ‘the not having’ (poverty – consider that there many in the world living on less than \$1 per day) and ‘the not free’.

Currently there is much interest in the use of crystalline materials known as [Perovskite](#) to develop cheaper and more efficient solar cells and also coloured light emitting diodes (LED). A quick search on [ScienceDaily](#) will provide you with up to date information about this developing field which was mentioned by [Professor Steven Chu](#) in the second Nobel Plenary Lecture ["Energy and Climate Change -- Challenges and Opportunities"](#). When referring to the USA government’s doubting attitude about climate change he showed a graph of temperature change from 1860 which indicates that 14 out of 15 of the hottest temperatures on record have occurred in the 21st century and added the observation that so far the 21st century has only had 14 years!

Rapid melting of glaciers is a problem of global warming and measuring these changes can now be done from space using an interesting application of the precision and accuracy of atomic clocks, themselves dependant on the technological developments in photonics based upon the fundamental physics of light. [Gravity Recovery And Climate Experiment \(GRACE\)](#) is a project that uses a pair of satellites which can detect ‘changes in their orbits to within a fraction of the width of a human hair’. The orbits change in response to gravitational variations on earth and relate to changes in acceleration due to gravity. Such measurement is the modern way to plot the change in state of glaciers!

[Professor William D. Phillips](#) in the third Nobel Plenary Lecture, “Einstein, Time and Light”, (see mms://stream.unesco.org/vod/IYL_3_en.wmv or a [5 minute sample on YouTube](#)), gave a very lively presentation on how atomic clocks have been improved, using laser cooling. This is a process where atoms are confined by the pressure of laser beams, are slowed down in a bottle comprising a magnetic field, and thus cooled to incredibly low temperatures. Temperatures as low as 240 micro Kelvin above absolute zero are now obtainable. The cooling is such that there is now an atomic clock with an accuracy of 2.4×10^{-18} equivalent to one second in the age of the universe.

Because the frequency (“ticking rate”) of atomic clocks is also altered slightly by gravity, magnetic fields, electrical fields, force and motion, there are other applications (see [Gravity Recovery And Climate Experiment \(GRACE\)](#)). Atomic clocks will keep time differently at different heights and this phenomenon makes it possible to now measure height to within about an inch!

Professor Phillips is not just a Nobel Prize winning physicist but a showman, amusing and very easy to listen to. Other interesting and informative lectures of his available on YouTube include [William D. Phillips: Time, Einstein and the coolest stuff in the universe](#) at Universität Innsbruck and [William D. Phillips: Time and Einstein in the 21st Century](#). The last section from about the 50 minute point has a demonstration of a magnet floating in air that should interest the most jaded student.

For some additional background about atomic clocks see [JILA Strontium Atomic Clock Sets New Records in Both Precision and Stability From NIST Tech Beat: January 22, 2014](#) and [A New Era for Atomic Clocks February 4, 2014](#) (3 Pages)

The fourth Plenary Lecture was “Light and the Quantum” by [Professor Serge Haroche](#) It can be seen in mms://stream.unesco.org/vod/IYL_4_en.wmv from 4min 30.



Do you see light as a particle or a wave?

Professor Haroche provided a general overview of the development of Quantum physics from 1900 to 2014. He ended by suggesting that just as at the time of The World Fair in 1900 none of the modern technologies were predicted that ‘without basic research, novel technologies cannot be invented.’ In addition the past teaches us that wonderful applications always emerge from blue sky research and that is one of the reasons why it should be protected and defended.

The fifth Plenary Lecture entitled “Efficient Light Conversion and Generation” was by [Professor Zhores Alferov](#) and dealt with semiconductor heterostructures which are opto- and micro-electronic components, based on layered semiconductor structures which are apparently crucial to the functioning of radio-link satellites, barcode readers, CD players, laser pointers, mobile phone systems and many other elements of modern day life and technology. His seemed to know most of the Nobel physicists and chemists involved in the development of semi conducting materials and devices. Predicts that by the second part of the 21st century solar energy conversion by using photovoltaic semiconductor materials will be one of the main source of energy production.

These two Wikipedia entries provide better information about his work and his other achievement than we can. See: <http://en.wikipedia.org/wiki/Heterojunction> and http://en.wikipedia.org/wiki/Zhores_Alferov

We would like to comment on all the lectures and to provide substantive links to follow them up but it is not practical. However here are a few more comments.

Painting with light or Light Art

Outside the main hall were a number of video displays that cycled through a hundred photographs produced by artists from the [Light Painting World Alliance \(LPWA\)](#) who work in darkness to produce some amazing visual images produced without any form of post processing. For some samples see the [Gallery](#) of the LPWA and also <http://www.lightart-photography.de> <http://congresolightartoviedo.com/>

In the evening of the 19th January there was a reception accompanied by a light show entitled "[Light is Here](#)" by the artist [Kari Kola](#) from Joensuu in Eastern Finland, that simulated the Aurora Borealis and the illumination of the exterior of the UNESCO building.



[Optical Technologies At Google For A Brighter Future By Bernard Kress](#) was a fascinating description of a number of projects under development at Google X to use light based technologies to improve the quality of life in areas such as health, communications, security, renewable energy, mapping and transportation. Specifically mentioned were Projects [LOON](#), IRIS, [GLASS](#), [CHAUFFER](#), [MAKANI](#) and [WING](#).

He described how combining the facilities of Projects Loon, Wing, Makani and Glass could help in a medical emergency in a remote area by providing an internet connection through a mobile phone and satellite based internet connection (Project LOON), to order critical medical supplies for delivery through Project WING. Electric power might be from kite based wind turbines (Project MAKANI). Google GLASS might be used by a doctor to direct a nurse to perform surgery.

Another fascinating lecture was [Ibn Al-Haytham's Contributions To Optics And Renaissance Art](#) by [Charles Falco](#) in which he discussed his work in analysing how optics may have been used by artists using either concave mirrors or refractive lenses to project the images of objects illuminated by sunlight onto their board or canvas. As an example he referred to the distorted image of a skull in [Hans Holbein's painting "The Ambassadors"](#). He showed how such knowledge based on the earlier work of Ibn Al-Haytham was available to theologians in the 13th century who had written books on optics and perspective and therefore to painters. Learn more about this fascinating subject and his collaboration with the British artist [David Hockney](#) in developing the [The Hockney-Falco Thesis](#) See www.art-optics.com or www.optics-art.com or <http://fp.optics.arizona.edu/SSD/art-optics/index.html>

Astronomy is one of the major sciences using the mathematics and science of light and totally dependent upon light based technologies. The area was referred to widely during the programme. Since one of the primary aims of IYL is that it should encourage education, the idea of building and using your own telescope is a good one. Featured on display was the [Galileoscope](#), developed by Stephen M. Pompea and Robert T. Sparks of the National Optical Astronomy Observatory, Tucson, Arizona USA as a project during [The International Year of Astronomy 2009 \(IYA2009\)](#) launched by the International Astronomical Union (IAU) and UNESCO. It is an educationally oriented optics kit to enable better understanding the first telescopic observations of 400 years ago. It can function in two modes either corresponding to Galileo's original design which used a concave eyepiece lens, or to correspond to the design of his contemporary Kepler, who used a convex eyepiece lens and so produced a much wider field of view, although this was then mirror-reversed and upside down.

Not featured at the UNESCO event but produced with IYL 2015 in mind and found at the [Nanoscale Informal Science Education Network \(NISE Net\)](#) website is some demonstration material about 'cloaking', or in simple English, invisibility. See Video: [The Rochester Cloak](#) and also instructions for [Building Your Own "Invisibility Cloak" Using Lenses](#), probably very useful for physics teachers and a PowerPoint presentation [What's Nano about Light?](#)

Not every lecture was about high tech research or solutions as can be seen from the afternoon Thematic Session – Light Solutions

Millions of people in developing countries suffer from poor vision where eyeglasses are primarily a luxury product unavailable in rural areas. Approximately **150 million people** need a pair of glasses, but have either no access to them or can not afford them. As a result there is a loss of income estimated at US\$150 million. [See what life with poor vision is like for those with no means to correct it.](#)

Consider:

What would you pay for a pair of spectacles if there was only one set available in the world?

What if it were possible to produce durable spectacles, at the point of need, for US\$1 that were optically suitable to the wearer?

These questions were the subject of the presentation by [Martin Aufmuth](#) of "EinDollarBrille" ([OneDollarGlasses](#)), entitled "Seeing the Light and Empowering People Through the OneDollarGlasses". It is a project which involves local production of lightweight, flexible spring steel frames, using a simple bending machine. Following simple refractive testing they are then fitted with prefabricated, spherical lenses made of polycarbonate with a hardened surface. The lenses are available in 0.5 diopters steps ranging from +6 diopters to -6 diopters.

An alternative methodology has been developed by one of the delegates [Professor Josh Silver](#). He is director of a charity [Centre for Vision in the Developing World CIC 2015](#). He has developed brilliantly simple but effective glasses that can be self-tuned to one's own prescription. Each lens consists of two flexible membranes filled with liquid. By adding or removing silicone fluid to make the lens more convex or concave the power of each lens can be set by the wearer. They have launched a large humanitarian project in co-operation with the Dow Corning Corporation. See also: [Self correction of refractive error among young people in rural China: results of cross sectional investigation](#), [The Child Self-Refraction Study](#) [Visualizing Development: Eyeglasses And Academic Performance In Rural Primary Schools In China](#)

Lighting for the deprived

It is estimated that 1.3 billion people do not have access to electricity and rely upon the use of burning wood, candles or paraffin (kerosene) lamps as sources of illumination, all of which introduce health hazards such as fire and respiratory problems and which are also expensive.

At [The Global Efficient Lighting Forum](#) in Beijing, *China* 10-11 November, 2014, the UN Under Secretary-General and UNEP Executive Director Achim Steiner, said, "Replacing the world's 670 million kerosene lamps with cleaner, safer, solar-powered lighting represents a major opportunity to deliver across multiple fronts, from cuts in global carbon emissions, health risks from indoor air pollution, support for green technologies and the generation of green jobs."

- The [en.lighten initiative](#) is a private sector partnership between UNEP, the Global Environment Facility, Philips, Osram, the Chinese National Lighting Test Centre and the Department of Industry, Australia
- If all light sources were switched to LED lamps, global electricity consumption for lighting would be reduced by more than 50 per cent, equivalent to the yearly CO2 emissions of Germany
- By 2030, the electricity used for lighting will increase by one-third, equivalent to the yearly consumption of France and Germany combined, if ambitious targets are not adopted
- The Nobel Prize for Physics 2014 was awarded to the inventors of blue LEDs which has triggered the commercial use of LED lighting as we know it today
- LED technology doubles in performance every two years. LED lamps are constantly decreasing in price, by approximately 20% every year.

[Eric Rondolat, CEO Philips Lighting in his lecture](#) introduced the concept of light poverty. He said it should be an irresistible decision to spend US\$10-20 as a one off investment on solar powered LED lighting as a safe alternative instead of recurring expenses of say US\$50/year on kerosene. Such investment would lead to improvements in health, educational opportunity and on the environment. He called upon all the relevant parties to use the means which exist to act to end light poverty by 2030.

The technology is now available for electricity supply to ‘leap frog’ the electricity grid solution and an interesting summary article about some of the problems of light poverty in Africa is [A brightening continent](#).

[A Liter of Light](#)

At the International Light Day (ILD) launch in Antwerp on 22 September 2013 at the ILA Conference, one of the items mentioned was the idea of using plastic bottles of water as solar light sources was developed by [Alfredo Moser](#) in 2002. Since then the idea has spread widely and [Illac Diaz](#) of [MyShelter Foundation](#) explained how with the addition of a small solar panel, a simple control circuit, a battery, four LED lights, some plastic tubing, the concept has been extended in the Philippines to provide a cheap source of lighting at night as well, either within buildings or even as street lighting.

The Future of IYL 2015

Many companies and technical journals are making particular efforts this year to make information available to a wide audience. An exploration of the websites of the many sponsors of IYL will turn up a vast amount of information ranging from very introductory video or slide shows to highly technical and current research.

Although there was no theme devoted specifically to the non-medical therapeutic application of light for health, it was referred to by several speakers.

It was really eye opening to have had the privileged opportunity to be part of the opening ceremony of [International Year of Light and Light-based Technologies \(IYL2015\)](#) and we hope this feedback will help stimulate others to better know and understand just how important light is to the development of what we are, what we have and the future of human society. The year's events have just begun and if you or your organisation wish to organise an associated event the opportunity exists to [publicise it on the IYL website](#).

Pauline Allen and Phil Stickland

If you wish to contact us about our impressions please do so via pauline@thesoundlearningcentre.co.uk or phil@thesoundlearningcentre.co.uk at [The Sound Learning Centre](#)

Some additional miscellaneous facts, comments and links to other resources

The dark sky is both beautiful and useful. 'If we lose darkness we lose light' (comment made by Patricio Hales, Ambassador and Permanent Delegate of Chile to UNESCO, in connection with light pollution of the night sky preventing us seeing stars)

There is a [Globe at Night](#) program to raise public awareness of the impact of light pollution by inviting citizen-scientists to measure their night sky brightness and submit their observations from a computer or smart phone.

There is a [Museum of Light in Mexico](#) See also http://en.wikipedia.org/wiki/Museum_of_Light,_Mexico_City One of the presentations was by Ana Maria Cetto, its Director.

[Earth Hour](#) was started as a lights out event in Sydney, Australia in 2007 to raise awareness of climate change. It is now celebrated for an hour commencing at 08:30 Local time on the last Saturday of March. (28th March for 2015)
See the [Earth Hour 2015 Official video](#).

Between 15-20% of all electricity use is for lighting and is expected to grow by approximately another 30% by 2020.

The use of LEDs can contribute significantly to a reduction in fuel and energy use and their effects on global warming.

Scientists need to spread the word to those **not** interested in science rather than those that are.

Partnerships bring together many competitive organisations.

Resistance to antibiotics in medicine is a ‘ticking time bomb’

Fluorescence may be able to distinguish between bacterial and non-bacterial infection and which should or should not be treated with antibiotics.

Light can be used to turn on and off biological functions.

We do not know everything. Remember that the story of light is still developing and needs telling.

The iPhone contains the applications derived from the basic science work of 25 – 30 Nobel Prize winning scientists. It is not just the ideas of Steve Jobs and Apple.

Additional Resources

See ‘Resources’ and ‘Fact Sheets’ at: <http://www.light2015.org/Home/About/Press-Office.html>

Logos of Sponsors <http://www.light2015.org/Home/About/Sponsors.html> (ILA is listed amongst the Bronze group.)

Spectroscopic Nomenclature <https://www.s-a-s.org/journal/nomen/>

The [Society for Applied Spectroscopy \(SAS\)](#)

Physics revisits six specific advances reported in the APS journals that are of special interest. <http://physics.aps.org/IYL>

International Year of Light - Blog <http://light2015blog.org/>

The [en.lighten initiative](#) and [Energy efficient lighting Toolkit](#)

An interesting website for researching summaries of research is <http://iresearch-reporter.com> as demonstrated by the [information on Alain Aspect](#) who presented a lecture on the quantum revolution. A similar lecture by Alain Aspect - [Breaking the Wall of Quantum Weirdness](#) is also available on the internet.

[Light: Beyond the Bulb](#) is an open-source international exhibition program for the International Year of Light to showcase the incredible variety of light-based science being researched today across the electro-magnetic spectrum, across scientific disciplines, and across technological platforms. If you wish to host an exhibition you can register on the site and have free use of the materials available. There is a detailed document [Hands-On Educational Activities on Light](#) that would be helpful to educators and exhibiting staff. ‘In proclaiming an International Year focusing on the

topic of light science and its applications, the United Nations has recognized the importance of raising global awareness about how light-based technologies promote sustainable development and provide solutions to global challenges in energy, education, agriculture and health. Light plays a vital role in our daily lives and is an imperative cross-cutting discipline of science in the 21st century. It has revolutionised medicine, opened up international communication via the Internet, and continues to be central to linking cultural, economic and political aspects of the global society.’
[Visit the image collection](#) [About Light poster](#) <http://lightexhibit.org/aboutlight.html>
[A calendar of About Light exhibit locations.](#)

Video

1001 Inventions and The Library of Secrets - starring Sir Ben Kingsley as Al-Jazari
https://www.youtube.com/watch?x-yt-cl=84503534&v=JZDe9DCx7Wk&feature=player_embedded&x-yt-ts=1421914688

Plenary Lecture ‘[Light and Life](#)’ Ahmed Zewail
Steven Chu: ["Energy and Climate Change -- Challenges and Opportunities"](#) plenary Lecture

The film [Einstein’s Light](#) due to be released in September 2015, was premiered at the International Year of Light 2015. The Official Trailer can also be found at <http://vimeo.com/117005227>

[1001 Inventions and The Library of Secrets – starring Sir Ben Kingsley as Al-Jazari](#)
Also at [1001 Inventions and The Library of Secrets – starring Sir Ben Kingsley as Al-Jazari.](#)