Curriculum Vitae

Contact Info: **Christopher Hayes**
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Current Research: Design of the near and far detectors for the DUNE Long Baseline Neutrino Experiment. Implementation of Elmer Finite Element Software Suite for the construction of Electrostatic and Gas simulations for the Gaseous Argon Near Detector (ND-GAr). Preparation of Electrostatic simulations for ARAPUCA light detectors for the far detector.

Past Research 1: Design, construction, and test of all components of the Radioactive Source Insertion System (RSIS) for the Nab experiment on Fundamental neutron Physics Beamline (FnPB) at ORNL's Spallation Neutron Source. The RSIS is a UH vacuum system with the capability of transporting weak radioactive sources into the inner bore of the Nab magnet spectrometer for calibrationand testing of segmented silicone detectors. Motion of the system in a UHV environment is provided by a complex electro-mechanical system driven by a Trio MC405 motion control computer.

Past Research 2: All aspects of the implemention of the n^{3}He experiment on Fundamental neutron Physics Beamline (FnPB). Design, construction, and integration of the Resonant Frequency Spin Rotator (RFSR). Design and construction of the four-jaw collimator. Design of all equipment associated with the initial determination of the neutron beam profile and alignment of the experiment. Performed neutron polarimetry with a ^{3}He analyzer cell on a monthly basis to measure beam polarization and ensure optimal tuning of the RFSR.

Other Research Interests: Theory of the classical electron. The problem of infinite electrostatic self-energy, the radiation reaction force, and its connection to Dirac electron theory. The theory of General Relativity and a satisfactory explanation of the presence of vacuum energy, dark energy, and dark matter.

Physics Publications: Thesis Publication: Spin Flipper, Neutron Polarimetry, and Simulation for the n^{3}He Experiment Advisor: Geoffrey Greene

First Precision Measurement of the Parity Violating Asymmetry in Cold Neutron Capture on ^{3}He. arXiv: 2004.11535v2 [nucl-ex] 28 Apr 2020

The n3He Experiment: Parity Violation in Polarized Neutron Capture on 3He. arXiv: 2004.108895v1 [nucl-ex] 22 Apr 2020

First Precision Measurement of the Parity Violating Asymmetry in Cold Neutron Capture on ^{3}He. Physical Review Letters, 125 131803 (2020)

The Nab experiment: A Precision Measurement of Unpolarized Neutron Beta Decay. EPJ Web of Conferences 219, 04002 (2019)

Education:

Ph.D , Physics: University of Tennessee, Knoxville 2016
Experimental nuclear physics (Neutron physics)

M.S. Physics
Oklahoma University**,** Norman 1989

M.S. Physics
University of Massachusetts, Amherst 1996

B.A. Physics, Minor, Mathematics
University of Massachusetts, Amherst 1987

Professional Experience:

Raytheon/Naval Air Warfare Center (1996 -2006)
Component Engineer with the Wiring & Component Qualification Group. Responsible for development and standardization of military specifications for high performance passive electrical interconnection devices. Provided technical oversight for qualification testing and failure analysis of interconnection components and accessories to military specifications.

- Participated in special working group meetings with the Electronics Industries Association (EIA) to harmonize MIL-STD-1344 connector test methods specification with EIA-364.

- Team Leader for a major research program (T-45 Aircraft) to evaluate the corrosion characteristics of backshells terminated to braided EMI shields.

- Responsible for the design and implementation of test procedures for FAA contracted research programs associated with degradation of electrical interconnect systems in commercial aircraft.

- Participated in the development of new hybrid wire slant sheets for the MIL-W-22759 high performance wire specification. Assisted in the design of Wet and Dry Arc Propagation tests for hybrid wire specifications for inclusion in MIL-STD-2223.

- Assisted in the development of Ribbonized, Organized, Integrated (ROI) interconnection technology for Raytheon Technical Services.

Engineering Publications:

Connector Accessory/Shield Termination Corrosion Phenomena: Presented to the SAE Aerospace Electrical Interconnect Systems Conference; Norfolk, VA. 20 Oct, 1999

Connector Accessory/Shield Termination Corrosion Phenomena: Presented to the American Society of Naval Engineers (ASNE) Symposium; Bloomington, IN, May 2002.

Raytheon Report 50-07-008, Corrosion Test Program for Shield Terminated Backshell Connector Acessories. June, 2000.

Presentations:

APS: Santa Fe, New Mexico
High Efficiency Spin Flipper for the n^{3}He Experiment
Oct 28-31, 2015

ACNS: Knoxville, Tennessee
Resonant Frequency Spin Rotator for the n^{3}He Experiment
Jun 1-5, 2014

APS: Savannah, GA
Resonant Frequency Spin Rotator for the n^{3}He Experiment
Apr 5-8, 2014

Nab Collaboration: Oak Ridge National Lab, Tennessee
Status of the Source Insertion System
May 15-20, 2018

DUNE Near Detector Collaboration Meetings: Attended Jan 2020, May 2020, October 2020, Jan 2021

Computer Skills: C, C++, ROOT, TeX, LaTeX, Autodesk Inventor v2016 and v2018, Motion Perfect v4, Elmer Finite Element Software Suite, Microsoft Office Suite

Memberships: **American Physical Society (APS) ,** Division of Nuclear Physics, since 2011

Activities: **President, Raytheon Men's Softball League**
1999-2005 Seasons

Ballroom Dancing:
Member, Indy Dancers 1999-2011
Member, Heartland chapter, USA Dance, Inc. 2005-2011
Treasurer, Heartland chapter, USA dance, Inc. 2009-2011
Member, Triangle chapter, USA Dance, Inc. 2018-2019
Member Elite Ballroom Dance Studio, 2017-2019