SYMPOSIUM ON UNDERGRADUATE RESEARCH

Division of Laser Science of APS - LS XXXIIII - 17 September 2017 - Washington DC

PARTICIPANTS' LUNCHEON - Jefferson East - 12:00-1:00 P.M.

The participants' luncheon will bring together the Symposium students and distinguished laser scientists. Sandwich lunches will be provided for participants and invited guests only.

REMINDER: Group Photo Break 4:00 – 4:10 p.m. PLEASE assemble at the designated place.

POSTER SESSION - Concourse Foyer - 1:00 - 4:00 P.M.

Session LS1A (poster) 1:00 - 4:00 p.m., Concourse Foyer - Sean Bentley, Adelphi University, Presider

LS1A - 1 Optimizing an electron's path to ionization using a genetic algorithm. *Jason Bennett[1], Kevin Choice[1], Bianca Gualtieri[1], Ankitha Kannad[2], Zoe Rowley[1], Vincent Gregoric[2], Thomas Carroll[1], Michael Noel[2]. 1) Ursinus College, Collegeville, PA 19426, 2) Bryn Mawr College, Bryn Mawr, PA 19010.* A Rydberg electron encounters many avoided crossings as it ionizes in an increasing electric field. The resulting amplitude transfers shape the ionization signal. A genetic algorithm can evolve an electric field pulse that controls the path to ionization. Simulation results of the optimization are presented and compared to data. Supported by NSF.

LS1A - 2 Using spectra and amplitude to stabilize an iInjection lLock. *Ethan Welch, Dallin Durfee, Jarom Jackson. Brigham Young Univ., Provo, UT 84602.* An injection locked laser can jump out of lock if its current or temperature drifts. By monitoring the spectra or the amplitude of the injection locked laser, we have been able to detect drifts and apply feedback to prevent the injection lock from breaking. Supported by NSF.

LS1A - 3 Numerical approximation of Bose-Einstein condensate ground states. *Nicholas Sergay, Nathan Lundblad. Bates College, Lewiston, Maine 04240.* A Bose-Einstein condensate's ground state in a trapping potential (often of optical and/or magnetic origin) can be calculated using the Gross-Pitaevskii (GP) equation, a modified Schrödinger equation. The Thomas-Fermi (TF) approximation simplifies this calculation. A TF solver was implemented in Mathematica and tested against a Matlab GP solver. Supported by Sherman Fairchild Foundation.

LS1A - 4 Nearly transit-time limited electromagnetically induced transparency in an undergraduate laboratory. *Kenneth DeRose, Kefeng Jiang, Hong Cai, Dillon DeMedeiros, Stone Oliver, Linzhao Zhuo, Samir Bali. Miami Univ., Oxford, OH 45056.* We observe electromagnetically induced transparency in the D2 transitions of atomic Rubidium in a standard uncoated vapor cell with no buffer gas. Contrasts of up to 30% are obtained. A narrowest linewidth of 90 kHz is observed, which exceeds the theoretical transit-time broadening by approximately a factor of two. Supported by Miami University.

LS1A - 5 Double-pass acoustic-optic modulator system. *Grant Richmond, Mary Lyon, Marty Cohen, Samet Demircan, Harold Metcalf. Stony Brook Univ., Stony Brook, NY 11794.* A cat's eye retroreflector, composed of a lens and mirror at its focus, was used to eliminate beam deflection when scanning the frequency of a double-pass acousto-optic modulator. The efficacy was determined by measuring coupling efficiency into an optical fiber. The system has been implemented in a Sisyphus cooling scheme. Supported by Simons Foundation.

LS1A - 6 Quantum control of a Rydberg electron's path to ionization using a genetic algorithm. *Ankitha Kannad, Vincent C. Gregoric, Thomas J. Carroll, Michael W. Noel. Bryn Mawr College, Bryn Mawr, PA 19010.* Field ionization is used to determine the state distribution of Rydberg atoms. This is limited because population spreads across several states as the electron is ionized. The ionization pathway can be controlled by perturbations to the electric field which are optimized by a genetic algorithm. Different algorithm parameters are studied. Supported by NSF, Bryn Mawr College Summer Science Research Program.

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Session LS1A (poster): 1:00 - 4:00 p.m., Concourse Foyer - Sean Bentley, Adelphi University, Presider

LS1A - 7 Design and application of a frequency-resolved optical gating (FROG) device for characterization of ultrashort pulses over a broad wavelength range. *Jonathan Nesper[1,2], Henry Kapteyn[1], Margaret Murnane[1], Kevin M. Dorney. 1) Univ. of Colorado, Boulder, CO 80309, 2) Univ. of Central Florida, Orlando, Florida 32816.* Advances in femtosecond pulse generation have expanded the range of wavelengths suitable for pump-probe spectroscopy. Characterization of newly developed sources remains a limitation. A broadband frequency-resolved optical gating (FROG) device was designed and used to characterize femtosecond pulses, ranging from near-IR supercontinua to shortwave infrared fields. Supported by Leadership Alliance, University of Colorado, Boulder.

LS1A - 8 Femtosecond machining of quantum wells. *Ahmed Zaid, Eric Martin, Steven Cundiff. Univ. of Michigan, Ann Arbor, MI 48109.* We examine the effects of an optical pulse near damaging threshold on Gallium Arsenide quantum wells, using a below band gap pulsed fiber laser to create 10-micron spots that will range in pulse intensity and excitation duration. The effects on the sample will be measured using photoluminescence and photoluminescence excitation. Supported by UROP (Undergraduate Research Opportunity Program)

LS1A - 9 Fabrication and characterization of organic thin-film polymeric devices. *Ricardo Espinoza[1,2], Kara Martin[1], Laura Parker[1], Kenneth Carter[1], Ana Sofia de Olazarra[2], Janice Hudgings[2]. 1) Univ. of Massachusetts, Amherst, MA 01003, 2) Pomona College, Claremont, CA 91711.* Devices fabricated from organic polymers are a highly sought alternative to silicon based electronics. We fabricate organic field effect transistors (OFETs) and organic light emitting diodes (OLEDs) and characterize their performance. Next, we will map the charge-carrier distribution using Modulated Amplitude Reflectance Spectroscopy imaging to characterize the device deficiencies.

LS1A - 10 Corneal endothelium imaging: new technique and protocol. *Yue Qi, Andrew Przysinda, Amanda Mietus, Changsik Yoon, Jannick P. Rolland. Institute of Optics, Univ. of Rochester, Rochester, NY 14627.* Evaluation of developing Gabor Domain Optical Coherence Microscopy (GDOCM) and assessing commercially available specular microscopy Kerato Analyzer on human corneal endothelium. Principles of GDOCM apparatus, experimental techniques, sample results and cell counting method were studied and developed. A comparison is made and potential applications of GDOCM addressed. Supported by Lindstrom and LighTopTech Corp. SBIR grants.

LS1A - 11 Stabilization of the readouts for a homemade fluorometer to detect lead in drinking water. *Spencer Graves, Gage Tiber, Theodore A. Corcovilos. Duquesne Univ., Pittsburgh, PA 15219.* We have developed a small, portable device that measures the concentration of lead in water samples. The device uses a chemical called Leadglow that changes a sample's fluorescence depending on lead concentration. The device's optical and electrical systems were redesigned to stabilize the readouts after consecutive test runs. Supported by InnovationWorks through a Dept. of Defense Technology Commercialization Consortium grant.

LS1A - 12 High harmonic generation in barium titanate crystal. *Erin Crites, Shima Gholam-Mirzaei, John Beetar, Michael Chini. Univ. of Central Florida, Orlando, Florida 32816.* Ferroelectric materials polarize along a hysteresis curve in the presence of an electric field, and are of significant interest for novel electronic devices. We use HHG extending into the ultraviolet range to study BaTiO3, a ferroelectric crystal, with a 3800 nm pulsed light source with repetition rate of 50 kHz. Supported by AFOSR.

LS1A - 13 Optimization of a two-photon laser scanning microscope. *Emma Moskovitz, Michael E. Durst. Middlebury College, Middlebury, VT 05753.* We present a custom-built two-photon laser scanning microscope with a simple sample alignment system. The microscope creates two-photon excited fluorescence images by focusing the beam to a small point and scanning the sample. We imaged Drosophila melanogaster (fruit fly) brains revealing autofluorescence and eGFP-tagged neurons when excited at different wavelengths. Supported by Institutional Development Award (IDeA) from NIH.

LS1A - 14 Interference from partially-coherent light sources. *Natalie Ferris, Hongyi Li, David Jackson, Brett Pearson. Dickinson College, Carlisle, PA 17013.* Double-slit interference patterns for partially-coherent light sources, including one arm of a down-converted light source, are presented. Experimental results are compared with mathematical models to analyze the visibility of the interference patterns. We show the effect of angular source size on the visibility and discuss the implications for ghost interference. Supported by Dickinson College.

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LS1A - 15 Toward a self-referenced fiber laser optical frequency comb. *Daniel Upcraft, Ella Johnson, Kellan Moorse, Chad Hoyt,. Bethel Univ., St. Paul, MN 55112.* A mode-locked erbium fiber laser, amplifier and highly nonlinear fiber generate an octave-spanning spectrum which interferes with a frequency-doubled portion of itself. Beat frequency peaks can reveal the carrier-envelope offset frequency. Progress toward this end is reported. Supported by NSF, NASA-MN Space Grant Consortium.

LS1A - 16 Laser modification effects on gallium arsenide measured with photoluminescence. *Robert Dalka, Steve Cundiff, Steve Yalisove, Ben Torralva, Alex Sarracino, Rico Cahyadi. Univ. of Michigan, Ann Arbor, MI 48109*. Samples of laser modified Gallium Arsenide have been hypothesized to contain vacancies and interstitials introduced when the GaAs is exposed to laser pulses. This claim is supported by observation of localization features in the photoluminescence (PL) spectrum. The results from the PL measurements and their significance will be discussed.

LS1A - 17 Stabilizing the wavelength of a reference laser for a modified Michelson interferometer. *Madelyn Hoying, Jahnavee Mittal, Bryonna Beeson, Theodore Corcovilos. Duquesne Univ., Pittsburgh, PA 15219.* Controlling the temperature of the laser controls the length of a laser cavity and therefore the wavelength of emitted light. Polarization was measured as a proxy for wavelength, and when the polarization changed, a PID controller changed the heater output to keep polarization and therefore the wavelength constant.

LS1A - 18 2D material excitonics. *Jonathan Dietz, A. Mukherjee, K. Konthasinghe, C. Chakraborty, A. N. Vamivakas. Univ. of Rochester, Rochester, NY 14627.* Heterostructures of 2D materials are used to study exciton formation, interaction, and recombination. The technique for fabrication is described, including methods of controlling defect formation, contamination, and doping. Spectroscopy techniques and degrees of freedom in device design are further explored. Supported by NSF.

LS1A - 19 High-speed optical imaging of compressible flows. *Keith Vollendorf, Nathan Wahlberg, Keith Stein. Bethel Univ., St. Paul, MN 55112.* Schlieren and Mach-Zehnder interferometer techniques are compared for imaging of high-speed recordings of compressible flows. Schlieren imaging is straightforward and presents detailed visual depictions of fluids density variations whereas the interferometer offers quantitative information. Together, these methods provide a holistic analysis of gas dynamics by supplementing each other's insufficiencies. Supported by Minnesota Space Grant Consortium.

LS1A - 20 Optomechanics of a levitated nanosphere. *Emily Law[1,2], Robert Pettit, Nick Vamivakas[1]. 1) Univ. of Rochester, Rochester, NY 14627, 2) Ashland Univ., Ashland, OH 44805.* A nanoparticle is levitated in an optical dipole trap and its oscillation cooled by modulating the optical potential well depth using parametric feedback. Particle dynamics are observed during various degrees of chamber pressure and trapping beam power without feedback. Supported by NSF.

LS1A - 21 Using a low cost SLM to encode and decode light. *David Siegel, Max Stanley, Samet Demircan, Martin G. Cohen, Mary Lyon, Harold Metcalf. Stony Brook Univ., Stony Brook, NY 11794.* We explore the properties of a low-cost spatial light modulator (SLM) to determine how phase modulation can be used to encode and decode light. We employ a double reflection from separate areas of a single SLM and study polarization effects that can affect the phase modulation. Supported by Simons Foundation.

LS1A - 22 Plasmonic trapping and manipulation of nanoparticles using holograms. *Joshua Kolbow, Nathan Lindquist. Bethel Univ., St. Paul, MN 55112.* Plasmonic tweezers have been developed which allow for the trapping of nanoparticles. A laser shaped via holography is used to generate plasmons to trap particles in the center of a bullseye-shaped cavity made in a silver substrate. Using holography to generate the plasmons allows for manipulation of trapped particles. Supported by NSF.

LS1A - 23 3D Imaging with a temporal focusing microscope. *Anthony Turcios, Michael E. Durst. Middlebury College, Middlebury, VT 05753.* We present a wide-field two-photon microscope that creates optical sectioning through temporal focusing, in which the laser pulse width varies with depth. We show that the addition of dispersion can scan the depth of the temporal focus, and we discuss how various parameters affect the resolution of the microscope. Supported by Institutional Development Award (IDeA) from NIH and the Middlebury Bicentennial Fund.

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Session LS1A (poster): 1:00 - 4:00 p.m., Concourse Foyer - Sean Bentley, Adelphi University, Presider

LS1A - 24 Monte Carlo wave functions to model Doppler laser cooling. *Derek Galvin, Swati Singh. Williams College, Williamstown, MA 01267.* We use Monte Carlo wave functions to simulate the electronic and motional states of an atom interacting with laser fields in a reservoir made of electromagnetic vacuum modes. We hope to use this method to develop a quantum description of some novel laser cooling techniques.

LS1A - 25 SERS-STORM imaging of *Chlamydomonas reinhardtii*. *Kallai Hokanson, Alyssa Spofford, Nathan Lindquist. Bethel Univ., St. Paul, MN 55112.* Using a combination of Surface Enhanced Raman Spectroscopy (SERS) and Stochastic Optical Reconstruction Microscopy (STORM), wild-type and mutant *Chlamydomonas reinhardtii* cells with impaired kinesin-homologous motor proteins are imaged both chemically and with super-resolution. Preliminary images and techniques will be discussed. Supported by NSF.

LS1A - 26 High-resolution interference patterns using nonlinear absorption. *Allan Delarosa, Muhammad Aziz, Sean Bentley. Adelphi Univ., Garden City, NY 11530.* We are developing a system that will generate arbitrary, high-resolution interference patterns by introducing phase shifts into interfering beams. Resolution is limited by wavelength, but by directing high-intensity beams onto a nonlinearly absorbing material, we can achieve a higher resolution than a particular wavelength would normally allow. Supported by McDonell Fellowship.

LS1A - 27 Illustrating the differences between a superposition and a mixture of states. *Muhammad Aziz, Allan Delarosa, Sean Bentley. Adelphi Univ., Garden City, NY 11530.* We prepared a classical system to mimic a quantum entangled system. Using a quantum eraser, we compared the results to demonstrate the difference between a mixture and a superposition. In a mixture, unlike a superposition, there is no way to erase the which-slit information and generate a double slit pattern.

LS1A - 28 Toward an optical bottle beam dipole trap for ultracold lithium atoms. *Greyson Stocker, Sam Johnson, Chad Hoyt. Bethel Univ., St. Paul, MN 55112.* The introduction of a optical dipole trap was explored in an existing lithium magneto-optical trap. A hollow laser beam, which was used to implement the blue-detuned dipole trap, was created using a home-built phase mask fabricated with a scanning electron microscope. Initial attempts at implementation will be discussed. Supported by Bethel University, NASA-MN Space Grant Consortium.

LS1A - 29 Directly testing the theory behind all optical QPM. *Thomas Lehman-Borer, Etienne Gagnon, Amy L. Lytle. Franklin & Marshall College, Lancaster, PA 17604.* Second harmonic generation is an inefficient nonlinear optical process in the absence of phase matching. A flexible means of quasi-phase matching uses interference from a counter-propagating pulse to change the strength of the second harmonic. This experiment tests two conflicting hypotheses explaining the interaction. Supported by NSF.

LS1A - 30 Propagation of structured beams in turbid media. *Alexander Fyffe, Brian Kantor, Ziyi Zhu, Zhimin Shi. Univ. of South Florida, Tampa, FL 33620.* Structured beams are promising for free-space applications. We establish a split-step method and von-Karman model to simulate propagation of structured beams through atmosphere. We also generate structured beams using cascaded spatial-light-modulators, which propagate through a heating-element-based turbulence cell. Our study shows that structured beams offer communication protocols that are turbulence-resistant. Supported by ONR.

LS1A - 31 Recovering the mutual intensity function with low light levels. *Gregory Costello[1,2], Miguel Alonso[1], Thomas Brown[1], Katelynn Sharma. 1) Univ. of Rochester, Rochester, NY 14627, 2) Stonehill College, North Easton, MA 02357.* The project’s aim is to recover the mutual intensity of an optical beam using as few photons as possible. Previous measurements were conducted using high light levels. A minimum threshold is obtained for the number of detected photons needed to recover the mutual intensity. Simulations and experimental results are compared. Supported by NSF.

LS1A - 32 Digital plasmonic holography. *Joseph Nelson, Greta Knefelkamp, Nathan Lindquist. Bethel Univ., St. Paul, MN 55112.* Experiments have been done in an effort to use surface plasmon waves and digital holographic microscopy to image objects smaller than the wavelength of light. Information recorded in one dimension is used to create two-dimensional images. Further information about the apparatus and experimental results will be discussed. Supported by NSF.

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Session LS1A (poster): 1:00 - 4:00 p.m., Concourse Foyer - Sean Bentley, Adelphi University, Presider

LS1A - 33 AC skin effect across a rectangular metal sheet. *Anne Blackwell, Seth Aubin, Drew Rotunno. College of William and Mary, Williamsburg, VA 23187.* We present an experiment to observe the AC skin effect in a metal sheet driven at kHz frequencies. We use a pick-up coil to observe the current distribution in the sheet. The experiment is motivated by work to develop microwave atom chips for ultracold atoms. Supported by AFOSR.

LS1A - 34 Temporal diffraction signal analysis of C. elegans locomotion. *Cheris Congo, Miranda Hulsey-Vincent, Jenny Magnes. Vassar College, Poughkeepsie, NY 12604.* Analyzing microorganism locomotion requires time consuming video analysis and may omit subtleties. We analyze the intensity of the diffraction pattern resulting from a nematode being placed in a laser beam. We modeled patterns found in worm movement and compared the results to experimental data. Supported by Vassar College Undergraduate Research Summer Institute, Lucy Maynard Salmon Research Fund, NSF.

LS1A - 35 Feedback induced dynamics of quantum dot lasers. *Tianyao Huang, Salim Ourari, Hong Lin. Bates College, Lewiston, Maine 04240.* We study behavior of a quantum dot laser subject to isotropic and polarization-rotated optical feedback. The laser is more sensitive to rotated feedback. Orthogonal polarization is stimulated and strong fluctuations can occur for large-angle rotation. Supported by Bates College.

LS1A - 36 Encoding information in optical angular momentum. *Christopher Ayala[1,2], Giovanni Milione[1,3]. Robert Alfano[1]. 1) The City College of New York, New York, NY 10031, 2) Stony Brook Univ., Stony Brook, NY, 11794, 3) NEC Laboratories America, Inc., Princeton, NJ 08540.* A method to efficiently measure the spin and orbital momentum of light is presented. In contrast to the use of, for example, fork diffraction gratings, we use refractive optics and conventional wave plates. As proof of principle, the spin and orbital angular momentum of various vector beams are measured.

LS1A - 37 Progress on developing an MRI analog lensless imaging technique using laser interference patterns. *Dionicio Sauer, Dallin Durfee, Jarom Jackson. Brigham Young Univ., Provo, UT 84602.* A proof of principle experiment was developed and tested for the development of an MRI inspired lensless imaging technique employing laser interference patterns. One dimensional reflectivity profiles of illuminated samples were generated using the preliminary technique. Principles of the method will be discussed. Supported by NSF.

LS1A - 38 Singularities in spinor ^{87}Rb Bose–Einstein condensates. *Annalise Slattery[1,2,] Joseph D. Murphree[1], Maitreyi Jayaseelan[1], Nicholas Bigelow[1]. 1) Univ. of Rochester, Rochester, NY 14627, 2) Bethel Univ., St. Paul, MN 55112.* Progress was made toward using a digital micromirror device to create and characterize optical beams that contain singularities. These singularities are to be imprinted on a spinor Bose-Einstein Condensate (BEC) of Rubidium-87 via a coherent two-photon stimulated Raman interaction, therein creating complex, spatially-dependent spin textures in the BEC. Supported by NSF.

LS1A - 39 Control of optical micromanipulation for investigating B dellovibrio bacteria. *Alexis Hartmann, Richard Halpern, Catherine M. Herne. S.U.N.Y. New Paltz, New Paltz, NY 12561.* We investigate the motion of B. bacteriovorus in an optical trap and implement stepper motors to improve the fine mechanical motion control of samples. We compare the trapping force on a bacterium when it is held against a glass surface versus when it is held against a bacteria-coated (prey) surface.

LS1A - 40 Magnetometry with cold Rydberg atoms. *Lamiaa Dakir[1], Hyunjung Kim[1], Vincent C. Gregoric[1], Thomas J. Carroll[2], Michael W. Noel [1] 1) Bryn Mawr College, Bryn Mawr, PA 19010. 2) Ursinus College, Collegeville, PA 19426,* A magnetic field is measured using Larmor precession in ultracold Rydberg atoms. The experiment is done by exciting a single $|m_j|$ state and observing the precession of population to other $|m_j|$ states using microwave spectroscopy. Zero magnetic field is found by varying the current in three Helmholtz coils. Supported by NSF, Bryn Mawr College Summer Science Research Program.

LS1A - 41 Nonlinear time series analysis of C. elegans: determination of largest Lyapunov exponents. *Ryan Hardt, Erik Szwed, Jenny Magnes, Vassar College, Poughkeepsie, NY 12604* In a nondestructive study the three dimensional motion of nematodes diffraction patterns is observed. A nonlinear time series analysis of nematode diffraction data is presented for mutant and non-mutant C. elegans. The largest Lyapunov exponents in our experiment indicate that motion of these nematodes is chaotic for both phenotypes.

<u>Group Photo Break</u> 4:00 – 4:10 PM
<u>PLEASE</u> assemble at the designated place.

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Session LS2A (oral): 4:10 - 5:00 p.m., Jefferson East - Jenny Magnes, Vassar College, Presider

LS2A - 1 A novel all-reflective rotational anisotropy nonlinear harmonic generation spectrometer. *Jason Tran, Darius Torchinsky. Temple Univ., Philadelphia, PA 19122.* Examining symmetries of crystalline lattices and associated ordered electronic phases is essential to understanding their mechanical, electrical, and magnetic properties. Our novel rotational anisotropy second harmonic generation spectrometer measures point group symmetries of quantum materials across an unprecedented wavelength range (460 nm - 2.6 um).

LS2A - 2 Frequency doubled source for atomic state lifetime measurement. *Ella Johnson[1,2], Andrew Ludlow[1], Robert Fasano[1], Daniele Nicolodi[1], Rich Fox[1]. 1) NIST, Boulder, CO 80305, 2) Bethel Univ., St. Paul, MN 55112.* The uncertainty of the ytterbium optical clock is dominated by the knowledge of the Stark shift due to room temperature blackbody radiation. This can be improved by an accurate measurement of the $^3D_1$ state lifetime. To this end, a frequency doubled laser source was prepared at 556 nm. Supported by NIST.

LS2A - 3 Noise-enabled optical ratchet in cold atoms. *Patrick Janovick, Anthony Rapp, Ethan Clements, Preston Ross, Jessie Slattery, Samir Bali. Miami Univ., Oxford, OH 45056.* By shining an additional laser beam onto a 3D optical lattice we introduce a propagating modulation that “ripples” through the lattice, “dragging” along some cold atoms. The underlying physical mechanism is discussed, and data presented to elucidate the interplay between noise (spontaneous emission) and directed motion. Supported by Miami Univ.

LS2A - 4 Towards quantum key distribution via full transverse beam structures. *Stone Oliver[1,2], Yiyu Zhou, Mohammad Hashemi, Robert Boyd[1]. 1) Institute of Optics, Univ. of Rochester, Rochester, NY 14627, 2) Miami Univ., Oxford, OH 45056.* A Laguerre Gaussian radial mode sorter has been realized via single-path interferometry induced by fractional Fourier transforms. Future work will entail implementation of this sorter in a quantum key distribution system utilizing multiple bits per photon encoded in the spatial quantum numbers of LG beams. Supported by NSF.

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Session LS3A (oral): 5:10 – 6:00 p.m., Jefferson East - Samir Bali, Miami University, Presider

LS3A - 1 Determination of the Landé g_J(2p9) factor in ^{20}Ne. *W. J. Dworschack, J. R. Brandenberger. Lawrence Univ., Appleton, WI 54911.* Using saturated absorption laser spectroscopy, the Landé g_J value for the 2p9 state of ^{20}Ne has been measured to an order of magnitude greater precision than previously. It is our hope that this new measurement will prompt further refinement of calculations concerning the Landé g_J factor. Supported by Lawrence University.

LS3A - 2 Determining elliptical polarization of light from rotation of calcite crystals. *Lucas A. Tracy, Natalie A. Cartwright, Catherine M. Herne, S.U.N.Y. New Paltz, New Paltz, NY 12561.* We developed a process for determining the polarization profile of a laser mode based on the motion of calcite crystals. Our results are typically within 5% of the actual polarization. Development of data collection and analysis techniques, as well as the future of the project, will be discussed. Supported by Summer Undergraduate Research Experience (SURE) program at S.U.N.Y New Paltz.

LS3A - 3 Design and construction of an efficient atomization tool for strong field science at the nanoscale. *Lindsay Hutcherson[1,2], Adam Summers, Jeff Powell, Carlos Trallero[1]. 1) Kansas State Univ., Manhattan, KS 66506, 2) Univ. of South Alabama, Mobile, AL 36608.* A more efficient nanoparticle source has been designed to make metallic nanoparticle studies more viable for strong field laser science. This source seeks to eliminate waste and increase nanoparticle production for limited beamtimes. Progress and the implications of this design's success will be discussed. Supported by NSF, AFOSR, DOE.

LS3A - 4 Optical path length stabilization for Al^+ optical clock. *Maxwell Werner[1,2], David Hume[1], David Leibrandt[1]. 1) NIST, Boulder, CO 80305, 2) Bethel Univ., St. Paul, MN 55112.* Due to recent advances in optical cavities, optical path length fluctuations in air now have an observable effect on the stability of atomic clocks. An active compensation system was designed to reduce these effects. The potential impact of this system on an Al^+ clock was then characterized and modeled. Supported by NIST and by ONR.

Symposium organized by Chad Hoyt and Harold Metcalf