

Optical Engineering

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International Year of Light

Michael T. Eismann



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You may be aware through various SPIE publications that 2015 has been designated by the United Nations as the International Year of Light and Light-Based Technologies. When I first learned of this decision last year, I must admit that I was a bit unsure what to make of it. Of course, I was pleased to see this high-level international attention given to my professional field; however, I really had no idea what significance an International Year of Light (IYL) would have or any real idea what it would mean to me. Since then, I have done a little more homework on the IYL and would like to share some of what I have learned.

The International Years are sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in order to raise awareness about topics and issues of importance in the world. There were four concurrent observances in 2014: the International Year of Solidarity with the Palestinian People, the International Year of Small Island Developing States, the International Year of Crystallography, and the International Year of Family Farming. By comparison, it seems to me that the IYL exhibits quite a bit more universality than the 2014 observances. The IYL shares 2015 with the International Year of Soils. No offense to the geologists, but I think that I'll take light over dirt.

The stated purpose of the IYL in the resolution adopted by the General Assembly on December 20, 2013, is to recognize "the importance of light and light-based technologies in the lives of the citizens of the world and for the global development of society on many levels." As a scientist, the vital nature of light to the existence of life and even the entire universe is so fundamental that it seems odd to me that its importance even needs to be recognized. It is akin to observing an International Year of Matter. As an engineer, I find it beneficial to reflect on the numerous advances that have propelled humanity forward over the past decades due to our ability to harness light in innovative ways. These include, of course, broadband global communications, medical imaging, smartphone displays and cameras, astronomical telescopes, weather satellites, bar code readers, and numerous other advances that people sometimes forget are all part of the

optical engineering industry—that is, *our* business. In that vein, the IYL should inspire us toward future discoveries and innovations in optical science and engineering to continue to improve the human condition throughout the world.

The particular year of 2015 was chosen for the IYL because it coincides with the anniversaries of multiple important discoveries related to light. The first is attributed to Ibn Al-Haytham, the Arab physicist who performed experimental studies forming an early basis for ray optics, and developed a theory of human vision in the *Book of Optics*, which he published while under house arrest between 1011 and 1021. With some averaging of the dates, the IYL falls on the 1000-year anniversary of this pioneering medieval work. In 1815, Augustin-Jean Fresnel lost his post in the French government when Napoleon returned from Elba and focused his attention on his scientific investigations in optics, including the establishment of mathematical formulas for reflection, refraction, and the wave theory of diffraction. Fresnel used interferometers to experimentally support the theory that light propagates as a transverse wave, and ultimately published this work in 1818. James Clerk Maxwell published his seminal theory of electromagnetism in his 1865 *Royal Society Transactions* paper entitled "A Dynamical Theory of the Electromagnetic Field," forever adjoining the fields of electricity and magnetism with optics. Albert Einstein added to the anniversary series with publications in his *annus mirabilis* of 1905 describing his Nobel-prize winning theory of the photoelectric effect that extended Max Planck's quantum theory of radiation, and in 1915 with his general theory of relativity that predicted the gravitational influence on light propagation and embedded light in the underlying theory of the universe. Finally in 1965, Arno Penzias and Robert Wilson unintentionally discovered the cosmic microwave background radiation supporting the Big Bang theory of the origin of the universe. While UNESCO may have taken a liberal view on some of the anniversary years, you must admit that this represents an impressive list of scientific achievements definitely worthy of a celebration.

As a founding sponsor for IYL, SPIE has organized several activities in which members can get involved, including special contests, grants, conferences, and publications. I encourage you to check these activities out on the SPIE website and participate where you can. The opening IYL ceremony was held on January 19–20 at UNESCO headquarters in Paris, and included presentations from five Nobel laureates: Ahmed Zewail, Steven Chu, Zhores Alferov, William Phillips, and Serge Haroche. If you were unable to attend (like me), you still have eleven months to organize your own IYL event to join in the festivities. After all, what better way to raise awareness than to throw an IYL party of your own for all of your colleagues, friends, and family? I'm sure that is what UNESCO *really* had in mind with the IYL designation. Party on!

Michael T. Eismann
Editor-in-Chief