



Office of  
**UNDERGRADUATE RESEARCH**  
THE UNIVERSITY OF UTAH

# 2020 Summer Symposium

**THURSDAY, JULY 30, 2020**  
Virtual Event

**UNIVERSITY OF UTAH**



# 2020 SUMMER SYMPOSIUM

Thursday, July 30, 2020

Virtual Event

University of Utah

**Seth Ack** (Lars Laurentius)

Department of Electrical and Computer Engineering

*DIAGNOSTIC CAPABILITIES OF NUCLEIC ACID AMPLIFICATION TESTING FOR COVID-19*

In this project, we focused on reviewing the current testing methods for diagnosing COVID-19 in patients that have been exposed to SARS-CoV-2. My role as part of this project was to examine the current capabilities and limitations of nucleic acid amplification tests (NAATs) in detecting the presences of SARS-CoV-2 RNA. This was accomplished through an extensive literature analysis evaluating the effect of sample type, timing of sample collection, and type of NAAT used.

**Oralia Aguilar** (Mary Ann Villarreal)

Office of Equity, Diversity, and Inclusion

*ORAL HISTORIES IN THE ERA OF COVID-19: THE UTAH NAVAJO AND THE WESTSIDE OF SALT LAKE CITY, UTAH*

Oral Histories in the Era of COVID-19: The Utah Navajo and the Westside of Salt Lake City, Utah is about giving agency and voice to underrepresented communities and the individuals from these communities impacted by COVID-19. Our research consisted of recording and collecting the voices of the undocumented Latinx communities of the Westside of Salt Lake City, and the Utah Navajo communities of San Juan County.

**Jacob Baldauf** (Lindsay Keegan)

Department of Internal Medicine

*ENHANCING TRANSMISSION MODELS OF COVID-19 WITH GENOMIC DATA*

Phylogenetic trees are one of many tools used to understand a virus's evolution. Phylogenetic trees allow researchers to understand how the virus spread from one population to another. Using covid-19 RNA sequences, researchers have created the evolutionary tree of covid-19. We created a dynamic simulation study to model the covid-19 pandemic. Using this simulation, we will investigate what information can be learned from phylogenetic trees regarding virus transmission.

**Alex Ballinger** (Diane Pataki)

Department of Biological Sciences

*COMMUNICATING RESEARCH INFORMATION AND ACTIVITIES THROUGH DIGITAL MEDIA*

Research with University of Utah College deans and researchers to create an effective way of communicating on digital media.

**Rebecca Bateman** (Frederick Adler)

Department of Mathematics

*JASC OR MASK: COULD SARS-COV-2 BECOME "JUST ANOTHER SEASONAL CORONAVIRUS"?*

This research uses mathematical modeling to determine the conditions under which SARS-CoV-2 may become more like a seasonal coronavirus in terms of virulence, immunity, and long term spread.

**Reverie Brown** (John David Symons)

Department of Nutrition and Integrative Physiology

*ASSESSING AUTOPHAGIC FLUX IN PRIMARY ARTERIAL ENDOTHELIAL CELLS FROM HUMANS*

Our research focuses on the intracellular protein quality control pathway macroautophagy in primary arterial endothelial cells from patients with and without cardiovascular disease. Cells are collected from the sheath that is otherwise discarded during an arterial catheterization procedure. Endothelial cells then are identified via immunofluorescent staining, followed by treatment with pharmacological agents that allow the process of autophagy to be evaluated.

**Danielle Brown** (Binita Hona)

Department of Physics & Astronomy

*VALIDATION OF MATCHED RUN METHOD FOR EXTENDED GAMMA-RAY SOURCES*

Extended gamma-ray sources that span the fields of view of gamma-ray instruments prevent them from 'seeing' the cosmic ray background near the source. This complicates the estimation of background radiation, which is needed for the analysis of source data. A new method of background estimation - the Matched Run Method - is required to enable analysis of extended sources using telescopes with small fields of view, such as the VERITAS instrument. My research consists of validating this method.

**Dallen Calder** (Andy Weyrich)

Office of the VP for Research

*LESSONS LEARNED FROM COVID-19 TO ENHANCE RESEARCH ADMINISTRATION SERVICES.*

Covid-19 shutdowns began in mid-march of this year. This project is focused on analyzing the work-from-home productivity levels when compared to pre-Covid metrics. The ability of the office of the Vice President for Research to telecommute and maintain levels of productivity were also assessed. Based high telecommute feasibility and employee work-from-home preference a hybrid work model may be recommended for the future.

**Tayla Chiang** (Lars Laurentius)

Department of Electrical and Computer Engineering

*MULTIPLEXED DETECTION OF COVID-19/SARS-COV-2 BIOMARKERS FOR DIAGNOSIS*

This project involved an extensive study of the current literature for COVID-19 diagnostic tests to better understand the testing criteria and their effectiveness. The focus is on laboratory and point-of-care based serological tests to identify SARS-CoV-2 infected individuals. These tests detect antibodies in blood produced by the immune system to fight the virus. Results from samples obtained at different times post infection onset and different types of serological test will be discussed.

**Raquel Cifuentes** (Cheryl Wright)

Department of Family & Consumer Studies

*GENDER ROLES IN PRESCHOOL CHILDREN'S STORYTELLING*

The purpose of the research was to find patterns and themes in preschool children's storytelling. Every child was able to make up a story, that they later on acted out in front of the class. Every story was coded to find any patterns that were gender related. The results were consistent with past research that indicated how young children did follow gender themes unconsciously in their storytelling.

**Liam Clancy** (Lauren Barth-Cohen)

Department of Educational Psychology

*AN ANALYSIS OF CROSS-CUTTING CONCEPTS IN A CLAIMS-EVIDENCE-REASONING FOCUSED PHYSICS COURSE*

Cross Cutting Concepts (CCCs) 'help provide students with an organizational framework for connecting knowledge from the various disciplines into a coherent and scientifically based view of the world.' My research investigated their use in an introductory physics lab class. I both critically analyzed the labs for their connection to the 3 point framework, and did coding analysis on student responses. In conclusion I argue that CCCs should be reclassified into primary and secondary concepts.

**Christopher Clyne** (Dmitri Ivanov)

Department of Physics & Astronomy

*MEASURING AIR FLUORESCENCE YIELD FOR DETERMINING ENERGIES OF COSMIC RAYS*

As part of the sFLASH collaboration, I found the constant of proportionality known as Fluorescence Yield linking the amount of fluorescence light produced by high energy cosmic rays in the atmosphere to the primary particle energy of the cosmic rays. I used a FLUKA simulation and past experimental data to reach my result.

**Mary Kathryn Curcio** (Kristine Campbell)

Department of Pediatrics

*COLLABORATING FOR CHILD HEALTH AND WELL-BEING: A PILOT RCT OF A COLLABORATIVE CARE PRACTICE BETWEEN CHILD WELFARE AND CHILD HEALTH CARE*

Infants with referrals to Child Protective Services for suspected child maltreatment often have social determinants placing them at risk for negative health outcomes. Primary healthcare providers (PCP) are often unaware of the interventions of child welfare caseworkers (CWC) in the lives of these children and families. We hypothesized that a collaborative care practice aligning CWCs and PCPs will improve parental perceptions of infant health, child health care, and child welfare interventions.

**Rachel D'Agostini** (Krista Carlson)

Department of Metallurgical Engineering

*SYNTHESIS OF EASILY STERILIZABLE AND REUSABLE XEROGEL FILTERS FOR N95 RESPIRATORS*

Single-Use N95 masks are being produced every day but can not keep up with the current demand. This project focuses on the synthesis of xerogels and understanding the interactions between the functional groups of our chemicals and porogen. This understanding will help us analyze the microstructures of xerogels and create a filter for N95 masks.

**Bridget Dorsey** (Albert Park)

Department of Pediatrics

*AUDIOGRAM INTERPRETATION AS A DIAGNOSTIC INDICATOR OF CONGENITAL CYTOMEGALOVIRUS*

Congenital cytomegalovirus (cCMV) is a significant cause of sensorineural hearing loss (SNHL) in children. This study asks, are there audiometric measures that are characteristic of cCMV and could be used to distinguish cCMV from other nonsyndromic causes of SNHL? Preliminary results suggest that cCMV infected children present with a larger difference in hearing loss between the better and worse hearing ears when compared to children with SNHL caused by Large Vestibular Aqueduct (LVA).

**Tiffany Farfan (Shiver)**

Department of Education, Culture & Society

*THE DISPARATE IMPACT OF COVID-19 REMOTE AND ONLINE WORK ON UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAM (UROP) STUDENTS*

We are examining the impact of COVID-19 requirements that undergraduate research be conducted remotely on undergraduate researchers through UROP, with a focus on the impact of the digital divide on under-served students. While the COVID-19 pandemic has (reasonably) required that we shift this work online, this shift likely has disparate impact on already under-served groups in research due to limited technological resources, location, and additional stressors associated with students' lives

**Nima Fatahian (Rajeshwary Ghosh)**

Department of Nutrition and Integrative Physiology

*DEFINING THE ROLE OF CHAPERONE MEDIATED AUTOPHAGY IN CARDIAC PATHOLOGY*

Protein degradation pathways are essential for maintaining protein homeostasis and thus normal cellular function. Chaperone Mediated Autophagy (CMA) is a novel protein degradation pathway that selectively degrades cytosolic and misfolded proteins containing a unique KFERQ-like motif. CRY-AB R120G has shown to accumulate in the heart and cause desmin-related cardiomyopathy. Our goal was to test if activating CMA can selectively deplete Cry-AB R120G before it accumulates and causes disease.

**Matthew Findlay (Kevin Shah)**

Department of Internal Medicine

*REMEDI-COVID19*

As COVID-19 spreads across the world, it has become apparent the virus has the alarming capacity to damage cardiovascular health. It appears that this damage is caused by excessive inflammatory molecules that can flood the body when a patient has a severe infection with COVID-19. Thus, by analyzing specific biomarkers of inflammation, it is hoped that physicians will be able to predict when a patient battling COVID-19 is at risk for suffering adverse cardiovascular events.

**Nathan Foulk (Mikhail Raikh)**

Department of Physics & Astronomy

*INTERACTION CORRECTIONS FOR 2D SCATTERING FROM A HARD DISK*

It is known that the presence of the Fermi sea modifies the scattering of an electron from a point-like impurity. This is due to the Friedel oscillations of the electron density around the impurity. These oscillations create an additional scattering potential for incident electrons. The closer the energy of the incident electron to the Fermi level, the stronger the additional scattering. We study this effect for the case when the impurity is not point-like but rather a hard disk.

**Izzy Fuller (Cynthia Furse)**

Department of Electrical and Computer Engineering

*ENHANCING EDUCATION AFTER COVID*

Our team focused on the transition to online learning due to COVID-19. Our goal was to learn what went wrong, why, and how we could improve teaching in the future. We used a combination of student and faculty surveys, interviews with faculty, and course feedback from the U of U. We found that COVID-19 did not create problems, but rather amplified existing issues. This presentation focuses on one theme of our preliminary research, communication, including our recommendations to faculty.

**Kameron Goold** (Gail Zasowski)

Department of Physics & Astronomy

*USING ELEMENTAL ABUNDANCES TO EXPLORE THE STAR FORMATION HISTORY OF THE MILKY WAY*

We focus here on efforts to empirically measure the relationship between the chemical abundance ratios of magnesium-to-iron (written [Mg/Fe]) and iron-to-hydrogen (written [Fe/H]). The distribution of this relationship in chemical space is representative of progressive star formation in the Milky Way. We parameterize this distribution by measuring the slope of its morphology in order to explore the star formation history of the Milky Way Galaxy.

**Jami Harvey** (Mary Ann Villarreal)

Office of Equity, Diversity, and Inclusion

*ORAL HISTORIES IN THE ERA OF COVID-19: THE UTAH NAVAJO AND THE WESTSIDE OF SALT LAKE CITY, UTAH*

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**Alyssa Hill** (Wanda Pillow)

Department of Gender Studies

*WOMEN'S SUFFRAGE IN THE UTAH TERRITORY: AN ANALYSIS OF WESTERN INFLUENCE AND THE "MORMON QUESTION"*

While the Utah Territory's geographic location and conservative Mormon influence made it an unlikely candidate for women's suffrage, it was the second Territory in the United States to grant women the right to vote in 1870. The focus of this project was to assess, through archival research, the Utah Women's Suffrage Movement. By conducting discourse analysis, I identified major themes, the role of media, and the participation of Utah Mormon women as they acquired the right to vote.

**Jerry Howard** (Krista Carlson)

Department of Metallurgical Engineering

*DRYING AND SINTERING OF EASILY STERILIZABLE AND REUSABLE XEROGEL FILTERS FOR N95 RESPIRATORS*

We wanted to make reusable filters for N95 masks. We proposed to make them from xerogel, as this is a porous material which can be autoclaved for sterilization. Xerogel is the result of making a sol-gel and drying it at ambient pressure. Making a piece of xerogel large enough to be used as a filter without cracking is difficult. We investigated the effects of diameter on drying time of xerogels. Xerogels with larger diameter showed a longer drying time.

**Emma Kerr** (Christoph Boehme)

Department of Physics & Astronomy

*OPTIMIZATION OF MAGNETIC COIL GEOMETRIES FOR COHERENT CONTROL OF ELECTRON SPIN STATES IN ORGANIC SEMI-CONDUCTOR THIN FILMS UNDER STRONG MAGNETIC DRIVE CONDITIONS*

The purpose of this study is to optimize the geometry of a current-carrying structure that produces a homogenous oscillating magnetic field at radio-frequencies (1-200 MHz) with high amplitude B1. The circuit element should exhibit low impedance and allow for a straightforward application of the radiation field to organic semiconductor thin film devices for the purpose of studying spin-state transitions among pairs of electronic charge-carriers under strong magnetic drives.

**Ayesha Khan** (Tolga Tasdizen)

School of Computing

*DEVELOPING AN AI WARNING SYSTEM FOR INFECTIOUS RESPIRATORY DISEASE OUTBREAKS*

COVID-19 presents itself in regions of the lungs which are filled with fluid instead of air. This is a phenomenon seen in other respiratory diseases, but COVID-19 is unique in that it is present in these regions of the lungs with no known specific pattern or distribution. The aim of this project is to create an AI system that recognizes abnormalities in chest x-rays and present a warning when similar cases are recognized. This allows the opportunity to contain the spread in a population.

**Justin Krier** (Michael Thorne)

Department of Geology and Geophysics

*MAPPING OF ULTRA LOW VELOCITY ZONES AT THE CORE-MANTLE BOUNDARY*

Using earthquakes to look for Ultra Low Velocity Zones. This study is looking at a region under the Samoan Islands.

**Samuel Lakey** (Cynthia Furse)

Department of Electrical and Computer Engineering

*ENHANCING EDUCATION AFTER COVID*

Our team focused on the transition to online learning due to COVID-19. Our goal was to learn what went wrong, why, and how we could improve teaching in the future. We used a combination of student and faculty surveys, interviews with faculty, and course feedback from the U of U. We found that COVID-19 did not create problems, but rather amplified existing issues. This presentation focuses on one theme of our preliminary research, communication, including our recommendations to faculty.

**Erica Lampers** (Beth Howard)

Academic Advising Center

*VALUE OF SCREEN PRESENCE IN DEVELOPING A SENSE OF BELONGING*

With orientation moving to a virtual format in response to COVID-19, first-year students had a very different orientation experience in comparison to students in previous summers. With this move to online, we examined if it was still possible to create a sense of belonging on a virtual platform. Undergraduate researchers recorded students' level of interaction through Zoom sessions. From this, we were able to determine that a camera being on greatly impacts a student's level of participation.

**Zachary Lauritzen** (Jiyoung Chang)

Department of Mechanical Engineering

*NANOFIBER FILTRATION IMAGE PROCESSING*

Nanofibers are a promising filter material that have the potential to capture large numbers of water droplets suspended in air. This stage of the project aims to determine the effectiveness of nanofibers in capturing droplets using images captured from a microscope. My task this semester has been to develop image processing software capable of counting the droplets in a video of nanofibers capturing water vapor.

**Somi Lee** (Joseph Kim)

Department of Psychiatry

*PSYCHOLOGICAL IMPACT OF SOCIAL ISOLATION IN OLDER ADULTS DURING THE COVID-19 PANDEMIC*

The COVID19 pandemic has brought numerous changes to our lives. In the U.S., many people have been encouraged or even enforced at one point to socially distance themselves and stay-at-home. While social distancing can help prevent the spread of the disease, limited social activity can negatively affect one's emotional well-being, especially for older adults whose social contacts are often outside the home. The goal of our study is to find out how social isolation impacts one's mental health.

**Annabel Lee** (Martin Horvath)

Department of Biological Sciences

*EXPLORING CAROTENOID BINDING SPECIFICITY RELATED TO AMD*

Carotenoids are found in the pigments of brightly colored fruits and vegetables and possess antioxidant properties. There is immense interest in understanding the benefits of the antioxidant properties to alleviate chronic diseases, such as Age-related Macular Degeneration (AMD). With the overarching goal to discover the structure of GSTP1 bound to zeaxanthin, virtual molecular docking is utilized to explore binding specificity of GSTP1 and StARD3.

**Bernard Li** (Julio Facelli)

Department of Biomedical Informatics

*COVID-19 AND MITIGATION CONSIDERATIONS: MODELLING EMERGENT PROPERTIES OF COVID-19*

The spread of COVID-19 is influenced by social factors, environmental factors, community intervention, and the trajectory of human behavior. This project aims to develop a computational model that addresses all these considerations so that mitigation strategies for COVID-19 can be quickly and sufficiently simulated.

**Isaac Martin** (Karl Schwede)

Department of Mathematics

*THE NUMBER OF TORSION DIVISORS IN A STRONGLY F-REGULAR RING IS BOUNDED BY THE RECIPROCAL OF F-SIGNATURE*

Earlier in 2020, Polstra showed that the cardinality of the torsion subgroup of the divisor class group of a local strongly  $F$ -regular ring is finite. We expand upon this result and prove that the reciprocal of the  $F$ -signature of a local strongly  $F$ -regular ring  $R$  bounds the cardinality of the torsion subgroup of the divisor class group of  $R$ , and provide a necessary and sufficient condition for equality.

**Emily Martin** (Martin Horvath)

Department of Biological Sciences

*IDENTIFYING THE STRUCTURE OF THE ZEAXANTHIN/GSTP1 COMPLEX*

Age-related macular degeneration (AMD) is the leading cause of irreversible blindness in wealthier nations and there is currently no way to slow or stop the progression of the disease. Xanthophylls help protect the macula from oxidative light damage, but we don't know much about how they interact with binding proteins. I used the molecular docking program AutoDock Vina to come up with likely solutions to the structure of the GSTP1/Zeaxanthin complex.

**Allison McElroy** (Lindsay Keegan)

Department of Internal Medicine

*UNDERSTANDING DEMOGRAPHIC CHARACTERISTICS OF COVID-19 IN UTAH USING A NETWORK MODELING APPROACH*

I investigated the use of network models as a way to explain the disparity of positive COVID-19 cases in different racial/ethnic demographics in Utah. My hypothesis is that greater connectivity between individuals deemed essential would be greater, explaining some of the differences in case counts.

**Eliza McKinney** (Nadja Durbach)

Department of History

*THE LIVING TOMB: VICTORIAN DISCOURSE ABOUT FEMALE SECLUSION IN THE ORIENT*

This project analyzes the language of Victorian, British women's writing about female seclusion in India, namely the use of the terms zenana, purdah, and harem, and the surrounding rhetoric regarding these terms.



**Olivia McQuarrie** (Jake Jensen)

Department of Communication

*TRACKING UNINTENDED EFFECTS OF COMMUNICATION AND BEHAVIORS RELATED TO COVID-19*

The goal of this project is to analyze public response to pandemic communication over time. Weekly studies of participants are measuring demographics, media use, unintended effects of communication (information overload, message fatigue, perceived exaggeration, and perceived repetition), and intentions to engage in COVID-19 prevention.

**Ashley Merrell** (Jordan Gerton)

Department of Physics & Astronomy

*INVESTIGATING THE IMPACT OF COVID-19 AND SOCIAL/POLITICAL ACTIVISM ON COLLEGE OF SCIENCE STUDENTS*

In the chaos of today's world, we were curious to see how COVID-19 and recent social and political events/activism are affecting how students view and manage their education. While we have begun analyzing the quantitative data received, this is merely the beginning of understanding the survey responses from each individual. We will continue to move forward by looking at the qualitative responses focusing on ideas of how to solve the issues that we have begun to see so far in our investigation.

**Matthew Mikota** (Ramón Barthelemy)

Department of Physics & Astronomy

*WORKPLACE CLIMATE FOR LGBT+ PHYSICISTS: A PREDICTOR OF OUTNESS*

We analyzed the climate experiences of LGBT+ physicists through an online survey (N=324) collected by the committee on LGBT+ physicists for the American Physical Society. We found that being a student, exposure to exclusionary behavior, and both positive and negative workplace climate were significant predictors of outness to coworkers. The results indicate a positive workplace climate is a strong predictor of outness suggesting the importance of proactively inclusive physics communities.

**Anh Nguyen** (Jennifer Shumaker-Parry)

Department of Chemistry

*VISUALIZING THE OPTICAL NEAR FIELD OF NOBLE METAL NANOPARTICLE VIA FDTD METHOD*

I have learned Finite-Difference Time-Domain (FDTD) calculations with this project. The main software for learning and practicing with this type of calculation is "FDTD Solutions" from Lumerical. I used FDTD method to calculate the E-field distribution for gold nanoparticle on glass substrate with different excitation wavelengths that correspond to wavelengths in the Raman microscope.

**Sahar Nikkhah** (Dave Kieda)

Department of Physics & Astronomy

*JOINT SPECTRAL ANALYSIS OF CRAB NEBULA WITH FERMI-VERITAS-HAWC DATA*

Galactic cosmic rays (CRs) are deflected by Galactic magnetic field in their journey to earth. Hence, they no longer carry directional information. We study gamma-ray emission to indirectly probe CR origin. We have different gamma-ray instruments in the space and the ground to observe the emission at different energy bands. In this analysis, we study the spectral analysis of the Crab Nebula using the data collected by three different observatories

**Milan Oxspring** (Ruth Watkins)

Office of the President

*RESPONDING TO COVID-19 IN HIGHER EDUCATION: LESSONS LEARNED FROM THE 2008 FINANCIAL CRISIS*

In light of the COVID-19 pandemic, leaders in higher education are busy developing strategic plans to guide their institutions through economic turmoil. One approach to finding a blueprint for success is through analysis of university advancement in the decade following the 2008 financial crisis. This project seeks to learn which of the largest public American universities saw the greatest growth and prosperity from 2008-2018 and what factors fostered this success.

**Jessica Padron-Loredo** (Robert C. Welsh)

Department of Psychiatry

*MINORITY HEALTH DISPARITIES AND HEALTH INFORMATION DURING THE COVID-19 PANDEMIC*

An abundant amount of information regarding COVID-19 is being released every day. Related information has become increasingly accessible by traditional methods and social media, but most of it is in English. This study is designed to survey the Spanish speaking community to determine if they are receiving sufficient information to address their needs during the COVID-19 pandemic.

**Kylie Persson** (Tara Deans)

Department of Bioengineering

*HIGH-THROUGHPUT PRODUCTION OF PLATELET-LIKE PARTICLES*

This project focuses on a novel method for producing platelet-like particles in vitro using the MEG-01 cell line. Matured and differentiated MEG-01 cells were infused through a microfluidic system and platelet-like particles were produced. We conclude that our microfluidic system produces viable platelet-like particles from MEG-01 cells and that PMA enhances CD41a expression of the particles.

**Nathan Pfau** (Joseph Kim)

Department of Physiology

*PSYCHOLOGICAL IMPACT OF SOCIAL ISOLATION DURING THE COVID-19 PANDEMIC*

COVID-19 has spread at a high rate through the United State and because of this social isolation/distancing has been encouraged or even enforced in some areas. Every little is know about how social isolation can affect the mental health of older people and especially during a pandemic. This study aims to focus on the effect of social isolation on the mental health of older adults during the COVID-19 pandemic.

**Tracy Phan** (Monisha Pasupathi)

Department of Psychology

*MENTAL HEALTH AMONG COLLEGE FRESHMEN DISPLACED BY COVID-19*

Freshman year of college is an important time for identity development and achieving autonomy. University closures due to COVID-19 has led to college freshmen being abruptly sent back home, or displaced. Disruptions to this formative year may have significant effects on freshmen well-being and mental health. This research project sought to answer whether mental health concerns are more elevated than normal among freshmen displaced due to COVID-19.

**Shaylie Platten** (Kristin Cloyes)

College of Nursing

*THE DIFFERENCES IN SELF-REPORTED SCORES OF RELATIONSHIPS SATISFACTION OF CANCER SURVIVORS WITH THEIR CAREGIVERS.*

In my exploratory summary of past data recorded, I examine the effects of cancer on the relationship satisfaction of cancer survivors and their caregivers.

**Eva Pronovost** (Cynthia Furse)

Department of Electrical and Computer Engineering

*ENHANCING EDUCATION AFTER COVID*

Our team focused on the transition to online learning due to COVID-19. Our goal was to learn what went wrong, why, and how we could improve teaching in the future. We used a combination of student and faculty surveys, interviews with faculty, and course feedback from the U of U. We found that COVID-19 did not create problems, but rather amplified existing issues. This presentation focuses on one theme of our preliminary research, communication, including our recommendations to faculty.

**Olivia Richards** (Pai Wang)

Department of Mechanical Engineering

*AEROGEL-BASED METAMATERIAL DESIGN FOR HELICOPTERS*

Our research is focused on metamaterials. We use their wave manipulating abilities to create a new material that will soundproof helicopters. We spent time designing unique cell structures for the material. After, we tested these designs with a finite element analysis program named Abaqus. We used compression to understand how these structures deform as well as how they interact with the cells surrounding them. These findings are important for our next steps toward sound damping behavior.

**MacKenzie Ridley** (Beth Howard)

Academic Advising Center

*VALUE OF SCREEN PRESENCE IN DEVELOPING A SENSE OF BELONGING*

With orientation moving to a virtual format in response to COVID-19, first-year students had a very different orientation experience in comparison to students in previous summers. With this move to online, we examined if it was still possible to create a sense of belonging on a virtual platform. Undergraduate researchers recorded students' level of interaction through Zoom sessions. From this, we were able to determine that a camera being on greatly impacts a student's level of participation.

**Luis Rufino** (Pearl Sandick)

Department of Physics & Astronomy

*INVESTIGATING SUPERSYMMETRIC DARK MATTER WITH MADHAT*

In this research project I explain what dark matter is and how the Minimal supersymmetric standard model has the possibility of explaining this phenomenon. I go over the theory along with how to detect these supersymmetric dark matter particles. Using a program called MADHAT allows me to place cross-section limits on supersymmetric dark matter models, and compare the cross-section with the Fermi-LAT satellite. Furthermore, determining if the dark matter models are excluded.

**Jacob Scutt** (Pai Wang)

Department of Mechanical Engineering

*EXPERIMENTAL STUDY ON THE PARAMETRIC ACOUSTIC ARRAY AND ITS APPLICATIONS*

This project aims to understand and consider applications for a new speaker technology which has very high directivity - like a flashlight but with sound.

**Sonia Sehgal** (Martin Horvath)

Department of Biological Sciences

*FINDING THE ROLE OF BIOLOGICAL PROBES IN MUTYH*

In this project, MUTYH will be studied through computational modeling and an activity assay to find biological probes that can bind to the protein and affect its function. Currently, the role of Base Excision Repair (BER) pathway in cancer is still unclear, making it challenging to find therapeutic interventions. These probes can later be tested in animal models and may serve as the foundation for anticancer drug discovery.

**Abel Shiferaw** (Yue Zhao)

Department of Physics & Astronomy

*LONG-LIVED PARTICLE SEARCHES AT THE LARGE HADRON COLLIDER*

The existence of Long-Lived Particles (LLPs) is highly motivated in Hidden Valley (HV) models. MATHUSLA is a newly proposed detector that is designed to be sensitive to LLP signatures. We use PYTHIA, a programming language, to generate a high-energy collision event at the Large Hadron Collider (LHC) to study the decay of a HV pion into dimuon pairs. We are interested in estimating the sensitivity of MATHUSLA to HV signatures.

**Faizah Siddique** (Douglas Bergman)

Department of Physics & Astronomy

*MEASURING THE TRANSPARENCY OF THE ATMOSPHERE USING DATA FROM TELESCOPE ARRAY*

My project focuses on attempting to make a measurement of atmospheric transparency using starlight data from the Telescope Array project. I create extinction curves of starlight over time, and I study these plots by fitting them to different exponential models. I make exponential fits based on Rayleigh and aerosol scattering models.

**Brett Smith** (Sonia Salari)

Department of Family & Consumer Studies

*DOMESTIC VIOLENCE IN THE AGE OF COVID-19*

As the COVID-19 pandemic continues there are worldwide concerns about domestic violence victims being ordered to stay at home with their abusers. This study is attempting to understand the impact of COVID-19 on domestic violence in Utah. On March 6 Governor Gary Herbert declared a state of emergency in Utah. On March 12 Utah schools were dismissed and remained so through the end of the school year. What impact has this had on the number of child abuse cases and domestic violence in general?

**Maia Southwick** (Monisha Pasupathi)

Department of Psychology

*MENTAL HEALTH AMONG COLLEGE FRESHMEN DISPLACED BY COVID-19*

Freshman year of college is an important time for identity development and achieving autonomy. University closures due to COVID-19 has led to college freshmen being abruptly sent back home, or displaced. Disruptions to this formative year may have significant effects on freshmen well-being and mental health. This research project sought to answer whether mental health concerns are more elevated than normal among freshmen displaced due to COVID-19.

**Kincade Stevenson** (Jon Rainier)

Department of Chemistry

*MODELING AND DOCKING POTENTIAL EIF4A INHIBITORS*

I modeled 3D structures and computationally docked them to the eIF4A protein to find which types of small molecules could be potential targets for eIF4A protein inhibition.

**Zachary Ta** (Kelly Baron)

Department of Psychology

*SLEEP, DIET, AND PHYSICAL ACTIVITY IN THE COVID-19 PANDEMIC*

How has Covid-19 Impacted Utah citizens routines and habits? We are interested in gathering qualitative, relevant data and understanding the biggest lifestyle changes that we are facing today due to the Coronavirus Pandemic.

**Michael Tao** (Sheila Crowell)

Department of Psychology

*PREGNANT DURING A PANDEMIC: PRELIMINARY STUDY ON THE IMPACT OF COVID-19 RELATED STRESS ON NEONATAL OUTCOMES*

This study compared archived birth outcome data collected before the onset of Covid to a smaller sample of births during the pandemic. For the births during the pandemic, we expect to find lower apgar scores, lower birth weights, lower birth lengths, lower ponderal indexes, and lower head circumferences. We found that birth outcomes collected for births during the pandemic are no different than birth outcomes before the pandemic.

**Shaylynn Trego** (Sara Grineski)

Department of Sociology

*INITIAL IMPACTS OF COVID-19 ON UNDERGRADUATE RESEARCHERS AT US UNIVERSITIES*

As COVID-19 rapidly evolved to pandemic status during Spring 2020, undergraduate education in the United States was altered in unforeseen ways. We conducted a survey of undergraduate researchers during July 2020 to develop an evidence-based understanding of the effects of the COVID-19 pandemic on undergraduate students' research experiences. We partnered with undergraduate research program directors at 18 universities to recruit undergraduate researchers to take our survey.

**Sarah Trela-Hoskins** (Kelly Baron)

Department of Psychology

*SLEEP, DIET, AND PHYSICAL ACTIVITY IN THE COVID-19 PANDEMIC*

How has Covid-19 Impacted Utah citizens routines and habits? We are interested in gathering qualitative, relevant data and understanding the biggest lifestyle changes that we are facing today due to the Coronavirus Pandemic.

**Sang Truong** (Hanseup Kim)

Department of Electrical and Computer Engineering

*RANDOM PARTICLE MOTION SIMULATION USING LAMMPS*

My research focuses on learning LAMMPS, Notepad++, and Ovito to simulate particles flowing through a nanogap. I was successful in getting a basic simulation of particles with random motions to flow through a 5 nm gap and track how far into the nanogap the particles were. Furthermore, I was able to track how many were within the nanogap at any given time. However, the simulations are still lacking in crucial detail to prove useful. I will need to better simulate molecules, viruses, and linkers.

**Robert Underwood** (Roseanne Warren)

Department of Mechanical Engineering

*AN EXPLORATION OF ALTERNATIVE SODIUM ION ANODE MATERIALS: METAL ORGANIC FRAMEWORK-DERIVED ORDERED CARBON STRUCTURES*

Developing Metal-Organic Framework derived carbon materials as alternative anodes for sodium ion batteries better able to support intercalation of the sodium ion than traditional carbons.

**Payton Utzman (Martin Horvath)**

Department of Biological Sciences

*A STRUCTURAL ANALYSIS OF THE LC MUTY METAGENOME*

MutY is a DNA repair enzyme that prevents cancer. The Lost City represents the beginning of life; thus by studying MutY from the Lost City the evolutionary history of this crucial enzyme can be analyzed. The goal of this project was to re-analyze the LC MutY metagenome collected by Dr. Brazelton in 2018 through a structural approach by predicting structures of amino acid sequences and virtually docking nucleotides.

**Keely VandenBerge (Sara Hart)**

College of Nursing

*A MENTORSHIP MODEL FOR EDUCATIONALLY DISADVANTAGED HIGH SCHOOL STUDENTS INTERESTED IN THE NURSING PROFESSION*

This project designs, implements, and evaluates a mentorship program for high school students enrolled in a Certified Nursing Assistant Program at Granite Technical Institute and nursing students at the University of Utah. The goal for this mentorship program is to strengthen pathways for diverse nursing students to enter the nursing profession.

**Betsy Marilisa Vega (Amy Bergerson)**

Department of Educational Leadership & Policy

*COVID-19 AND THE STAFF EXPERIENCE AT THE UNIVERSITY OF UTAH*

When COVID-19 forced the University to suspend all activity on campus, faculty, staff, and students had to adapt in the ways they interact and learn. This research focuses on how COVID-19 has affected University staff members and how staff members' work has been impacted by COVID-19 related changes. Through our research, we have identified four salient themes that encompass the concerns of University staff members and we provide recommendations on how to address those concerns.

**Christopher Wallace-Carrete (Amy Bergerson)**

Department of Educational Leadership & Policy

*COVID-19 AND THE STAFF EXPERIENCE AT THE UNIVERSITY OF UTAH*

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