

# ***ANNUAL RESEARCH SYMPOSIUM***

***April 2, 2015***



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### **PROGRAM**

|                                                                                      |                    |
|--------------------------------------------------------------------------------------|--------------------|
| Session S1 (KDM Science Building, S-127)                                             | 1:00 PM -- 2:24 PM |
| Session S2 (KDM Science Building, S-123)                                             | 1:00 PM -- 2:24 PM |
| BREAK                                                                                | 2:24 PM -- 3:00 PM |
| Session S3 (KDM Science Building, S-127)                                             | 3:00 PM -- 4:24 PM |
| Session S4 (KDM Science Building, S-123)                                             | 3:00 PM -- 4:12 PM |
| Keynote Talk, Awards Dinner, and<br>Presentation of Awards<br>(SRSC Traditions Room) | 6:00 PM -- 8:00 PM |



## **SESSION S1**

**Room:** KDM Science Building, S-127

**Chair:** Dr. Jeff Kopachena  
*Department of Biological and Environmental Sciences*

- 1:00 PM S1.1 **Electron Screening in Stellar Environments**  
**Michael Hendrix** and Carlos Bertulani  
*Department of Physics & Astronomy*  
**Undergraduate** (College of Science and Engineering)
- 1:12 PM S1.2 **Global Competence amongst First Year Students**  
**Ashley Kimble** and Shonda Gibson  
*Student Access and Success*  
**Graduate** (College of Education and Human Services)
- 1:24 PM S1.3 **The Narrative of Poverty: Implications for Student Clinicians and Clients**  
**Andrew McLane**, Chase Court, Morgan Saxon, and Linda Openshaw  
*Department of Social Work*  
**Graduate** (College of Education and Human Services)
- 1:36 PM S1.4 **Mast Syndrome: Complicated or Not?**  
**Diana Sanchez**, Halie Fetters, Kartheek Gavini, Lauren Bailey, and Lani Lyman-Henley  
*Department of Biological and Environmental Sciences*  
**Undergraduate** (College of Science and Engineering)
- 1:48 PM S1.5 **Predicting Propensity to Join Alumni Association following Exposure to Persuasive Messaging**  
**Rochana Kaushik**, Stephen Reysen, and Shonda Gibson  
*Department of Management*  
**Graduate** (College of Business)
- 2:00 PM S1.6 **Using a Monte-Carlo Simulation to Calculate the Cross Section of the  $\rho^0$  meson in ultra-peripheral nuclear collisions**  
**James O. Thomas** and Carlos Bertulani  
*Department of Physics and Astronomy*  
**Graduate** (College of Science and Engineering)
- 2:12 PM S1.7 **A DAFT Supernova Progenitor Search**  
**Kurtis A. Williams**, Donald Serna-Grey, Subho Chakraborty, and Matt Wood  
*Department: Physics & Astronomy*  
**Faculty** (College of Science & Engineering)

## **SESSION S2**

**Room:** KDM Science Building, S-123

**Chair:** Dr. Stephen Starnes  
*Department of Chemistry*

- 1:00 PM      S2.1      **The Use of Educational Portfolios to Communicate and Monitor the Educational Needs of Students Living in Foster Care**  
**Trudy E. Watson** and Susan Szabo  
*Department of Education, Curriculum and Instruction*  
**Graduate** (College of Education and Human Services)
- 1:12 PM      S2.2      **Capturing Volatility in the Options Market**  
**Nishanth Arepalli**, Harika Vasireddy, and Kurtay Ogunc  
*Department of Economics and Finance*  
**Graduate** (College of Business)
- 1:24 PM      S2.3      **Combinatorial Interpretation of Q-Analogue of Special numbers**  
**Ayoub H. Al-Amin** and Hasan Coskun  
*Department of Mathematics*  
**Graduate** (College of Science and Engineering)
- 1:36 PM      S2.4      **Regional elasticity of milk supply and the resultant policy implications under 2014 Farm Bill**  
**Frannie Miller**  
*Department of Economics and Finance*  
**Faculty** (College of Business)
- 1:48 PM      S2.5      **Development of a Novel Multivariate Classification Method and Its Application to Wireless EEG Data**  
**Seetaramaraju Jampana** and Unal “Zak” Sakoglu  
*Department of Computer Science*  
**Graduate** (College of Science and Engineering)
- 2:00 PM      S2.6      **Chiral Porphyrins with Chiral Caps: Synthesis and Chiral Recognition Studies**  
**Khanh Truong** and Stephen Starnes  
*Department of Chemistry*  
**Graduate** (College of Science and Engineering)
- 2:12 PM      S2.7      **Few Body Calculations - An Overview**  
**Kacper Topolnicki** and Carlos Bertulani  
*Department of Physics and Astronomy*  
**Faculty** (College of Science and Engineering)

2:24 PM -- 3:00 PM

**BREAK**

**SESSION S3**

**Room:** KDM Science Building, S-127

**Chair:** Dr. Kurtis Williams  
*Department of Physics and Astronomy*

- 3:00 PM      S3.1    **Estimating Solutions to Systems of Integral Equations Using Gronwall's Inequality**  
**Christopher Johnston**, Bradford Garcia, and Tingxiu Wang  
*Department of Mathematics*  
**Undergraduate** (College of Science and Engineering)
- 3:12 PM      S3.2    **Oxidation of Vanadium**  
**Darius Durant** and A. R. Chourasia  
*Department of Physics and Astronomy*  
**Undergraduate** (College of Science and Engineering)
- 3:24 PM      S3.3    **The Nature and Function of Questions in Algebra 1 Textbooks: Implications for Students with Mathematics Difficulties or Disabilities**  
**Hayleigh Garlow**, Carmen Gills, Monquie Williams, Amber Berg, and Brittany Hott  
*Department of Psychology, Counseling, and Special Education*  
**Undergraduate** (College of Education and Human Development)
- 3:36 PM      S3.4    **Does Differential Handling Effect Responsiveness in Standard Behavioral Testing of Colubrid Snakes?**  
**Elizabeth Jones**, Lauren Bailey, and Lani Lyman-Henley  
*Department of Biological and Environmental Sciences*  
**Undergraduate** (College of Science and Engineering)
- 3:48 PM      S3.5    **Periodic Analysis of V447 Lyr: A U Geminorum Cataclysmic Variable in the Kepler Field**  
**Chance C. Brown** and Matt A. Wood  
*Department of Physics and Astronomy*  
**Graduate** (College of Science and Engineering)
- 4:00 PM      S3.6    **The Spectrum of Pair Production in Photons and their Collision with Target Nucleus**  
**Nathan Brady** and Carlos Bertulani  
*Department of Physics and Astronomy*  
**Graduate** (College of Science and Engineering)
- 4:12 PM      S3.7    **Time Series Analysis of V1101: A Z Cam Cataclysmic Variable**  
**Alexander C. Spahn** and Matt Wood  
*Department of Physics & Astronomy*  
**Graduate** (College of Science and Engineering)

## **SESSION S4**

**Room:** KDM Science Building, S-123

**Chair:** Dr. DongWon Choi  
*Department of Biological and Environmental Sciences*

- 3:00 PM      S4.1      **Effects of a Leadership Training Program on International Students' Sense of Belonging and Social Identity**  
**Sanchali Ray**, Stephen Reysen, and Shonda Gibson  
*Department of Educational Leadership*  
**Graduate** (College of Education and Human Services)
- 3:12 PM      S4.2      **Examining the performance of IPOs in the short-run: A case study of firms in the U.S**  
**Monica Kabutey**, Olutola Kehinde, and Kurtay Ogunc  
*Department of Economics and Finance*  
**Graduate** (College of Business)
- 3:24 PM      S4.3      **Effects of Volume Exclusion on the Equation of State for Neutron Stars**  
**Jared Lalmansingh** and Carlos Bertulani  
*Department of Physics and Astronomy*  
**Graduate** (College of Science and Engineering)
- 3:36 PM      S4.4      **Teacher Perceptions of a Simple Data-Mapping Tool© to Plan for Student Interventions**  
**Brittany L. Hott** and Laura J. Isbell  
*Department of Psychology, Counseling, and Special Education, Curriculum and Instruction*  
**Faculty** (College of Education and Human Services)
- 3:48 PM      S4.5      **Write On: The Effects of Self-Regulated Strategy Development with Science Prompts on the Persuasive Writing Performance of Elementary Students with Emotional and Behavioral Disorders**  
**Nelly Shora** and Brittany Hott  
*Department of Psychology, Counseling, and Special Education*  
**Graduate** (College of Education and Human Services)
- 4:00 PM      S4.6      **Relation between parental divorce and adjustment in college students**  
**Breanna Connel**, DeMarquis Hayes, and Maria Carlson  
*Department of Psychology, Counseling, & Special Education*  
**Undergraduate** (College of Education and Human Services)

## **POSTER PRESENTATIONS**

**KDM Science Building Foyer** (1:00 PM -- 4:30 PM)

- P1. **Cultivation Optimization of *Methylosinus trichosporium* OB3b for Methanobactin Preparation; Controlling Dissolved Oxygen and Cell Density**  
**Israel Chavarri**, Shakti Gurung, Jihyun Kim, and DongWon Choi  
Department of Biological and Environmental Sciences  
**Graduate** (College of Science and Engineering)
- P2. **Effects of Prescribed Fire, Tillage, and Herbicide to Reestablish Native Vegetation on Old Fields within the Blackland Prairie Ecoregion of Texas**  
**Audrey Whaley**, Jim Eidson, and Jeffrey Kopachena  
Department of Biological and Environmental Sciences  
**Graduate** (College of Science and Engineering)
- P3. **Administrators' Perceptions of Behavioral Response to Intervention (RtI) on the Secondary Level**  
**Marquita M. Anderson** and Kemp-Graham  
Department of Educational Administration  
**Graduate** (College of Education and Human Services)
- P4. **Examining the performance of IPOs in the short-run: A case study of firms in the U.S**  
**Olutola Kehinde**, Monica Kabutey, and Kurtay Ogunc  
Department of Economics and Finance  
**Graduate** (College of Business)
- P5. **Cardiac-Inducing RNAs Direct the Differentiation of Stem Cells into Cardimycocytes for Heart Repair**  
**Andrei Kochevarov**, Allyson Davis, Lena Mitchell, Michael Neal, Nikolas Scarcelli, Greg Vaughn, and Larry F. Lemanski  
Department of Biological and Environmental Sciences  
**Undergraduate** (College of Science and Engineering)
- P6. **Habitat Suitability Model for Eastern Bell's Vireo in Northeast Texas**  
**Amanda Turley** and Jeffrey Kopachena  
Department of Biological and Environmental Sciences  
**Graduate** (College of Science and Engineering)
- P7. **Extending the Testing Effect Research into the Classroom**  
**Cynthia L. McAllister** and Benton Pierce  
Department of Psychology, Counseling, and Special Education  
**Graduate** (College of Education and Human Services)

- P8. **An Examination of the Testing Effect as a Function of Math Anxiety and Math Fluency**  
Beth Nikopoulos, Stephen Dreiling, Sarah Borja, Cindy May, Eva Limoges, Katie Reeves, Andrea Rosales, and Lacy Krueger  
Department of Psychology, Counseling, and Special Education  
Graduate (College of Education and Human Services)
- P9. **Disaster Preparedness for Undergraduate Baccalaureate Nursing Students**  
Bonnie Smithers and Monica L. Tenhunen  
Department of Nursing  
Faculty (College of Education and Human Services)
- P10. **SPG21 Mutation leads to Progressive Adult Onset Hereditary Spastic Paraplegia and Attenuated Lower Limb Function**  
Alexis Bivona, Will Latson, Anne Davenport, and Venu Cheriya  
Department of Biological and Environmental Science  
Graduate (College of Science and Engineering)
- P11. **GRIP, a Novel Functional Genomics Strategy to Identify and Validate Antiestrogen Resistance Genes in Breast Cancer Cells**  
Sirisha Chakkapalli, Lee Chetham, and Venu Cheriya  
Department of Biological and Environmental Sciences  
Graduate (College of Science and Engineering)
- P12. **Light Curve Analysis of Five Asteroids**  
Sarah Cantu, Max Adolphson, Vanessa Lyons, Steven Allemang, Cole Humphrey, and Kent Montgomery  
Department of Physics and Astronomy  
Undergraduate (College of Science and Engineering)
- P13. **The Epigenetic Effects of Bisphenol A on the Transgenerational Promotion of Yellow Coat Color and Obesity in Agouti Mice**  
Amanda Hill, Kailee Johnson, and Venu Cheriya  
Department of Biological and Environmental Sciences  
Undergraduate (College of Science and Engineering)
- P14. **G1P3 Alters Redox Signaling and Induces Mitochondrial Fusion to Evade Apoptosis in Breast Cancer Cells**  
Kailee Johnson, Ashjan Khalel, and Venu Cheriya  
Department of Biological and Environmental Sciences  
Undergraduate (College of Science and Engineering)
- P15. **Diadzin-rich soy isoflavones promote estrous cycling in VCD-Induced Menopause Mouse Model**  
Simbarashe Mazambani, Kailee Johnson, Sravan Vemuri, Sameerh Alshafi, and Venugopalan Cheriya  
Department of Biological and Environmental Sciences  
Graduate (College of Science and Engineering)

### **Keynote Talk**

**Room:** Traditions Room (SRSC, 212)

**Time:** 6 PM

**Chair:** Dr. Cheri Davis  
*Office of Planetarium*

#### **Role of Kisspeptin in Vertebrate Reproduction: Do Fish Need a Kiss?**

**Dr. Izhar Khan**

Biological and Environmental Sciences

Kisspeptin (Kiss) hormone and its receptors were first discovered in humans and other mammalian species in mid 2000s and subsequently Kiss genes were found in fish. Kiss via binding to its cell surface receptor is considered to act as a gatekeeper of reproduction in vertebrates, and is therefore one of the most important regulators of pubertal development. Dr. Khan uses fish as alternative vertebrate model to investigate the role of Kiss in vertebrate reproduction, and how environmental chemicals can impair reproduction by interfering with the function of brain hormones such as Kiss and gonadotropin-releasing hormone that regulate reproduction. Identifying a novel mechanism of neuroendocrine toxicity in a relatively simple vertebrate model will open new opportunities for further research in this area using other vertebrate models and case studies in human subjects exposed to the chemicals accidentally or due to exposure through diet. The presentation will cover a brief overview of the current status of research in this relatively new field.



# **ABSTRACTS**



## Electron Screening in Stellar Environments

Michael Hendrix

Advisor: Carlos Bertulani

Department: Physics & Astronomy

College: Science and Engineering

Category: Undergraduate

The universe is filled with stars consisting of stellar plasmas actively undergoing nuclear fusion. The reacting ions within this plasma are surrounded by a sea of electrons due to the ionization of the atoms. Our research attempts to understand and quantify the “screening” affect these electrons have on the nuclear fusion reaction. The screening enhancement factor is a numerical value derived from the adjustment of the charge density and Coulomb potential around the reacting ions due to the electrons. It directly influences the calculation of the fusion reaction rate in stars. Following each step and referencing additional literature, we review the derivation of the screening enhancement factor proposed in a 2003 article by Theodore E. Liolios. Our research culminates in the numerical evaluation and graphing of the screening enhancement factor for various stellar environments. We conclude that the screening effect of the electrons plays an important role in the fusion reaction taking place within stars.

**Global Competence amongst First Year Students**

Ashley Kimble

Advisor: Shonda GibsonDepartment: Student Access and SuccessCollege: Education and Human ServicesCategory: Graduate

The world has been transformed into an environmentally, politically, and economically interconnected and interdependent web. Due to our increasingly connected global society the need for individuals with the ability to demonstrate global competence is undeniable. Hunter (2004) has defined global competence as “having an open mind while actively seeking to understand cultural norms and expectations of others, and leveraging this gained knowledge to interact, communicate and work effectively in diverse environments” (pp. ). To produce globally competent individuals, educational institutions need to address the challenge of preparing and producing graduates with a global worldview. Past research has shown that students are not necessarily formally educated and trained to comprehend the full impact of global interconnectedness, nor to make informed decisions with full knowledge and awareness of the global implications (Olson & Krueger, 2001). In the current analysis, 930 incoming, first-time, full-time freshman students were asked to complete the Global Competence Aptitude Assessment (GCAA). Students demonstrated low levels of historical perspectives and global awareness (external readiness). Overall, students’ internal and external readiness scores are underdeveloped. Supporting past research, the current study found that students have not fully mastered global competence, and may not be fully prepared to interact in an interconnected world. The results aid in better understanding college students’ level of global competence providing insight regarding areas for improvement and development of programs designed to improve global competence.

## **The Narrative of Poverty: Implications for Student Clinicians and Clients**

Andrew McLane

Advisor: Linda Openshaw

Co-Authors: Chase Court and Morgan Saxon

Department: Social Work

College: Education and Human Services

Category: Graduate

This research explores the root causes of poverty, its influences on the individual and the role of the clinician. Poverty in the United States is an issue that is experienced on a daily basis by all walks of life and extends across the globe. Using a variety of theories and explanations, poverty is broken down into various components in order to present the multidimensional facets of impoverishment. It is imperative for clinicians to view poverty as a factor that can influence a client's wellbeing and daily functioning. In order to provide efficient care, clinicians must understand the narrative of poverty.

## **Mast Syndrome: Complicated or Not?**

Diana Sanchez

Advisor: Lani Lyman-Henley

Co-Authors: Halie Fetters, Kartheek Gavini, and Lauren Bailey

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Undergraduate

Introduction: Hereditary Spastic Paraplegias (HSPs) are neurological disorders marked by weakness, immobility or spasticity of the lower limbs, and sensory inhibition that progresses with age. HSPs can be divided into pure and complicated categories. The pure category consists of those HSPs that only involve motor abnormalities, while the complicated category includes HSPs that involve motor abnormalities accompanied by other symptoms, such as mental retardation. Mast syndrome (SPG21) is an autosomal-recessive complicated form of HSP described among the Old Order Amish that originates from a frameshift mutation of the ACP33/masparidin gene. Affected individuals suffer from dementia, abnormalities in white matter, and thinning of the corpus callosum in addition to spastic paraparesis.

A SPG 21  $-/-$  “knockout” mouse model has been developed to research this disorder. Previous research has suggested these mice exhibit motor abnormalities; some of these observed abnormalities are a back-leg clasp, which can be best observed when the mouse is held up by the tail, and a lack of balance that has been demonstrated in previous research by beam-walking tests.

Other studies have shown that BMP4 diminishes cognitive ability and the generation of neurons from progenitor cells in mice. Recent research has shown that masparidin may act in helping to inhibit BMP signaling in Mouse Embryonic Fibroblasts (MEFs) and Neurons. Therefore, our working hypothesis is that the SPG 21  $-/-$  mouse will exhibit cognitive deficits as compared to wildtype. To provide conclusive evidence that the SPG 21  $-/-$  mouse is a complete model of Mast Syndrome, classical maze testing was conducted in order to assess cognitive function.

Method: A total of 12 mice were used for testing (6 knockouts and 6 wild types), balanced across 6 month, 12 month, and 15 month age groups. Mice were first allowed to familiarize themselves with the maze apparatus for 30 minutes per day for a period of 3 days. After the habituation period was finished, the testing design was set, with a reward provided in the form of a hiding place complete with bedding, which had proven more attractive to the subject animals than food rewards. Each subject navigated the maze 6 times, with a 10 minute maximum allowed for completion.

Results: Preliminary results show the wild type mice chose the correct path more frequently when running through the maze. However, the knockout mice consistently made incorrect choices and were prone to wandering the maze for longer periods of time, supporting the working hypothesis that SPG 21  $-/-$  mice will express cognitive deficits in comparison to the normal wildtype mice. More testing is needed for an accurate comparison. Additional differences in behavior such as general activity level and defensiveness are also being studied.

**Predicting Propensity to Join Alumni Association following  
Exposure to Persuasive Messaging**

Rochana Kaushik

Advisor: Shonda Gibson

Co – author: Stephen Reysen

Department: Management

College: Business

Category: Graduate

Influencing others is challenging, which is why Cialdini (2001) and other researchers (Clark & Kemp, 2008) have sought to better understand the psychological principles behind the process. Following a variety of experimental studies and field immersion among professionals who are commonly associated with the art of persuasion, six principle factors were identified as notable including: reciprocity, commitment/consistency, social proof, liking, authority, and scarcity (Cialdini, 2001). The current study investigates the effects of Cialdini's six factors as predictors of student's propensity to join an alumni association following exposure to specially created marketing messages. Recent Texas A&M University-Commerce graduates (2012-2014) will be randomly assigned to receive an email with one of these six marketing messages. The current study will then assess the persuasive effectiveness of each marketing message. Participants in this session will be presented with background and study materials in effort to solicit feedback for this study.

**References:**

- Cialdini, R. B. (2001). Harnessing the Science of Persuasion. *Harvard Business Review*, 79(9), 72-79.
- Clark, W. R., & Kemp, K. J. (2008). Using the six principles of influence to increase student involvement in professional organizations: A relationship marketing approach. *Journal for Advancement of Marketing Education*, 1243-51

S1.6

**Using a Monte-Carlo Simulation to Calculate the Cross Section of the  $\rho^0$  meson in ultra-peripheral nuclear collisions**

James O. Thomas

Advisor: Carlos Bertulani

Department: Physics and Astronomy

College: Science and Engineering

Category: Graduate

Charged ions moving at relativistic speeds have strong electromagnetic fields that behave like a beam of photons. These equivalent, or virtual, photons can initiate a nuclear reaction in another nearby nucleus. These photon induced reactions can be simulated using a Monte-Carlo Multi-Collisional (MCMC) model. The CRISP (Collaboration of Rio and Sao Paulo) is one software package that utilizes this method. This software package has successfully predicted observables, such as neutron multiplicity from reactions, but the photoproduction of  $\rho^0$  mesons has only recently been added to the CRISP code. Recent results from the ALICE collaboration of the  $\rho^0$  cross section allow for the theoretical calculations made using the CRISP code to be compared with experimental observations.

## **A DAFT Supernova Progenitor Search**

Kurtis A. Williams

Co-Authors: Donald Serna-Grey (TAMUC/U. Washington),  
Subho Chakraborty (TAMUC/CUNY), and Matt Wood (TAMUC)

Department: Physics and Astronomy

College: Science & Engineering

Category: Faculty

Type Ia Supernovae are among the most energetic events in the Universe, and are visible from billions of light-years away. As such, they are extraordinarily useful in studying the structure of the Universe over cosmological times. In 2011, the Nobel Prize in Physics was awarded to two teams who used Type Ia Supernovae to discover that the expansion of the universe is speeding up. Yet despite this acknowledged importance, astronomers still do not know what type of system causes these supernovae! I will present results from the DAFT Supernova Progenitor Search (Dang, Another Failed Type-Ia Supernova Progenitor Search). We identified two seemingly strong candidate Type Ia Supernova progenitor systems. Alas, follow-up work finds these two systems will not become Type Ia progenitors. However, we are still able to draw some important lessons from our work.

**The Use of Educational Portfolios to Communicate and Monitor  
the Educational Needs of Students Living in Foster Care**

Trudy E. Watson

Advisor: Susan Szabo

Department: Education, Curriculum and Instruction

College: Education and Human Services

Category: Graduate

Each year, an estimated half million foster children and youth are served by three state systems simultaneously. These are comprised of the judicial, social welfare and education systems. Foster children and youth are placed into the court system following an investigation by a social welfare agency that determined it was in the “best interest of the child/youth” to be removed from their family home. One ramification of the child’s transition to foster care arrangement established by the court through a child protective service agency is the impact on the school-aged child/youth’s ability to continue their education without detriment to their scholastic achievement.

The risk to a foster child’s/youth’s success in school is recognized as one of the potential factors contributing to additional struggles facing students living in foster care. In an effort to minimize the potential risk for foster children and youth to fail in school, Texas legislators, judges, child welfare workers, foster parents, and educators have joined forces to identify ways to improve educational outcomes of children living in foster care. The establishment of education portfolios occurred when state legislators signed into law Senate Bill 6 in 2006, which required the collection of pertinent artifacts for each foster child.

This study examined the perspectives of two significant groups of adults who care for foster children and youth; foster parents and CASA volunteers. Each of these two groups of adults has a unique vantage point because of their roles and responsibilities through personal relationships with foster children and youth. One role of the foster parent is to gather artifacts and maintain the educational portfolio. The CASA volunteers advocate for the foster children in the courtroom, reporting directly to the judge on matters related to the foster child’s progress in school. The purpose of this research study was to ascertain if educational portfolios are effective in communicating and monitoring the educational needs of students living in foster care. Using a phenomenological approach, the researcher investigated the foster parents and CASA volunteers’ perceptions of the educational portfolio as a means to communicate and monitor learning outcomes for the foster child they serve. Additionally, the study participants shared their beliefs on whether or not the educational portfolio facilitated their understanding of the foster child’s educational needs.

The results of the research indicated that foster parents feel that gathering the required documents and artifacts for the educational portfolios to be a worthwhile use of their time and effort. Additionally, both the foster parents and the CASA volunteers believed that the educational portfolio is an effective communication tool, and that the documents contained within the educational portfolio aided them in developing a deeper understanding of the educational needs of the foster child in their care.

## **Capturing Volatility in the Options Market**

Nishanth Arepalli

Advisor: Kurtay Ogunc

Co-Author: Harika Vasireddy

Department: Economics and Finance

College: Business

Category: Graduate

We explore a model in which the volatility of a particular asset is subject to random and discontinuous shifts around the time of earning announcements. We attempt to derive profits off of movements contingent on such volatility causing events and analyze options-based trading strategies to either capture or hedge against the risk of jumps in stock price volatility. This model can be further applied to time periods around unsystematic and systematic events that cause spikes in volatility such as mergers, takeovers, major changes in business plans, or shifts in economic policy. Our model attempts to capture profits based on volatility effect of such events in options markets.

S2.3

### **Combinatorial Interpretation of Q-Analogue of Special numbers**

Ayoub H. Al-Amin

Advisor: Hasan Coskun

Department: Mathematics

College: Science and Engineering

Category: Graduate

The survey discusses combinatorial interpretations of the  $q$ -analogues of the classical binomial coefficients along with the Stirling, Lah, Bell, Bernoulli, Catalan and Fibonacci numbers. Their combinatorial formulas are also illustrated utilizing Mathematica software. The  $q$ -analogues of these special numbers have been investigated by many researchers, but a systematic study and comparison of their properties has been lacking. We expect that our work will be useful for novel researchers interested in this area. We will also give a brief introduction to the two parameter  $qt$ -analogues of these numbers at the end of the paper.

**Regional Elasticity of Milk Supply and the Resultant Policy Implications  
under 2014 Farm Bill**

Frannie Miller

Department: Economics and Finance

College: Business

Category: Faculty

U.S. dairy policy changed dramatically under the 2014 farm bill. Instead of federal dairy support occurring in the form of direct income support, it has changed to a subsidized insurance program. Under the new program, dairy farmers can insure a milk income over feed cost (IOFC) margin. The level of federal expenditures for indemnity payments under the new program will be a function of how milk production responds to low margin periods. A key difference from the prior income support program is the removal of any cap on the level of benefits that individual farmers may receive. This is likely to shift the regional distribution of federal benefits away from regions characterized by small dairies towards the larger dairies in western states.

In this paper, the own price elasticity of regional milk production is evaluated. The result is a finding of no significance, with little evidence of short-term response to changes in milk price. Instead, the lack of statistical significance is offered as evidence that the federal budgetary expenditures for the new Margin Protection Program in the dairy subtitle of the 2014 Farm Bill could be quite high. Additional measurements include estimates of supply response to changes in the number of farms in a region, the average size of farms, and milk output per cow. Final discussion centers on possible improvements for modeling dairy production.

## **Development of a Novel Multivariate Classification Method and Its Application to Wireless EEG Data**

Seetaramaraju Jampana

Advisor: Unal “Zak” Sakoglu

Department: Computer Science

College: Science and Engineering

Category: Graduate

Electroencephalography (EEG) measures neural activity by detecting electrical signals from the surface of the brain. Various EEG signals (Delta, Theta, Alpha, Beta, Gamma, Mu, etc.) are generated in the human brain. Developing machine learning algorithms in order to extract and identify signature signal patterns under different conditions/stimuli can help classify what kind of tasks the brain is engaged with.

One goal we are interested in achieving is to successfully classify whether an individual is looking at a positive scene or a negative scene, just by using their EEG data. We are proposing to develop and apply a novel machine learning and classification method based on temporal shift extension of the collected EEG data, for this purpose.

We have recently acquired pilot EEG data with our wireless, dry-contact, 32 channel EEG device (Mindo Sepia 32) for this purpose as part of our ongoing research project. For the project, 12 young healthy participants (6 Females, 6 Males, aged 18-30) will be presented, in a random order, 30 positive (pleasant) images and 30 negative (disturbing) images from Geneva affective picture database (GAPED), while their brain EEG signals are being recorded. The images will be shown approximately every 10 seconds, with each image being shown for 3 seconds. The recorded pilot data is preprocessed using EEGLAB (a MATLAB-based toolbox for processing EEG data, UCSD) and our in-house developed MATLAB codes. Preprocessing involves filtering the data for noise and unwanted frequencies, re-referencing and baselining of the preprocessed data. Event related potentials (ERP) are then computed for the negative and positive visual stimuli for each 3-second epoch, when the subject is visually stimulated with the image, and signals from each epoch are extracted from the EEG data. Each epoch attributes (mean, standard deviation, etc.) are computed. Depending on the attributes of epoch, the stimuli (e.g. the images) are classified using machine learning / pattern classification techniques and also our novel classification algorithm. The results can also be used to identify and visualize the areas of brain cortex which are active during processing of these stimuli and the brain areas that contribute most to the classification. We will present some results based on the pilot data collected so far.

**Chiral Porphyrins with Chiral Caps: Synthesis and Chiral Recognition Studies**

Khanh Truong

Advisor: Stephen StarnesDepartment: ChemistryCollege: Science and EngineeringCategory: Graduate

This project centers on the synthesis of chiral porphyrins characterized by the spatial positioning of asymmetric centers above the porphyrin surface which effectively serves to cap the porphyrin. Thus, these hosts have asymmetric centers positioned directly above the metal center of the porphyrin. The introverted nature of these hosts asymmetrically positions recognition elements within the interior of the host cavity from above the porphyrin where they can work in tune with the metal center for cooperative guest binding. A novel aspect of the hosts is their fairly rigid nature such that recognition elements are in well-defined positions. Furthermore the hosts are modular in design. For the creation of the hosts, a common porphyrin isocyanate will be reacted with a variety of commercially available chiral amines and chiral amino acids; the hosts should thus be available in diversity in high yield with minimal synthetic effort. This work will involve the synthesis of these hosts and their chiral guest recognition properties. Chiral recognition properties will be examined using UV/Vis, NMR fluorescence and circular dichroism studies. Besides studying the recognition of Zn-TPP, Cadmium-TPP was synthesized and studied on different urea guests in order to aid future porphyrin host designs. This study would help to lower the  $\lambda_{\text{max}}$  of porphyrin host.

### **Few Body Calculations - An Overview**

Kacper Topolnicki

Advisor: Carlos Bertulani

Department: Physics and Astronomy

College: College of Science and Engineering

Category: Faculty

A brief overview of the three dimensional (3D) formalism that is being developed by the Kraków Few Body Physics group will be presented. Using the 3D momentum eigenstates of the nucleon directly, instead of relying on the partial wave decomposition of operators involved in the calculations, makes it possible to use a very direct approach. This in turn makes it possible to tackle a large variety of few-body problems. Additionally new research perspectives, at the TAMUC research group with Carlos Bertulani, will be outlined.

**Estimating Solutions to Systems of Integral Equations  
Using Gronwall's Inequality**

Christopher Johnston

Advisor: Tingxiu Wang

Co-author: Bradford Garcia

Department: Mathematics

College: Science and Engineering

Category: Undergraduate

In 1919, Gronwall published an inequality which provides estimates to the solutions of differential and integral equations. This paper looks at applying a generalized form of Gronwall's inequality to a system of integral equations to estimate the solution. A previous result found in Wang [?] by Lyapunov's second method is then compared with this by an example illustrating the different shortcomings of the two results.

### **Oxidation of Vanadium**

Darius Durant

Advisor: A. R. Chourasia

Department: Physics and Astronomy

College: Science and Engineering

Category: Undergraduate

Thin films of elemental vanadium were evaporated on silicon substrates. The samples were then oxidized under different processing conditions. In one case, the vanadium sample was exposed to oxygen at a partial pressure of  $1 \times 10^{-6}$  Torr. The substrate temperature was kept at 400°C and the oxidation was done in a vacuum chamber. In the other case, the vanadium sample was annealed at a temperature of 400°C in air. The oxidized samples were characterized by the technique of x-ray photoelectron spectroscopy. The vanadium 2p regions were investigated. It is observed that the oxidation state of the sample oxidized in the vacuum chamber is different from the one that is oxidized in air. The sample oxidized in the vacuum chamber is identified to be  $V_2O_3$  while the one oxidized in air is  $V_2O_5$ . The study will allow identification of the oxides when vanadium interacts with other metal oxides.

**The Nature and Function of Questions in Algebra 1 Textbooks: Implications  
for Students with Mathematics Difficulties or Disabilities**

Hayleigh Garlow

Advisor: Brittany Hott

Co-Authors: Carmen Gills, Monquie Williams, Amber Berg

Department: Psychology, Counseling, and Special Education

College: Education and Human Development

Category: Undergraduate

The purpose of this study was to evaluate the nature and function of questions presented in middle school Algebra 1 textbooks. A comprehensive analysis of 7 textbooks was completed. Results indicate that the majority of questions posed were at the knowledge level and textbooks do not meet the standards outlined in the National Mathematics Panel 2008 Report. Implications for practice and future research directions are reported.

S3.4

**Does Differential Handling Effect Responsiveness in  
Standard Behavioral Testing of Colubrid Snakes?**

Elizabeth Jones

Advisor: Lani Lyman-Henley

Co-Author: Lauren Bailey

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Undergraduate

Standardized testing methodologies exist for several aspects of snake behavior, including the Tongue-Flick Attack Score (TFAS) used to measure predatory interests via responsiveness to chemical cues, and testing regimes that examine defensive responses in snakes. However, different results may be seen from naïve snakes and excessively handled snakes. This leads to the question: What might be the effect of handling experience upon various behaviors being measured? In order to evaluate the effects of handling, individuals were separated into Handling and Non-Handling groups, in which half the animals received gentle handling (such as that seen with pet animals) periodically in addition to the standard (Non-Handling) feeding and cleaning manipulations. Both before and after 8 weeks of differential experience, the specimens were tested for defensive behavior and chemical prey preferences. Defensive behaviors were documented in each subject group, allowing comparison across species, ages, and handling conditions. Further effects of handling and comparisons between various subject groups will be discussed.

**Periodic Analysis of V447 Lyr: A U Geminorum  
Cataclysmic Variable in the Kepler Field**

Chance C. Brown

Advisor: Matt A. Wood

Department: Physics and Astronomy

College: Science and Engineering

Category: Graduate

Expanding on the results of Ramsay et. al (2012), we look at the eclipsing dwarf nova V447 Lyrae in the Kepler field. V447 Lyrae is a U Geminorum type dwarf nova with eclipses occurring every 3.74 hrs and a light curve that shows characteristic short and long outbursts. Due to the period of V447 Lyr being on the possible edge of superhump stability, we focus on detection of periods outside of the orbital period in which we find none. The lack of an additional period outside of the orbital period using Kepler short cadence data could indicate the maximum period of stable superhump activity is less than 4 hours. We then characterize the long and short outbursts by using a high pass fourier filter then phase aligning and averaging the group of 7 long outbursts and the group of 6 short outbursts. The averaged long outbursts show a dip in the light curve around  $\phi = 0.6$  that is maximal at outburst maximum and gradually gets more shallow as the flux declines. This secondary dip is of dubious nature and needs more analysis to be properly understood.

**The Spectrum of Pair Production in Photons and  
their Collision with Target Nucleus**

Nathan Brady

Advisor: Carlos Bertulani

Department: Physics and Astronomy

College: Science and Engineering

Category: Graduate

Photons, when provided enough energy, have a certain probability of generating a particle anti-particle pair according to quantum mechanics. This process, called pair production, gives the photon a spectrum of possible pair creation events, which is determined by the initial energy and the associated probability amplitudes for each event. Only through the interaction between a target nucleus and the high-energy photon can these creation events be observed. The objective is to determine the spectrum of pair production events, which comprise these high-energy photons typically observed in accelerators such as RHIC at Brookhaven and ALICE at CERN in order to predict the type and amount of particles incident on a target nucleus.

## Time Series Analysis of V1101: A Z Cam Cataclysmic Variable

Alexander C. Spahn

Advisor: Matt Wood

Department: Physics and Astronomy

College: Science and Engineering

Category: Graduate

We report on the analysis of the light curve of V1101 Aql between the months of July and September in 2013 as measured by several amateur astronomers. V1101 Aql is a Z Cam type dwarf novae, which are known to display outbursts every 10 days to tens of years which last for anywhere between 2 and 20 days. Z Cams are best known for their standstills, during which outbursts cease for tens of days to years. The original light curve was adjusted to mean-zero and the low frequency amplitudes of the superhumps were subtracted  $\alpha^d$  to obtain a flattened light curve displaying only the high frequency data on timescales of just a few hours. These variations are seemingly a result of a negative superhump, which are due to the retrograde precession of a tilted disks. Both a sine fit and a discrete Fourier transform (DFT) were performed using the flattened data and the results indicated a superhump period of roughly  $P_{sh} = 3h53m$ , just a few percent less than the system's orbital period of  $P_{orb} = 4h07m$ . Data were also split into high and low states based on their placement above or below the mean-zero brightness. For both resulting sets of data as well as the total light curve, the average pulse shapes were determined. The amplitudes are relatively constant and are nearly the same for both the high and the low data, implying that the same mechanism is responsible for the variabilities detected in both sets of data. The constant string of long outbursts also suggests the existence of a very high mass transfer rate between the stars. Furthermore, an O-C diagram was produced and reveals the variations in precession rate and radius of the accretion disk of the system.

S4.1

**Effects of a Leadership Training Program on International Students’  
Sense of Belonging and Social Identity**

Sanchali Ray

Advisor: Shonda Gibson

Co – author: Stephen Reysen

Department: Educational Leadership

College: Education and Human Services

Category: Graduate

Although noted improvement has been shown in relation to international students’ learning experiences many challenges remain, especially in relation to enhancing students’ sense of belonging in American universities (Glass, Buus & Braskamp, 2013; Glass & Westmont, 2013). Belonging has been defined as, “the experience of personal involvement in a system or environment so that persons feel themselves to be an integral part of that system or environment” (Hagerty, et.al., 1992, p. 173). This definition served as the basis for the Sense of Belonging Instrument (SOBI), which will be utilized as the primary assessment tool in the current study. Research has shown that individuals establish social identities through involvement with reference groups, where strong identification leads to adoption of the traits, competencies, values and behaviors associated with that identity (Tajfel & Turner, 1979). A variety of studies have shown that leadership training programs can improve student’s sense of community, which is thought to be deeply connected to one’s sense of belonging and social identity (Cress, Astin, Zimmerman-Oster & Burkhardt, 2001). The current study will investigate the impact of a leadership training program on international students’ sense of belonging and social identity. During the symposium session, the audience will be presented with background research, proposed methodology, and expectations of the study.

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**Examining the Performance of IPOs in the Short-Run:  
A Case Study of Firms in the U.S**

Monica Kabutey

Advisor: Kurtay Ogunc

Co-Author: Olutola Kehinde

Department: Economics and Finance

College: Business

Category: Graduate

The timing of movements in the prices (returns) of stocks from their Initial Public Offering (IPOs) play an important role in determining trading and investing decisions. The intent of this research is to evaluate the performance of IPO's through randomly selected firms in five major industries in the U.S. We achieve this objective by analyzing prices of stocks: from their release dates and the trends of these stock prices in the short run, using data from 2005-2013. The research also focuses on the price (return) averages within time periods; to determine a possible price stability of the stocks in this short term period.

S4.3

### **Effects of Volume Exclusion on the Equation of State for Neutron Stars**

Jared Lalmansingh

Advisor: Carlos Bertulani

Department: Physics and Astronomy

College: Science and Engineering

Category: Graduate

Neutron stars are highly dense stars - which are almost wholly comprised of neutrons - originating from the aftermath of supernova of Type Ib, Ic or Type II of a massive progenitor star. Of particular interest for the determination of neutron star properties is the thermodynamics governing the coexistence of nuclear clusters which enter the equation of state of nuclear matter. We discuss and present the effects that the consideration of volume-exclusion has on constraining the thermodynamics and overall equation of state, and its effects on the formation of nuclei in neutron stars.

## **Teacher Perceptions of a Simple Data-Mapping Tool<sup>®</sup> to Plan for Student Interventions**

Brittany L. Hott

Co-Author: Laura J. Isbell

Department: Psychology, Counseling, and Special Education,  
Curriculum and Instruction

College: Education and Human Services

Category: Faculty

This session reports how teacher educators used data maps with in-service teachers to foster data based preparation, instruction, and intervention planning. Results indicate that the use of data mapping helped make intervention decisions at the classroom, group, and individual levels. Implications for practice and future research directions are shared.

S4.5

**Write On: The Effects of Self-Regulated Strategy Development with Science Prompts on the Persuasive Writing Performance of Elementary Students with Emotional and Behavioral Disorders**

Nelly Shora

Advisor: Brittany Hott

Department: Psychology, Counseling, and Special Education

College: Education and Human Services

Category: Graduate

Students with Emotional and Behavioral Disorders (EBD) experience difficulty with organization that makes writing a challenge. Self-Regulated Strategy Development (SRSD) is an intervention for students with EBD. This study extended the SRSD writing intervention research using POW + TREE to science content and behavior of elementary students with EBD.

**Relation between parental divorce and adjustment in college students**

Breanna Connel

Advisor: DeMarquis Hayes

Co-Authors: Maria Carlson

Department: Psychology, Counseling, & Special Education

College: Education and Human Services

Category: Undergraduate

The role of parental divorce on the adjustment of emerging adults has been understudied and mostly limited to first-year college students. This study sought to examine the relation between parental divorce and adjustment in college students to identify differences in students from intact and divorced families while also examining gender and age differences. Results indicated no adjustment differences as a whole or by gender for intact and divorced families. However, students who were older when their parents divorced had higher levels of self-esteem than those whose parents divorced when they were younger. Implications of the study are discussed

**Cultivation Optimization of *Methylosinus trichosporium* OB3b  
for Methanobactin Preparation; Controlling  
Dissolved Oxygen and Cell Density**

Israel Chavarri

Advisor: DongWon Choi

Co Authors: Shakti Gurung and Jihyun Kim

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Graduate

Methanobactin (mbs) are a type of Cu-binding chromopeptide secreted by a select few methanotrophs, which allow for copper acquisition that are mostly dependent on Cu concentration. Mb produced from *Methylosinus trichosporium* (mb-OB3b; C<sub>45</sub>H<sub>58</sub>N<sub>10</sub>O<sub>16</sub>S<sub>5</sub>; Mw 1154.26) has become the archetype molecule due to its extensively studied nature. Preliminary results have indicated a minimum of 40% methanotrophic siderophores contamination of mb-OB3b, resulting in questionable data obtained from previous studies. Further studies have demonstrated that mb-OB3b production as well as quality may have connections with that of oxygen saturation. *Methylosinus trichosporium* OB3b was cultivated in Bioflo110 bioreactor, where agitation speed, temperature, gas flow (ambient air and CH<sub>4</sub>), and copper availability were controlled in semi-continuous batch mode. Dissolved oxygen, pH, and cell density were monitored as potential indicators of in situ mb-OB3b productivity levels. Cu levels and Dissolve Oxygen levels were altered accordingly. Secreted mb-OB3b was isolated by tangential flow filtration followed by elution using an HP20 Diaion column. Analysis was prepared using information obtained from recorded DO levels, Cell Density measurements, and data provided by our UV-Vis spectrophotometer. Findings showed, increased oxygen tension is an important requirement for the quality production of mb and air tension will have to be adjusted to provide suitable DO levels as Cell Density increases.

**Effects of prescribed Fire, Tillage, and Herbicide to Reestablish Native Vegetation  
on Old Fields within the Blackland Prairie Ecoregion of Texas**

Audrey Whaley

Advisor: Jeffrey Kopachena

Co-Author: Jim Eidson

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Graduate

This study was conducted to determine the effectiveness of prescribed fire, tillage, and herbicide for reestablishing native vegetation seeded onto former Texas Blackland Prairie sites. Subplots were exposed to fire, herbicide, and tillage and all combinations of these techniques. Cover was estimated before and after treatment for five native grasses, two native forbs, seven exotic grasses, and one exotic forb. Cover was found to change for all species except *Bothriochloa ischaemum* and *Engelmannia peristenia*. A decrease in exotic species observed in control plots made it difficult to interpret the effects of the treatments on exotic species. In terms of germinating and establishing native species, some treatments seemed to be more effective than others. The treatments of tillage and tillage + fire were most effective for establishing seeded native species. However, follow-up studies are necessary to determine whether the effects observed here are maintained over the long term and whether they would be equally effective under non-drought conditions.

## **Administrators' Perceptions of Behavioral Response to Intervention (RtI) on the Secondary Level**

Marquita M. Anderson

Advisor: Kemp-Graham

Department: Educational Administration

College: Education and Human Services

Category: Graduate

### **Purpose**

Response to Intervention (RtI), which is now utilized throughout the educational world, came about in an effort to help identify students who could benefit from additional supports and interventions pertaining to academics and behavior. Bradley, Danielson, & Doolittle (2005) shared that the primary issue of concern is that the right students are determined eligible in a timely manner. To do this, proper training has to be put in place for teachers, and that can only happen if respective administrators have an understanding of RtI. Some think that because there is little research at the middle or high school levels that RtI is not valid on the secondary level, but the principles and components of RtI are the same at all grade levels. Due to the needs of various learners, there is a need for a structured plan to be in place to deal with behavioral concerns. RtI has four pillars; however, the one that much emphasis is typically placed upon deals with academics. Vanderheyden (2011) summarized RtI as a framework that used student performance data to determine if instruction was effective for most students and to identify students who needed supplemental intervention to obtain benchmarks. Over recent years, RtI has transformed from merely focusing on academics and determining interventions that are needed for instruction to placing importance on behavior and interventions that can be implemented thus appealing to the whole child. Educators can hone in on the behavioral pillar to target discipline and help provide specific supports and interventions to students who are in need; however, teachers have to be willing to take the time to understand behavioral RtI. While there are various studies that focus on the academic side of RtI, there is little empirical research that focuses on behavioral RtI. This study seeks to identify necessary components in the implementation of behavioral RtI from an administrator's perspective. The purpose of this study is to examine the perceptions of administrators regarding behavioral response to intervention within a school district in an effort to determine what it takes for a school and/or district to effectively implement the behavioral component of RtI. Observations and data collected will be used to determine how a district can effectively implement behavioral RtI when academic RtI has already been established in a manner that will have administrator buy-in early on in the implementation. The following research questions guided the study:

1. What are administrators' current perceptions of behavioral RtI?
2. How do administrators introduce RtI efforts on a secondary campus?
3. What professional development is necessary for administrators seeking to implement RtI on a secondary campus?
4. What recommendations do administrators make to enhance the implementation of RtI on a secondary campus?

## **Method**

A qualitative research study using the phenomenological approach will be carried out in one school district located in Irving, TX that has utilized academic RtI in the past and recently implemented behavioral RtI. The participants will be selected randomly from the twelve secondary campuses within the district. Participation in the study is voluntary, and participants may choose to not take part at any time without penalty. The researcher will interview five secondary administrators in face-to-face interviews that will last at least one hour. The interview technique seeks to describe the meanings of central themes in the life world of the subjects. Kvale (1996) shared that the main task in interviewing is to understand the meaning of what the interviewee says. The researcher will begin the interview by explaining the purpose of the interview and study, addressing confidentiality, reviewing informed consent, and reminding the interviewee of the proposed time allotment. Software will be downloaded that will allow the researcher to record the interview and transcribe the interview as well. The researcher will also take notes throughout the interview. Downright Transcription, an app available on via Apple, will be used to help receive audio transcription of the interview. Once the transcription has been dictated by the software, the researcher will e-mail the information from the software to begin the coding process. The researcher will code the data using acquired software to describe the context of the setting and to code the interview by themes, and the research will seek to identify the essence of human experiences about a phenomenon as described by the participants, (Creswell, 2009).

## **Conclusions**

The results from this proposed study will contribute to a very limited body of research that exists about administrators' perceptions of the implementation of behavioral RtI on the secondary level. Since many districts are looking to begin utilizing behavioral RtI in addition to traditional stand alone academic RtI, the research produced can be beneficial in ensuring that those districts are able to do so with fidelity due to a well thought out process for implementation.

**Examining the Performance of IPOs in the Short-Run:  
A Case Study of Firms in the U.S**

Olutola Kehinde

Advisor: Kurtay Ogunc

Co-Author: Monica Kabutey

Department: Economics and Finance

College: Business

Category: Graduate

The timing of movements in the prices (returns) of stocks from their Initial Public Offering (IPOs) play an important role in determining trading and investing decisions. The intent of this research is to evaluate the performance of IPO's through randomly selected firms in five major industries in the U.S. We achieve this objective by analyzing prices of stocks: from their release dates and the trends of these stock prices in the short run, using data from 2005-2013. The research also focuses on the price (return) averages within time periods; to determine a possible price stability of the stocks in this short term period.

## **Cardiac-Inducing RNAs Direct the Differentiation of Stem Cells into Cardiomyocytes for Heart Repair**

Andrei Kochegarov

Advisor: Larry F. Lemanski

Co-Authors: Allyson Davis, Lena Mitchell, Michael Neal,  
Nikolas Scarcelli, and Greg Vaughn

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Undergraduate

A major problem in heart regeneration after a myocardial infarction is that muscle cells, or cardiomyocytes, die and are replaced by fibrous scar tissue rather than new cardiac cells. This supports the damaged heart temporarily, but in the long term, it weakens the organ's ability to contract normally and increases the risk of a further heart attack. This is the major reason why heart disease is the leading cause of death worldwide. By 2030, it is estimated that failing hearts will kill more than 23 million people every year. Right now the only option for a severely failing heart is organ transplantation. Since the early 2000s, scientists have been trying to use stem cells from an individual's own body to grow new muscle in damaged hearts. Stem cells are capable of producing all of the various types of cells in the body, and the hope is that they will be able to generate new cardiomyocytes. We undertook an approach initially developed in the laboratory of Dr. Lemanski to use myofibril-inducing RNAs to restore heart development in cardiac non-function mutant salamanders, *Ambystoma mexicanum*, (Zhang et al., 2009, J. Biomed Sci, 16;81). Recently we have identified two RNAs of human origin that we termed Cardiac-Inducing RNAs (CIR). One fetal heart RNA, is associated with the mitochondrial cytochrome c oxidase subunit II gene. This RNA came from our clone #30 and is capable of inducing tropomyosin synthesis and myofibrillogenesis in mutant axolotl hearts which ordinarily do not synthesize tropomyosin or form organized myofibrils (Moses-Arms et al, 2015, In Vitro Cell Dev. Biology – Animal. 51; 273). Molecular analyses of the second CIR, derived from fetal heart RNA, revealed that it is a fragment of N-sulphoglucosaminesulphohydrolase and the caspase recruitment domain family member 14 precursor. Stem cells transfected with these CIRs form into spindle-shaped cells characteristic of early developing cardiomyocytes, and express the cardiac specific contractile protein markers, cardiac troponin-T, tropomyosin and  $\alpha$ -actinin as detected by immunohistochemical staining. Expression of these contractile proteins shows organization into sarcomeric myofibrils characteristic of striated cardiac muscle cells. Computer analyses of the RNA secondary structures of the active human-derived CIRs reveal significant similarities to the RNA originally described in salamander MIR (for Myofibril-Inducing RNA) that also promotes nonmuscle cells to differentiate into cardiac muscle. Thus, these RNAs appear to have evolutionarily conserved secondary structures suggesting that both play major roles in vertebrate heart development and, particularly, in the differentiation of cardiomyocytes from non-muscle cells during development. Our current and future goals are to generate a myocardial infarction model in mice by coronary artery ligation and inject CIR-treated stem-cell-derived cardiomyocytes to regenerate the damaged areas of the infarcted mouse hearts leading to a full recovery of the damaged heart muscle tissue. We hope in the future that this type of approach can be used to treat myocardial infarctions in human patients such that heart attack victims could

return to normal pre-heart-attack activity levels. (Supported by NIH grant HL61246, NSFRUI grant 1121151 and an American Heart Association Grant).

## **Habitat Suitability Model for Eastern Bell's Vireo in Northeast Texas**

Amanda Turley

Advisor: Jeffery Kopachena

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Graduate

Bell's vireo (*Vireo bellii*) is a shrubland bird species that has been listed as near endangered by the International Union for the Conservation of Nature (IUCN). Most research/conservation efforts have focused on the subspecies *Vireo bellii pulsilis* since it was listed as endangered in 1986. However, very little research has been done on the near endangered subspecies *Vireo bellii bellii*, whose habitat range includes parts of northeast Texas. This study focuses on the development of a habitat suitability model for *V. b. bellii*, utilizing Geographic Information Systems (GIS) and Maxent for spatial analysis of habitat variables. The identification of potential habitat and nesting sites for this species would allow for more focused conservation and habitat preservation efforts.

## **Extending the Testing Effect Research into the Classroom**

Cynthia L. McAllister

Advisor: Benton Pierce

Department: Psychology, Counseling and Special Education

College: Education and Human Services

Category: Graduate

Recently, there has been a great deal of research on the mnemonic benefits of retrieval practice. Researchers have found that after an initial study phase, participants engaged in a memory retrieval task performed better on a final test than did those who participated in a restudy task. In this session, the memory research will be summarized, and related research in educational settings will be reviewed.

**An Examination of the Testing Effect as a Function of  
Math Anxiety and Math Fluency**

Beth Nikopoulos

Advisor: Lacy Krueger

Co-Authors: Stephen Dreiling, Sarah Borja, Cindy May,  
Eva Limoges, Katie Reeves, and Andrea Rosales

Department: Psychology, Counseling, and Special Education

College: Education and Human Services

Category: Graduate

Previous research has provided evidence of the benefit of intermediate testing to enhance the long-term memory of students (Agarwal, Karpicke, Kang, McDermott, & Roediger, 2008; McDaniel, Roediger & McDermott, 2007; Roediger & Karpicke, 2006a). Much of this research has been conducted using prose passages and verbal materials; therefore, Nikopoulos (2013) investigated the use of testing to enhance long-term recall in mathematics and found that individuals who were repeatedly tested recalled more equations than those who re-studied number facts. The research objectives in the present study included further assessment of the effectiveness of testing in math fact learning, and examinations of math anxiety and math fluency as covariates to analyze their impact on long-term memory. Preliminary results will be presented.

## **Disaster Preparedness for Undergraduate Baccalaureate Nursing Students**

Bonnie Smithers

Co-Authors: Monica L. Tenhunen

Department: Nursing

College: Education and Human Services

Category: Faculty

### **Purpose**

The *Essentials of Baccalaureate Education for Professional Nursing Practice* state that graduates should be able to use clinical judgment and make decisions during disaster situations. All nurses need training in emergency preparedness and this should occur during their initial nursing education program declares the International Council of Nurses. The American Nurses Association supports nurses being competent to respond to disasters and provide care.

The government of the United States has a national preparedness goal to improve capacity to respond to incidents. Additionally, the United Nations has an international day for disaster reduction that occurs yearly on October 13.

Faculty at Texas A&M University-Commerce Nursing Department decided to develop a disaster drill for the senior community health clinical nursing students to take place during October 2014.

### **Methodology**

A review of the literature was completed using terms “disaster drill,” “disaster preparedness,” and “undergraduate nursing” from 2008-2014. A total of twelve articles and five resources were identified. The references for these were reviewed for other relevant articles. Seventeen articles that applied to the identified population and content were reviewed.

### **Findings**

There is limited evidence regarding disaster preparedness for undergraduate nursing students. Studies on registered nurses indicated that nurses felt the content was important and most had not received any education or training during their nursing program. Faculty primarily supported having disaster preparedness in the undergraduate curriculum. Students that participated in drills felt it was useful and they used the knowledge and skills they had received during their nursing program. There are no uniform competencies for preparing for a disaster drill and methods of providing the experience to students are varied.

### **Implications for Nursing**

Further research is needed on disaster drills for undergraduate baccalaureate nursing students. A challenge is determining the best practice for content to be included in the experience. In addition, the method of presenting the experience to the students needs to be evaluated.

**SPG21 Mutation leads to Progressive Adult Onset Hereditary  
Spastic Paraplegia and Attenuated Lower Limb Function**

Alexis Bivona & Will Latson

Advisor: Venu Cheriya

Co-Author: Anne Davenport

Department: Biological and Environmental Sciences

College: Science and Engineering

Category: Graduate

Mast syndrome is a form of hereditary spastic paraplegia (HSP), an autosomal recessive disease caused by non-sense mutations in the SPG21 gene which encodes for the maspardin protein. Since loss of lower limb function and increased spasticity are characteristics of mast syndrome, the role of maspardin in controlling the sensorimotor capabilities was investigated in SPG21<sup>+/+</sup> and SPG21<sup>-/-</sup> mice. Behavioral studies including the beam walking test, hind limb clasp test, and ledge test identified significant impairment and progressive loss of sensorimotor functions in SPG21<sup>-/-</sup> mice. The 12 month SPG21<sup>-/-</sup> cohorts exhibited a significant increase in foot slips as compared to the SPG21<sup>+/+</sup> in the 12 month age group ( $p < 0.05$ ). Additionally, in the hind limb clasp and ledge tests SPG21<sup>-/-</sup> mice scored 2 fold less than that of SPG21<sup>+/+</sup> mice ( $p \leq 0.05$ ). Since these results suggested progressive reduction in motor neuron functions in SPG21<sup>-/-</sup> mice, we hypothesized that maspardin plays a critical role in the growth of cortical neurons. To test this hypothesis, the growth of SPG21<sup>+/+</sup> and SPG21<sup>-/-</sup> cortical neurons were compared in vitro. Relative to SPG21<sup>+/+</sup>, there was a 3.6x reduction in the growth of SPG21<sup>-/-</sup> neurons at 96 hours ( $p < 0.05$ ). Nuclear staining studies ruled out the possibility of differences in the rate of proliferation in conferring the observed differences in the growth of SPG21<sup>+/+</sup> and SPG21<sup>-/-</sup> neurons. Based on these correlations, we hypothesized that there would be a significant increase in spastic paraplegia and progressive lower limb dysfunction in the SPG21<sup>-/-</sup> mice over the age of six months. In summary, our results suggest that maspardin is indispensable for the growth of cortical neurons and the loss of maspardin may lead to impaired sensorimotor neuron functions in SPG21<sup>-/-</sup> mice.

**GRIP, a Novel Functional Genomics Strategy to Identify and Validate  
Antiestrogen Resistance Genes in Breast Cancer Cells**

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Despite recent advances in endocrine therapies, ~40% of estrogen receptor positive (ER+) breast cancer patients are either intrinsically resistant or acquire resistance during therapy. To identify and validate target genes to overcome therapeutic resistance, we designed a novel high genome wide, cell-based functional genomics screen GRIP (Genome Wide Random Insertion of Promoter). GRIP vector has the ability to turn on or amplify expressions of any genes of ER+ MCF-7 cell lines. Confirming to this, 3'RACE analysis of 2 million GRIP transductants identified the GRIP activation of genes with varying number of exons on different chromosomes. In a proof-of-concept study, GRIP activation resulted in several TAM resistant MCF-7 cell clones. In one of them, phosphatidylinositide 3-kinase mRNA, a kinase that can induce TAM resistance was overexpressed. Removal of GRIP vector using Cre-Lox reduced PI3K expression and reversed TAM resistant phenotype. In summary, we designed an innovative strategy for unbiased, cell-based, functional genomics screen to identify genes that drive antiestrogen-resistance. Rapid identification and validation of clinically relevant antiestrogen using GRIP strategy will elucidate pathophysiology of ER+ breast cancer recurrence.

## Light Curve Analysis of Five Asteroids

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Light curves were determined for the following five asteroids: 800 Kressmania, 2007 McCuskey, 3544 Borodino, 7749 Jackschmitt, and 25891 2000WK9L. These were main belt asteroids, chosen for their orbital position and brightness. Telescopes, with CCD cameras, from Kitt Peak National Observatory, Cerro Tololo InterAmerican Observatory, and the A&M-Commerce observatory were used to image the asteroids. The images were reduced using standard techniques and analyzed using differential photometry to produce light curves. From these curves, rotational periods of  $4.472 \pm 0.219$ ,  $8.611 \pm 0.003$ ,  $5.437 \pm 0.001$ ,  $5.337 \pm 0.008$ , and  $4.1375 \pm 0.0015$  hours were found for 800 Kressmania, 2007 McCuskey, 3544 Borodino, 7749 Jackschmitt, and 25891 2000WK9L, respectively.

**The Epigenetic Effects of Bisphenol A on the Transgenerational Promotion of Yellow Coat Color and Obesity in Agouti Mice**

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Over 34% of the American population is estimated to be obese and 9% is estimated to have diabetes. With the increasing rates of metabolic syndromes, understanding causes of these diseases is necessary. Endocrine disruptors, particularly xenoestrogens, are proposed contributing factors to obesity and diabetes development. A widely used plasticizer, Bisphenol A (BPA), is a xenoestrogen and exhibits weak estrogenic activity. In addition to its estrogenic properties, BPA was determined to produce epigenetic effects. BPA hypomethylates DNA to cause gene expression changes associated with several diseases. In an agouti mouse model, BPA hypomethylated the Avy gene locus in utero, shifting coat color of offspring from brown to yellow. Promotion of yellow coat color was associated with increased weight gain and diabetes development. However, it remained unclear whether BPA's effects could be transmitted to the next generation without in utero exposure. This study identified that despite the absence of BPA exposure during gestation, postnatal exposure to BPA results in a significant increase in the number of yellow coat colored offspring (75% and 40 % yellow for BPA treated and control, respectively,  $p=0.0422$ ). Yellow mice were also more likely to gain weight than their brown littermates ( $p=0.0002$ ). Furthermore, we observed a deviation from the expected 1:1 ratio of agouti : nonagouti births, with BPA exposure favoring agouti (Avy/a) offspring, and phytoestrogen deprivation favoring nonagouti (a/a) offspring (66.67% Avy/a for BPA treated,  $p=0.2480$ , and 33.33% Avy/a for control,  $p=0.1967$ ). Taken together, our results suggest that epigenetic modifications caused by BPA can be transmitted to future generations, even if current BPA exposure stops. Therefore, to curb metabolic syndromes and associated health problems, contact with BPA containing plastics and materials should be limited.

## **G1P3 Alters Redox Signaling and Induces Mitochondrial Fusion to Evade Apoptosis in Breast Cancer Cells**

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Despite advances in antiestrogen therapies, more than 50% of estrogen receptor positive (ER+) breast cancer patients relapse as therapeutic resistance develops. Mechanisms responsible for this resistance are multifactorial, however evasion of apoptosis is consistently present. Antiapoptotic processes generating resistant breast cancer are unclear. Therefore, the objective of this proposal is to elucidate the causes of apoptotic suppression by G1P3, a novel survival protein discovered to be targeted by estrogen and cytokine (interferon) signaling. G1P3 was determined to be overexpressed in both early and advanced breast cancers, and significantly correlated with poor survival in ER+ breast cancer patients. Furthermore, G1P3 was found to contribute to resistance to antiestrogen therapies tamoxifen and paclitaxel in ER+ breast cancer cells. G1P3 is localized on the inner mitochondrial membrane. Consistent with its location, we hypothesized that G1P3 suppresses apoptosis through changes in redox signaling. This hypothesis was tested by measuring total mtROS levels of MCF-7G1P-3 and MCF-7VECTOR breast cancer cells using the redox probe Mitotracker Red (CM-H2XROS). To specifically quantify superoxide anion levels, the probe MitoSOX red was also used. Furthermore, mitochondrial membrane potential ( $\Delta\psi$ ) was quantified with TMRM. Results showed G1P3 significantly increased total mitochondrial reactive oxygen species (mtROS) levels relative to the vector (1.6x, 2.8x, 3.3x at 24, 48, and 72 hours, respectively). However, MCF-7G1P3 cells showed significantly lower superoxide anion levels (~2x and ~5x at 24 and 48 hours, respectively). Conservation of  $\Delta\psi$  was also observed (22.5% and 31.4% for MCF-7G1P-3 and MCF-7VECTOR, respectively). Furthermore, under ionomycin stressed conditions, G1P3 expressing cells showed induction of mitochondrial fusion with significant increase in mtROS levels. Together, these results suggest that G1P3 alters redox signaling, inducing mitochondrial fusion to ultimately promote cell survival. Consequently, rebalancing this redox signaling in cancer cells may restore apoptotic mechanisms and antiestrogen therapy sensitivity.

**Daidzin-rich soy isoflavones promote estrous cycling in  
VCD-Induced Menopause Mouse Model**

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By 2025 postmenopausal women will make up to 20% of the US population. Since traditional hormone replacement therapies increase the risk of breast cancer, alternative strategies are needed to delay and manage menopause. With this intention, we screened isoflavone (phytoestrogens) extracts of 54 commercially grown soybean cultivars in a bioassay for their estrogenic activity. While isoflavone extracts from 51 out of 54 cultivars were estrogenic, extracts from three cultivars were highly estrogenic and promoted the growth of an estrogen dependent breast cancer cell line by 2.59 to 4.64 folds ( $P < 0.005$ ). Additionally, isoflavone profiling using high performance liquid chromatography (HPLC) identified a positive association between daidzin concentration and estrogenic activity of isoflavone extracts. Based upon these results, we hypothesized that soy isoflavone extracts with high daidzin concentration will delay menopause onset in mice. To test this hypothesis, the effects of highly estrogenic soyisoflavone extracts were tested on a VCD-induced mouse menopause model. Results showed that there was significant difference ( $p=0.0004$ ) in the number of estrous cycles between VCD treated mice on a diet fortified with an estrogenic isoflavone extract compared to VCD treated mice on an unfortified diet. There was no significant difference in mean weights between the mice on isoflavone diets and mice on unfortified diets ( $p=0.195$ ). In conclusion our study suggests that soy isoflavone extracts with high levels of daidzin may delay the onset of menopause by increasing the functional estrogen available during menopause transition.