Professional Development Grant Final Report

"Travel to and Registration for the 2018 Joint Frontiers in Optics / Laser Science Meeting"

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Restatement of professional enhancement opportunity:

The purpose of this proposal was to request funds to travel to Washington, DC for the joint Frontiers in Optics and Laser Science (FiO/LS) conference that is co-sponsored by the American Physical Society and the Optical Society of America.

Dr. Young presented a paper titled entitled "Polarization Properties of Generalized-Gauss Laser Beams" The type of laser beams studied (e.g. Generalized-Gauss beams) are of current interest for use in optical communications due to their increased data density compared to fundamental Gaussian beams. The main objective of the research project presented was to show how the intensity profile of a linearly polarized Generalized-Gauss beam changes with propagation.

Review of the professional enhancement opportunity:

Dr. Young's primary research interest is fundamental laser physics. The annual FiO/LS is the primary meeting of the year for laser physicists. The opportunity to attend and present research at this conference was an invaluable professional experience. A few new research ideas were created as a result of discussions that occurred during the conference.

Summary of experience:

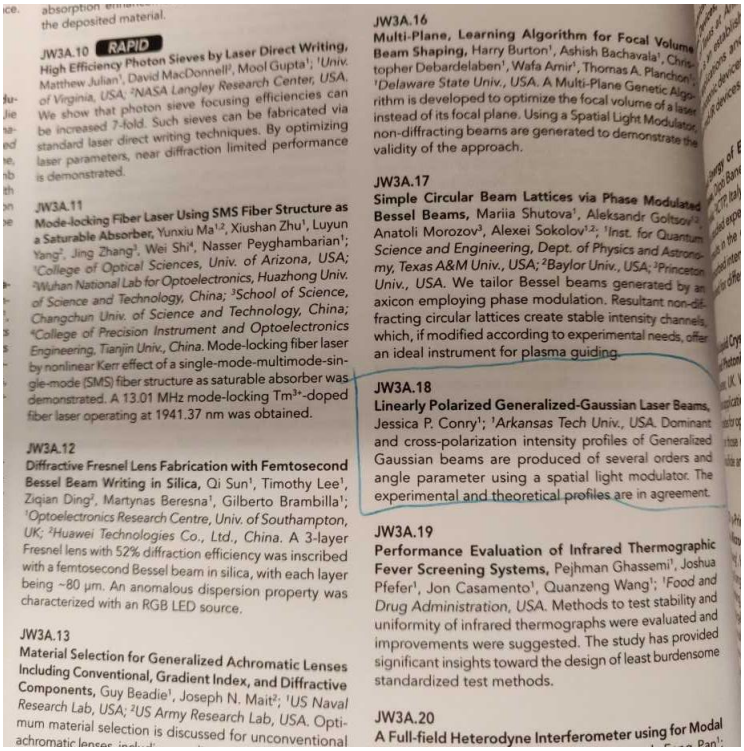
As a presenter at FiO/LS, Dr. Young received valuable feedback on her research. Other conference attendees' input and ideas related to the research project has led to ideas for Dr. Young's next research projects. As an attendee, Dr. Young benefited from attending other talks and keynote speeches as well as participating in networking opportunities. During the conference, Dr. Young made arraignments for a collaboration with a researcher from the University of Arkansas that has agreed to (and is currently working on) complete the experimental verification the results of the theory she presented at this conference. This collaboration is very important because the equipment required to verify the theory is beyond the capabilities of Dr. Young's current equipment at ATU. It is very likely this collaboration will result in at least one journal article.

Conclusions:

Dr. Young is grateful to the Professional Development Grant committee for approving her use of funding and allowing her to present and participate in the premier laser and optics research conference of the year. Participating in the 2018 FiO/LS meeting proved to be a beneficial experience not only realizing new and improved laser physics research ideas but also exposure to optical physics education research.

Proof of attendance:
Name badge

Abstract in the conference program



the deposited material.

JW3A.10 RAPID
High Efficiency Photon Sieves by Laser Direct Writing, Matthew Julian[1], David MacDonnell[2], Mool Gupta[1]; [1]*Univ. of Virginia, USA;* [2]*NASA Langley Research Center, USA.* We show that photon sieve focusing efficiencies can be increased 7-fold. Such sieves can be fabricated via standard laser direct writing techniques. By optimizing laser parameters, near diffraction limited performance is demonstrated.

JW3A.11
Mode-locking Fiber Laser Using SMS Fiber Structure as a Saturable Absorber, Yunxiu Ma[1,2], Xiushan Zhu[1], Luyun Yang[2], Jing Zhang[3], Wei Shi[4], Nasser Peyghambarian[1]; [1]*College of Optical Sciences, Univ. of Arizona, USA;* [2]*Wuhan National Lab for Optoelectronics, Huazhong Univ. of Science and Technology, China;* [3]*School of Science, Changchun Univ. of Science and Technology, China;* [4]*College of Precision Instrument and Optoelectronics Engineering, Tianjin Univ., China.* Mode-locking fiber laser by nonlinear Kerr effect of a single-mode-multimode-single-mode (SMS) fiber structure as saturable absorber was demonstrated. A 13.01 MHz mode-locking Tm^{3+}-doped fiber laser operating at 1941.37 nm was obtained.

JW3A.12
Diffractive Fresnel Lens Fabrication with Femtosecond Bessel Beam Writing in Silica, Qi Sun[1], Timothy Lee[1], Ziqian Ding[2], Martynas Beresna[1], Gilberto Brambilla[1]; [1]*Optoelectronics Research Centre, Univ. of Southampton, UK;* [2]*Huawei Technologies Co., Ltd., China.* A 3-layer Fresnel lens with 52% diffraction efficiency was inscribed with a femtosecond Bessel beam in silica, with each layer being ~80 μm. An anomalous dispersion property was characterized with an RGB LED source.

JW3A.13
Material Selection for Generalized Achromatic Lenses Including Conventional, Gradient Index, and Diffractive Components, Guy Beadie[1], Joseph N. Mait[2]; [1]*US Naval Research Lab, USA;* [2]*US Army Research Lab, USA.* Optimum material selection is discussed for unconventional achromatic lenses

JW3A.16
Multi-Plane, Learning Algorithm for Focal Volume Beam Shaping, Harry Burton[1], Ashish Bachavala[1], Christopher Debardelaben[1], Wafa Amir[1], Thomas A. Planchon[1]; [1]*Delaware State Univ., USA.* A Multi-Plane Genetic Algorithm is developed to optimize the focal volume of a laser instead of its focal plane. Using a Spatial Light Modulator, non-diffracting beams are generated to demonstrate the validity of the approach.

JW3A.17
Simple Circular Beam Lattices via Phase Modulated Bessel Beams, Mariia Shutova[1], Aleksandr Goltsov[1,2], Anatoli Morozov[3], Alexei Sokolov[1,2]; [1]*Inst. for Quantum Science and Engineering, Dept. of Physics and Astronomy, Texas A&M Univ., USA;* [2]*Baylor Univ., USA;* [3]*Princeton Univ., USA.* We tailor Bessel beams generated by an axicon employing phase modulation. Resultant non-diffracting circular lattices create stable intensity channels, which, if modified according to experimental needs, offer an ideal instrument for plasma guiding.

JW3A.18
Linearly Polarized Generalized-Gaussian Laser Beams, Jessica P. Conry[1]; [1]*Arkansas Tech Univ., USA.* Dominant and cross-polarization intensity profiles of Generalized Gaussian beams are produced of several orders and angle parameter using a spatial light modulator. The experimental and theoretical profiles are in agreement.

JW3A.19
Performance Evaluation of Infrared Thermographic Fever Screening Systems, Pejhman Ghassemi[1], Joshua Pfefer[1], Jon Casamento[1], Quanzeng Wang[1]; [1]*Food and Drug Administration, USA.* Methods to test stability and uniformity of infrared thermographs were evaluated and improvements were suggested. The study has provided significant insights toward the design of least burdensome standardized test methods.

JW3A.20
A Full-field Heterodyne Interferometer using for Modal