Feb 13th, 9:00 AM - 10:00 AM

Oral Concurrent Session I: Facets of Physics Research

Stephen Bueltmann
Old Dominion University

9:00-10:00 AM (ROOM 1311)
Facets of Physics Research
Chair: Stephen Bueltmann

Decoupling Linear and Nonlinear Regimes: An Evaluation of Efficiency for Nonlinear Multidimensional Optimization
Chris Cotnoir (Mentor: Dr. Balša Terzic)

Solving a large subset of multidimensional nonlinear optimization problems can be significantly improved by decoupling their intrinsically linear and nonlinear parts. This effectively decreases the dimensionality of the problem, reduces the search space and improves the efficiency of the optimization. This decoupled approach is generalized with mathematical formalism and its superiority over standard methods empirically verified and quantified on a couple of examples involving chi-square curve fitting to data.

Compton Scattering in the Low-Field Regime
Erik Johnson (Mentor: Dr. Balša Terzic)

I have developed a general calculation for the spectrum of photons back-scattered from photon-electron collisions. This first calculation differs from similar calculations used in models recently published in peer-reviewed journals in that it is firmly rooted in a four-vector energy-momentum analysis; this distinction is vital for working with high energy, relativistic photon-electron collisions.

Mapping De-Icing Salt Deposition on Moore Drive Bridge, Rochester, New York
Sterling Gordon (Mentor: Dr. Desmond Cook)

The Chloride percentages across the webs of the girders on Moore Drive Bridge, Rochester, New York have been determined using X-ray fluorescence. The percentage of Akaganeite (β-FeOOH) was determined through X-ray diffraction and it was found to follow the same trends as the Chloride percentage. It was found that webs of girders facing incoming traffic have higher Chloride percentages than those facing away from traffic.

Investigation of Maximum Drift Time as a Function of Gas Mixture in a Drift Chamber
Heather Hagood (Mentor: Dr. Gail Dodge)

Drift chambers are gaseous ionization detectors that are used to determine the trajectory of a particle traveling through the chamber. In this presentation, the functionality of a drift chamber in a large 5 T magnetic field was studied in the interest of preparing for an upcoming Jefferson Lab experiment to study the structure of the neutron. To examine the effect of magnetic fields on drift chambers, various drift chamber configurations were simulated using the CERN program Garfield.

Scintillator Repair and Testing for the Large Acceptance Detector
Katheryne McMahan (Mentor: Dr. Lawrence Weinstein)

Scintillation counters are used to detect fast moving elementary particles in nuclear physics scattering experiments. The scintillation counters of Jefferson Labs CLAS detector are presently being refurbished at ODU for future experiments with the Large Acceptance Detector in Hall C. Defective counters are being replaced with new ones. The methods of characterizing and testing scintillation counters and amplification photomultiplier tubes will be discussed.