# Undergraduate Research Symposium May 17, 2013 Mary Gates Hall

# Online Proceedings

## SESSION 1O

## HEALTH IN GLOBAL COMMUNITIES

*Session Moderator: Stephen Gloyd, Global Health*
**288 MGH**
*1:15 PM to 2:45 PM*

* Note: Titles in order of presentation.

**Farmworker Morbidity and Mortality in Eastern Washington State**
*Spencer May, Senior, Biochemistry, Biophysics and Molecular Biology, Whitman College*
*Mentor: Jim Russo, BBMB, Whitman College*
*Mentor: Jennie McLaurin, Migrant Clinicians Network*
*Mentor: Adam Hoverman, Director, Clinical Skills I; Director of Global Health and Research, Pacific Northwest University of Health Sciences*

Immigrant farmworkers have been an integral part of Eastern Washington communities for decades. Their health and well-being are essential for the health of our communities. But for many farmworkers, health care access is unavailable or limited by a lack of insurance, health providers, discrimination, and social marginalization, making it difficult to assess their health status and burden of disease. A lack of basic information about farmworker health complicates the decision-making of state and local officials, physicians, and other advocates dedicated to improving farmworker health. In partnership with the Migrant Clinicians Network and the Pacific Northwest University of Health Sciences, I used community-based research techniques to design a farmworker public health study which could provide the necessary data to inform policies to improve farmworker health. Our survey research was designed to assess the serious injuries, diseases and causes of death among farmworkers and their families.

## POSTER SESSION 2

**Commons West, Easel 11**
*12:45 PM to 2:15 PM*

**Mental Rotation and Autism Spectrum Disorder**
*Keitaro Machida, Senior, Psychology*
*Mary Gates Scholar*
*Mentor: Michael Murias, Psychiatry*

Superior spatial abilities in Autism Spectrum Disorder (ASD) are popularly associated with savant behaviors, and have been demonstrated in previous studies including tests of spatial intelligence. Our study examines participant's performance on a classical mental rotation task, which provides an objective measure of spatial ability. We seek to demonstrate how differences in reaction time (RT) and brain responses of adults with ASD differ from controls in this task. Previous research in typical individuals demonstrates that as the degree of rotation increases, participants are slower to make orientation decisions. These RT measures suggest individuals mentally rotate a second image to a reference image in order to make a decision. Our study tested age and IQ matched ASD and typical controls in a task that required a decision about the orientation of images of block alphabet letters. Participants were asked to decide whether the second of two images was identical to or a mirror of the first image. Images were presented at one of four angles. Dense array electroencephalography (EEG) and RT were recorded. Thirty-five male adults (17 in ASD, 18 in control) participated. RT, IQ, angle of images, and accuracy were variables for behavioral analysis. EEG data was analyzed in the time/frequency domain using open source and in-house software. EEG and RT measures from each trial of the task were compared based on subject group, types of images (normal or mirrored), and angle of images. Our analysis extends to include investigating brain activity prior to the pressing of the response key (the time that participants are making a decision). No general advantage in mean RT was seen in ASD group, however, high performance IQ (PIQ) participants in ASD group performed faster over the course of the experiment. This suggests high PIQ autistics may learn faster in this particular task.

## POSTER SESSION 4

**Commons East, Easel 55**
*4:15 PM to 5:45 PM*

**Computational Design and Analysis of ZaP-HD**
*Harrison Cole (Harrison) Stankey, Sophomore, Aeronautics & Astronautics*
*NASA Space Grant Scholar*
*Mentor: Uri Shumlak, Aeronautics & Astronautics*

The ZaP Flow Z-Pinch Project researches the stabilizing effects of sheared axial flow on Z-pinch plasmas. Stable plasmas are necessary to harness nuclear fusion. Nuclear fusion

is an essentially limitless source of power, but the difficulty of creating long-lived plasma stability has hindered the development of controlled nuclear fusion. The ZaP experiment forms a Z-pinch plasma by ionizing hydrogen gas into plasma and dynamically forming a 100 cm long column approximately 1 cm in radius. Z-pinches are extremely susceptible to instabilities, which tend to disrupt the plasma on the order of 10-8 s. With a sheared flow, the ZaP experiment has observed a Z-pinch plasma lifetime of 10-5 s. These successful research results have led to a new experiment, ZaP-HD, the goal of which is to produce and observe high energy-density plasma pinches. This new experiment will be modeled with MACH2, a two-dimensional magnetohydrodynamic equation-based simulation code. The design that is modeled will use a similar design to the current ZaP Flow Z-Pinch experiment, however it will have significant modifications to its geometry and operating conditions. These will be reflected in the simulation by changes to the code's input file, which consists of a matrix of points to form the geometry and parameters that determine the running conditions. Two major design changes include the addition of a third electrode and a second power supply. These modifications allow for independent control of the motion of the plasma through the two phases of the experiment. The simulation data collected will provide the team with a complex and detailed view of how this new experiment, ZaP-HD, will operate as well as any changes that need to be made to the planned design.