Feb 7th, 10:15 AM - 11:50 AM

Facets of Physics Research

Stephen Bueltmann
Old Dominion University

10:15 – 11:15 AM (Room 1311)
Facets of Physics Research
Chair: Dr. Stephen Bueltmann, Department of Physics

The Heavy Photon Search Experiment at Jefferson Lab
By: **Mathieu Ehrhart** (Mentor Dr. Stephen Bueltmann)

Dark Matter could potentially interact with itself via a heavy vector boson (heavy photon), which could in turn interact weakly with the photon, the carrier of the electromagnetic force, through kinetic mixing. The Heavy Photon Search experiment is scheduled to take data at Jefferson Lab's Hall B in 2015 using the newly energy-upgraded electron beam. The detected electron-positron pairs from the decay of the bremsstrahlung produced heavy photons will cover a heavy photon mass range from 20 to 1000 MeV/c^2.

Observational Astronomy at the CTIO in Chile
By: **Joshua Frechem** (Mentor Dr. Yelena Prok)

Using data from the 2.3 meter Bok telescope on Kitt Peak and the FRANKENSpec spectrograph, we aim to investigate the circum-nuclear region of active galaxies in the J, H, and K passbands in order to obtain high signal to noise spectra with reasonable investment of observing time. The sample is selected to cover a wide range of AGN types of activity in luminous nearby galaxies. These data unveil details of what the environment is like in the area surrounding the supermassive black holes that are found in the heart of each of these galaxies.

Energy Sharing (e,2e) Collisions - The Ionization of Xenon in Geometries Ranging from Coplanar to Perpendicular
By: **Robert D. Mydlowski** (Mentor Dr. Colm Whelan)

The ionization of the inert gas Xe is investigated. The role of single and multiple scattering in determining the shape of the triple differential cross section in different energy sharing geometries is clarified. By varying the geometries we explore the role of exchange, polarization and post collision interaction. Our theoretical results are compared with recent experiments.

The Ionization of Hydrogenic Ions by Proton Impact: CTMC Calculations
By: **Anthony Sciola** (Mentor Dr. Colm Whelan)

The ionization by proton impact of hydrogenic ions will be discussed. The Classical Trajectory Monte Carlo (CTMC) method has yielded good results for proton impact on neutral hydrogen, but has proved less successful for hydrogenic ions. Possible reasons for this failure are discussed and calculations are presented in a modified version of the code.