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2013 Undergraduate Research Symposium

Feb 9th, 2:00 PM - 3:00 PM

Facets of Experimental Physics at ODU

Stephen Bueltmann
Old Dominion University

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2:00-3:00 PM (Room 1311)
Facets of Experimental Physics at ODU
Chair: Dr. Stephen Bueltmann, Department of Physics

A Solid Polarized Target for CLAS12 at Jefferson Lab

By Sean Averill (Advisor: Dr. Stephen Bueltmann)

To be able to study the spin-dependence of the nucleon structure with electron scattering experiments, targets providing spin-polarized nuclei are needed. We report on the development of a new solid polarized target for the CLAS12 detector presently being installed in Jefferson Lab's Hall B. The talk will emphasize the polarization measurement of proton and deuterons with the nuclear magnetic resonance (NMR) technique.

Detecting and Observing Extrasolar Planet Dynamics

By Brian Brooks (Advisor: Dr. Stephen Bueltmann)

The search for extrasolar planets has resulted in an increasing number of discoveries in the past decade. Using the 24" robotic telescope on Fan Mountain (Virginia) and the IRAF analysis package, we can measure light curves of star with their transiting exoplanets. We measured and analyzed several transits of the exoplanet Qatar-1b with a transit period of 1.42 days. The system consist of a K type dwarf star orbited by a nearby giant gas planet. In combination with other amateur observations, we detect a decreasing occurrence of the mid-transit, indicating a decreasing radial orbit.

A MOTley Project: Building a Laser Lock, a Glass Cell, and a Vacuum Chamber for Obtaining a Rubidium Magneto-Optical Trap (MOT)

By Dawn Hedges (Advisor: Dr. William Williams)

Laser cooling and trapping of atoms is accomplished in a Magneto Optical Trap (MOT). The goal of this project was to set up the equipment necessary for obtaining a MOT. Each of the four phases had its challenges, but the lock was successful, the optics were set up, and the glass cell was constructed and mounted to the chamber. Future work to obtain a MOT includes fixing the ion pump, constructing new magnetic field coils, and an improvement to the DAVLL apparatus.

Remote Sensing With Continuous Wave Laser Light

By Eric Ingram (Advisors: Dr. Charles Sukenik and Dr. William Williams)

This project focuses on using a continuous wave (CW) laser to make a remote sensing light detection and ranging (LIDAR) apparatus. The project involves using phase modulation to put frequency sidebands on a continuous wave laser and from the evolution of that beam, determine the distance the laser beam travelled. One important feature is that it has a particular application in oceanography, due to the shorter distances covered. The end goal of this project is to develop a cheaper, more compact, and more readily useable LIDAR system to replace the expensive and bulky pulse laser systems used today.

Drift Chamber Detectors for CLAS12 at Jefferson Lab

By Christian Wooten (Advisor: Dr. Lawrence Weinstein)

The energy upgrade at Jefferson Lab requires the construction of a new CLAS12 detector for Hall B. For momentum reconstruction of the scattered particles, three different size regions of drift chambers will be placed inside a toroidal magnetic field. At ODU, the medium-sized drift chambers, equilateral triangles of ~2 m side length, have been built and tested under cleanroom conditions. An overview of the design, construction, testing and future use will be given.

Need projector and computer.