Online Proceedings

Poster Session 1

MGH 241, Easel 139

11:00 AM to 1:00 PM

Neuronal Protein Expression in Novel HdhQ200/200 Mouse Model of Huntington's Disease

Sofia Maria (Sofia) Simonton Siegel, Senior, Neurobiology
Mentor: Jessica Cao, Pharmacology
Mentor: Nephi Stella, Pharmacology

Huntington's Disease (HD) is a fatal neurodegenerative disease that results in neurological and motor impairments that worsen after onset over a period of 10-25 years. HD is caused by an expanded polyQ gene characterized by increased CAG repeats. Specifically, HD causes degeneration of medium spiny neurons, located in the striatum. We studied the pathogenesis in a novel HD murine model containing approximately 200 CAG repeats inserted in the mouse homolog of the human HD gene, Hdh. This HdhQ200/200 mouse more closely mimics the symptomology of HD than the current mouse models, which do not completely imitate the HD phenotype seen in humans. The HdhQ200/200 model also allows for improved analysis of gene involvement in HD development. Previous models show decreases in neuronal protein expression responsible for functions including glutamate transport, cAMP regulation, initiation of glycolysis, and other similarly ubiquitous functions such as anchoring synaptic proteins. In addition, the CB1R gene, which is a significantly known early marker for the onset of human HD pathology, also shows decreased expression in previous mouse models. Decreased expression of these proteins causes widespread neuronal dysfunction, characteristic of HD symptomology. Here, we examine neuronal protein expression in this novel HdhQ200/200 model using western blotting technique to see if these proteins are similarly down regulated, indicating that this model could be an alternate method of studying HD in mice. This would provide substantiating evidence that the HdhQ200/200 mouse is an appropriate model for HD, which would allow for more accurate research into HD pathogenesis and symptomology that could help current HD patients

Poster Session 2

Commons East, Easel 61

1:00 PM to 2:30 PM

Disaster Migration and Civil Infrastructure: Water and Wastewater Utilities' Response to Rapid Population Increase

Katarina Kubiniec, Junior, Civil Engineering
Mary Gates Scholar
Mentor: Jessica Kaminsky, Civil & Environmental Engineering
Mentor: Miriam Hacker, Civil & Environmental Engineering

The recent refugee crisis has shown an unprecedented increase in people seeking asylum in European countries over the last five years. This sudden change in population creates potential challenges for water and wastewater utilities in providing services. These challenges may include inter-agency coordination and assessing network capacities. As such, it's important to understand how utility employees prioritize their responses to an unexpected population influx. Identifying these patterns in response will be useful for utility providers to accurately predict demand and efficiently plan systems for municipalities. There is a lack of literature regarding utility involvement in urban emergency response, ergo an exploratory analysis was conducted to document water and wastewater utilities' responses to disaster migrations. The project goals are twofold: identify areas of response from German utilities involved with coordinating emergency housing for displaced persons, and compare those results to a hypothetical utility disaster response survey conducted in the United States in 2016. Ten ethnographic interviews with German water and wastewater utility employees were recorded during summer 2016. Four significant areas of response have been identified through qualitative analysis of the interviews: Coordination, New Infrastructure, Technical Capacity, and Financial Capacity. Based on relative frequency, Coordination was predominant in the German interviews while Technical Capacity was prevalent in the US. This suggests the utility employees may have different perspectives and priorities between the two countries. Understanding these patterns provide a clear representation of utility employees' primary priorities and concerns in the event of rapid population increase.

Poster Session 3

Commons East, Easel 52

2:30 PM to 4:00 PM

A Spectroscopic Study of Quasar PG1407+265 and Galaxies Along the Sightline

Camellia Rose (Camellia) Magness, Senior, Physics: Comprehensive Physics, Astronomy
Mary Gates Scholar, UW Honors Program
Mentor: Jessica Werk, Astronomy, University of Washington, Seattle

Quasi-stellar objects (also known as quasars/QSOs) are the most luminous type of all known astronomical objects and can be seen over vast cosmological distances (often parameterized in terms of the degree to which light is "redshifted" due to the expansion of the universe). Quasars are characterized by an intrinsic astronomical spectrum that features a very bright continuum, which makes them useful as standard "background sources" to assess foreground material, such as the circumgalactic and intergalactic media. These are the warm-hot gaseous regions of space between and surrounding galaxies that are not directly measurable or observable due to their incredibly diffuse nature. However, as the quasar photons interact with this gas, the intrinsic spectra of quasars is distorted as atomic elements (such as Hydrogen, Oxygen and Iron) absorb some of this light. In my work, I use a Python Graphical User Interface to display the entire processed spectral region of interest and manually scroll through redshifts to detect and identify possible absorption features. I identify hundreds of features as foreground gas at distinct redshifts and subsequently correlate it with the redshift distribution of galaxies nearby in projection along the line of sight for a quasar. I am focusing on QSO PG1407+265, a quasar with a high signal to noise spectrum from a Hubble survey taken with the Cosmic Origins Spectrograph (COS). From that spectrum I have produced absorption models that I am analyzing in conjunction with ground-based galaxy spectra in order to compare host galaxy and circumgalactic metallicities. This particular QSO has a galaxy and absorption system rich sightline that will ultimately serve as a powerful diagnostic of the cosmic baryon cycle, the fundamental driver for galaxy evolution.

POSTER SESSION 3

Commons East, Easel 72

2:30 PM to 4:00 PM

Forest Snow Interception

Max Mozer, Senior, Civil Engineering
Mary Gates Scholar
Mentor: Jessica Lundquist, Civil And Environmental Engineering
Mentor: William Currier, Civil and Environmental Engineering

For efficient water management, quantifying the amount of water stored in mountains through accurate hydrologic modeling is critical. Snow is an essential aspect of water resources because it acts as a natural storage, and melted snow accounts for a large amount of our water supply. Snow forest interception is the process of trees blocking snow from reaching the ground. Forests cover almost 40% of snow covered regions, and trees can intercept up to 60% of the total annual snowfall. Thus, forest interception has a large influence over how much water is stored in surrounding watersheds. Current methods for modeling forest-snow interception are based on parameterizations from few observations in non diverse areas. Evaluation of such methods is necessary and improvements in modeling will lead to improved hydrologic forecasting and planning. To evaluate such forest-snow interception parameterizations, I used time-lapse photography and citizen science through a project called Snow Spotter. Snow Spotter is an online tool where users can answer questions about the presence of snow intercepted by trees, from time-lapse photography throughout the western United States. Based on the classifications of our users, I created a time series of data containing the interception patterns which I used to develop a temporal understanding of forest snow interception which I compared to modeled parameterizations. The differences outlined in my research allows the time-lapse photography to improve these parameterizations. Thus, it improves the modeling process and the quantification of water resources in general, enabling better water resource management in the future.

POSTER SESSION 3

Commons East, Easel 51

2:30 PM to 4:00 PM

Ultraviolet Spectroscopy of the Circumgalactic Gas Flows that Drive Galaxy Formation and Evolution

Dustin Lloyd (Dustin) Burnham, Senior, Physics: Applied Physics, Astronomy
UW Honors Program
Mentor: Jessica Werk, Astronomy, University of Washington, Seattle

The circumgalactic medium (CGM) is gas that is constantly being thrown out and being recycled back into galaxies. Learning more about the composition and location of this gas can give information about its origin and fate. However, this gas is exceedingly difficult to observe in emission, as it is very diffuse and ionized, and therefore must be observed in absorption at ultraviolet wavelengths. Fortunately, the *Hubble Space Telescope (HST)* Cosmic Origins Spectrograph (COS) installed in 2009 allows for very sensitive measurements of CGM UV absorption lines. As light from very bright quasi-stellar objects (QSOs) passes through the universe on its way to Earth, it encounters a galaxy's gaseous CGM resulting in absorption lines from ionized gas in the QSO spectra. My research involves an analysis of many QSO spectra from *HST*/COS. I identify ionized elements seen in absorption at distinct redshifts along the QSO line of sight.

The goal is to identify everything in the spectrum, and in doing so isolate the systems of gas that contain strong Lyman Series lines from Hydrogen and metals (elements heavier than hydrogen) with a corresponding redshift from the Milky Way. These redshifts can be used to reference various databases to actually look for the host galaxy halo at some projected distance from the QSO absorber system. With this information, the distance between the galaxy and the sightline of the QSO can be calculated giving a lower limit for the extent of its CGM. Additionally, the composition of the galaxy can be compared to that of the gas in its CGM. Ultimately, these data will further our understanding of the dynamic processes that drive galaxy formation.

POSTER SESSION 3

Commons East, Easel 53

2:30 PM to 4:00 PM

Mapping the Cosmic Baryon Cycle Using Quasar Absorption Line Spectroscopy

Brittany Anne (Brittany) Platt, Junior, Physics: Comprehensive Physics, Astronomy
Mentor: Jessica Werk, Astronomy, University of Washington, Seattle
Mentor: Hannah Bish

Most of the atomic matter in the universe lies in the diffuse ionized gas in the inter and circumgalactic medium, cycling in and out of galaxies over billions of years. Mapping this cosmic baryon cycle is the key to understanding galaxy properties and evolution. Because we cannot observe gas by its own emission, we use a technique called quasar absorption line spectroscopy to study the gas. Quasars serve as bright background sources, and as light passes through gas clouds and galaxy halos we can analyze absorption features in the spectra to determine elements that are present in the gas. These absorption features also give us information about the distance to each gaseous system. When an absorption system with a high density of elements is identified in proximity to a known galaxy, it is likely that the system is galactic halo gas that is cycling in and out of the galaxy. I present my analyses of three quasar spectra at redshifts z = 0.789, 0.88, and 0.99, with a list of identified gaseous systems that are potentially associated with known galaxies. The study of these systems will help us gain an understanding of how this cosmic baryon cycle has given rise to the visible structures in the universe