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I wish you all a very happy, illuminating, and productive year!

On December 20, 2013, the United Nations (UN) General Assembly’s 68th Session proclaimed 2015 as the International Year of Light (IYL). In proclaiming an international year focusing on the topic of light science and its applications, the UN 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. More information on this can be obtained from the IYL webpage www.light2015.org.

In the spirit of IYL, the Electro-Optics (EO) Program at the University of Dayton (UD) continues to educate young minds on various applications of optics and photonics. As one of the premiere institutions in the nation on photonics, we strive to excel in a variety of areas, including lasers, imaging, quantum optics, nonlinear optics, holography, polarization, nano-optics, propagation through turbulence, LIDAR, and optical sensing. We have a group of dedicated faculty from EO, Physics, and Electrical & Computer Engineering, which boasts 20 Fellows of professional organizations, along with about 35 MS and 30 PhD students. Last year, we graduated 3 PhDs and 15 MS students, who are all gainfully employed or are continuing their studies at UD or other universities. EO is part of a research center of excellence, CETRAE, that has been newly created to foster research in thin-films and surface engineering.

To follow up on the last newsletter, there will be a special session at SPIE’s Photonics West in 2015 to honor Dr. Peter Powers, who unfortunately passed away last year. I am sure Dr. Power’s legacy will live on through the work of his students and fellow collaborators.

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A New Name: CPC is now Fitz Hall

What once was known as College Park Center has been renamed Raymond L. Fitz Hall. This is a tribute to Brother Ray Fitz, who served as president of UD from 1979 to 2002. Fitz, an electrical engineering alumnus and professor, believes in the Marianist values of learning, leading, and serving. It is the goal of the Electro-Optics Program (EOP) to demonstrate its commitment of implementing these values within our program. EOP is located in the 5th floor of Fitz Hall (39.738669N, 84.183668W), with its nanofab facilities located in the Science Center.

The concept of pointing a powerful laser at a target to vaporize it is a very simplistic take on what is actually required to create an operational HEL weapon. In turbulent atmospheric conditions, the laser must propagate efficiently and stay accurately focused on the target. The system must compensate for the movement of the target, the motion of the platform and the distortion of the beam from weather or environmental conditions. The platform must be compact enough to fit on a vehicle or even a soldier’s shoulder, while the optics must be ruggedized to withstand shock and high irradiance. In addition to these requirements for size, weight and power (SWaP), they must be safer to use than chemical-based high energy lasers.

Optonicus, based within EO, has developed a 21-element optical phased array (OPA) for DARPA’s Excalibur program, with low power requirements, long-range turbulence correction and scalability. The nature of the phased-array design enables control of the individual fiber lasers to correct for atmospheric turbulence and aberrations on a sub-millisecond timescale to maximize the laser irradiance at the target 6.4 km away at a power efficiency of 35% and near-perfect beam quality.—OPN

The Selection of current high-energy laser (HEL) sources:

- Area Defense Anti-Munitions (ADAM): Lockheed Martin
- GAMMA: Northrop Grumman
- EXCALIBER: Optonicus
- High Energy Liquid Laser Area Defense System (HELLADS): General Atomics
- Laser Weapon System (LaWS): Kratos
- Robust Electric Laser Initiative (RELI): Northrop Grumman, Boeing, Lockheed Martin
- Solid-State Laser - Technology Maturation: Kratos, Raytheon, Northrop Grumman, BaE Systems

Dear Sir/Madam,

I am writing to express my dissatisfaction with the recent article titled “High Energy Lasers” published in *Optics and Photonics News* (OPN). The article claims that the concept of using high energy lasers to vaporize targets is a simplistic approach. However, I would like to express my concerns regarding the feasibility and practicality of implementing such technology.

Firstly, the article mentions that in turbulent atmospheric conditions, the laser must propagate efficiently and stay accurately focused on the target. While this may be feasible in controlled environments, the real-world implications of achieving such precision in unpredictable weather conditions are concerning. Additionally, the article fails to address the technical challenges associated with the movement of targets and platforms, which are significant obstacles in the development of operational HEL weapons.

Furthermore, the article highlights the requirement for compactness in the platform design. While this is an important consideration, it is essential to weigh the trade-offs against the size, weight, and power (SWaP) requirements. Moreover, the article touches on the ruggedization of the optics to withstand shock and high irradiance. However, it omits the critical aspect of user safety, which should be a top priority in the deployment of such technology.

In conclusion, while the concept of high energy lasers holds promise, the feasibility and practical challenges must be thoroughly addressed before full-scale deployment. I suggest that future articles in OPN include a more comprehensive analysis of these technical and safety considerations to provide a balanced perspective.

Yours sincerely,

[Name]

*Email Address*
Journals Papers


Conference Papers


What do Peter Powers, Andy Chong and Imad Agha have in common? Here is a hint: all passed through Cornell on their way to UD. Peter started out from Canada, Andy from Korea, and Imad from Lebanon. As diverse as it may seem, it is true that their convergence to Cornell, albeit at different periods, showed them the way to Dayton, located at the crossroads of America, and to a successful future.

Born and raised in Beirut, Lebanon, Imad moved to Cornell University in Ithaca, NY, in 2002. His dissertation involved the fabrication of high-Q silica microcavities, and the generation of broadband frequency combs via cascaded four-wave mixing. After his PhD, he moved to the Institut d’Optique in Palaiseau, France, where he worked on generating squeezed states of light in atomic vapors, and then on to Telecom Paristech where he worked on producing correlated photons in nonlinear crystals and distributing them on DWDM networks. After moving back to the US, Imad worked at NIST as a research associate in the Nanofabrication Research Group on the generation of single photons in quantum dot structures. Currently Imad is an Assistant Professor in Physics and EO at UD, working on developing novel structures in lithium niobate and in silicon for high speed quantum information processing applications.
A Nobel Year for Optics

In 2014, the Physics and Chemistry Nobel prizes went to groups working in the general area of optics. The Nobel Prize in Physics was awarded jointly to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura "for the invention of efficient blue light-emitting diodes which has enabled bright and energy-saving white light sources". The Nobel Prize in Chemistry was awarded jointly to Eric Betzig, Stefan W. Hell and William E. Moerner "for the development of super-resolved fluorescence microscopy". We warmly congratulate the recipients and look forward to further recognitions in the area of optics in the near future.

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udayton.edu/engineering/departments/electrooptics_grad/index.php

Factoid

An innovative laser transmitter system jointly developed by the Intelligent Optics Lab of the Electro Optics Program at the University of Dayton, and Optonicus (see p. 2), has been named a finalist in the SPIE’s prestigious Prism Awards.

The Prism Awards for Photonics Innovation is a leading international competition that honors the best new photonic products on the market. Optonicus’ innovative INFA product was selected as one of three finalists in the category of Scientific Lasers. The winners will be announced Wednesday, 11 February 2015 at Photonics West in San Francisco, California during a gala event known as the "Oscars of Photonics".