**Luke A. Heroux**

**Labs and Soft Matter Group Leader**

Oak Ridge National Laboratory

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**EMPLOYMENT**

2023-Present Labs and Soft Matter Group Leader,

Neutron Scattering Science Division, Oak Ridge National Laboratory

2018-2023 HFIR Senior Instrument Operations Scientific Associate,

Neutron Scattering Science Division, Oak Ridge National Laboratory

2013-2018 SNS Senior Instrument Operations Scientific Associate,

Neutron Scattering Science Division, Oak Ridge National Laboratory

2005-2013 SNS Instrument Scientific Associate,

Neutron Scattering Science Division, Oak Ridge National Laboratory

2004-2005 Research Assistant

Department of Physics, Southern Illinois University Carbondale

2004-2005 Teaching Assistant

Department of Physics, Southern Illinois University Carbondale

2002-2003 Laboratory Assistant

Department of Physics, Southern Illinois University Carbondale

**EDUCATION**

Doctor of Philosophy in Materials Science and Engineering, December 2021

University of Tennessee Knoxville

Dissertation: “Structural Analysis of Soft Energy Materials using Neutron Scattering”

Master of Science in Applied Physics, August 2005

Southern Illinois University Carbondale

Thesis: "Tetrafluoromethane Adsorption on HiPco Purified Nanotubes"

Bachelor of Science in Applied Physics, December 2003

Southern Illinois University Carbondale

Minor: Math

**PROFFESSIONAL EXPERIENCE**

Labs and Soft Matter Group Leader

Sample Environment Spallation Neutron Source/ High Flux Isotope Reactor

* Provide line management for Labs and Soft Matter group employees including work planning, and performance evaluations.
* Provide support for user labs, sample management, and soft matter sample environments.
* Meet with researchers and management to develop and improve operations of sample environments.
* Work with ES&H to improve process and safety of chemical handling for SNS and HFIR user programs.
* Work with researchers to provide high quality lab space for material preparation.
* Work with staff to design, purchase, and maintain cells for use in neutron experiments.

Senior Instrument Operations Scientific Associate

High Flux Isotope Reactor – Bio-SANS, GP-SANS, IMAGINE

* Mentored scientific associates at HFIR.
* Scheduling/operations/SE changes for Bio-SANS
* Ops lead for collimator upgrade and HBRR.
* Commissioned robot sample changer
* Rheometer responsible
* USANS experiments/alignment
* Bio-SANS team as lead of operations.
* IMAGINE team as lead of operations.
* GP-SANS team as back-up of operations (Lead during extended Team lead absence and transitions from contract employees to permanent employee)
* Continued role in Cans, Substrates and Cells (CaSC) Initiative.

Senior Instrument Operations Scientific Associate

Spallation Neutron Source – USANS, CORELLI, POWGEN, NOMAD

* Formed collaborations with users interested in using USANS, SANS, WANS, and reflectometry.
* Mentored scientific associates to establish common roles among the SNS including sample management, experiment scheduling, training, and operations.
* Managed neutron scattering instrument operations for POWGEN, CORELLI, USANS, GP-SANS, and Bio-SANS
* USANS and CORELLI instrument operations to complete construction of instruments and perform readiness reviews to complete the SINGII project at the Spallation Neutron Source
* Lab Space Manager for POWGEN, CORELLI, USANS, GP-SANS, and Bio-SANS.
* Team Lead for Cans, Substrates and Cells (CaSC) Initiative to establish an inventory and database of all sample holders at the SNS, and to manage the development, design, and control of all existing and new sample holders.
* Commissioning of USANS and CORELLI instruments including initial neutron scattering experiments and establishing sample environments, operations, data acquisition and data analysis. Determining instrument backgrounds and inefficiencies and working with support groups to develop improvements and upgrade plans.
* Perform alignment tests on USANS including the pre-monochromator, monochromator, and analyzer crystal adjustments.
* Assist in development of EPICS based data acquisition system.
* Worked with neutron users to establish experiments using extreme temperatures, gas flow, and gas adsorption.
* Handling and control of samples used for external user experiments at all four instruments.
* Worked with Sample Environment group to install, operate and upgrade sample environments.
* Work with detector group to install, operate, and upgrade detector coverage on CORELLI and NOMAD
* Work with engineering group and instrument support technicians to minimize vibrations and improve performance of USANS.
* Schedule experiments and communicate user needs for proposals on POWGEN, NOMAD, CORELLI and USANS.

SNS Instrument Scientific Associate

Spallation Neutron Source –POWGEN

* Support users and instrument scientists in powder diffraction studies including operation of the powder diffractometer POWGEN, sample loading and management, arranging laboratory needs and collaboration on experiments.
* Schedule user experiment time, sample environment, and local contacts for the POWGEN team.
* Work with engineers and sample environment team to design new sample environment and participate in reviews of this and similar equipment.
* Manage extended commissioning of POWGEN at the Spallation Neutron Source.
* Owner of vanadium can supply and inventory.
* Perform initial user and commissioning experiments.
* Request maintenance tasks.
* Work with ES&H to lay the foundation for development of a sample management system among SNS/HFIR.
* Participate as a member of a team to establish the sample management system as an accepted and useful program for the entire directorate.
* Participate as a Beta tester for Experiment Scheduling System
* Maintain proper training and comply with all DOE and OSHA standards.
* Document all procedures and progress.
* Coordinate the installation of the powder diffractometer.
* Work with scientists, engineers, installation group, and craft workers to design and construct the POWGEN instrument and components including assembly, QA, and installation of wavelength shifting scintillator neutron detectors, QA, install and alignment of super-mirror neutron guide and installation of neutron shielding, vacuum systems and computer systems and programming.
* Initiate purchase orders.
* Work with project management to set and monitor installation and commissioning schedules and deadlines.
* Initiate and maintain communication between teams within the directorate concerning POWGEN and universal systems.
* Participate in reviews of multiple neutron scattering instruments.

Research Assistant, Migone Research Laboratory

Department of Physics, Southern Illinois University Carbondale

* Run volumetric gas adsorption experiments on carbon nanotubes with various gases.
* Research publications relevant to gas adsorption.
* Develop and assemble gas introduction systems for new measurements related to gas adsorption on carbon nanotubes including high pressure studies and improving LabView control system.

Teaching Assistant

Department of Physics, Southern Illinois University Carbondale

Laboratory Instruction - Mechanics, Electricity and Magnetism, and Astronomy

Laboratory Assistant, Migone Research Laboratory

Department of Physics, Southern Illinois University Carbondale

* Write, test, and debug LabVIEW programming for operation of gas adsorption setups.
* Built vacuum systems operated through LabVIEW program.
* Run volumetric gas adsorption experiments on various samples of carbon nanotubes.
* Order mechanical parts and test equipment.
* Rebuild leak detectors.

**PROJECTS**

* POWGEN Installation, design, and commissioning
* POWGEN detector upgrade
* Automated Gas Environment System (AGES) design and commissioning
* POWGEN sample changer FERNS design, and commissioning
* POWGEN sample changer PAC design, and commissioning
* CORELLI installation and commissioning,
* USANS design, installation, and commissioning,
* Bio-SANS robot sample changer commissioning
* HFIR SANS collimator upgrade,
* Bio-SANS mid-range detector upgrade,
* Rheometer upgrades and operations
* Bio-SANS single stage Peltier (Neutron iQ) commissioning
* CASC Initiative lead and member.
* ITEMS design and commissioning
* EXPRESS design and commissioning of scheduling system and sample cell repository
* Remote Experiment Sample Cell team

**SELECTED PUBLICATIONS**

Spittle, S., Poe, D., Doherty, B., Kolodziej, C., Heroux, L., Haque, M.A., Squire, H., Cosby, T., Zhang, Y., Fraenza, C., Bhattacharyya, S., Tyagi, M., Peng, J., Elgammal, R., Zawodzinski, T., Tuckerman, M., Greenbaum, S., Gurkan, B., Burda, C., Dadmun, M., Maginn, E., Sangoro J., Evolution of Microscopic Heterogeneity and Dynamics in Choline Chloride-based Deep Eutectic Solvents, Nature Communications 2022, 13, 219.

Heroux, L., Moncada, J., Dadmun, M., Controlling the Morphology of PEDOT: PSS Blend Films with Pre-Deposition Solution Composition and Deposition Technique. ACS Applied Polymer Materials 2022, 4, 1, 36–43.

Burdette-Trofimov, M. K., Armstrong, B. L., Heroux, L., Doucet, M., Sacci, R. L., Veith, G. M., Structure and dynamics of small polyimide oligomers with silicon as a function of aging. Soft Matter 2021, 17 (33), 7729-7742.

Yao, X. X., Avery, B., Bobrek, M., Debeer-Schmitt, L., Geng, X. S., Gregory, R., Guyotte, G., Harrington, M., Hartman, S., He, L. L., Heroux, L., Kasemir, K., Knudson, R., Kohl, J., Lionberger, C., Littrell, K., Pearson, M., Pingali, S. V., Pratt, C., Qian, S., Ruiz-Rodriguez, M., Sedov, V., Taufer, G., Urban, V., Vodopivec, K., A Unified User-Friendly Instrument Control and Data Acquisition System for the ORNL SANS Instrument Suite. Applied Sciences-Basel 2021, 11 (3).

Zhang Y., Poe D., Heroux L., Squire H., Doherty B.W., Long Z., Dadmun M., Gurkan B., Tuckerman M.E., Maginn E.J., Liquid Structure and Transport Properties of the Deep Eutectic Solvent Ethaline, Journal of Physical Chemistry B, **124,** 5251-5264 (2020).

Peng, J., Cantillo, N. M., Nelms, K. M., Roberts, L. S., Goenaga, G., Imel, A., Barth, B. A., Dadmun, M., Heroux, L., Hayes, D. G., Zawodzinski, T., Electron Transfer in Microemulsion-Based Electrolytes. Acs Applied Materials & Interfaces 2020, 12 (36), 40213-40219.

Heller, W. T., Cuneo, M., Debeer-Schmitt, L., Do, C., He, L. L., Heroux, L., Littrell, K., Pingali, S. V., Qian, S., Stanley, C., Urban, V. S., Wu, B., Bras, W., The suite of small-angle neutron scattering instruments at Oak Ridge National Laboratory. Journal of Applied Crystallography 2018, 51, 242-248.

Shen, B. H., Armstrong, B. L., Doucet, M., Heroux, L., Browning, J. F., Agamalian, M., Tenhaeff, W. E., Veith, G. M., Shear Thickening Electrolyte Built from Sterically Stabilized Colloidal Particles. Acs Applied Materials & Interfaces 2018, 10 (11), 9424-9434.

Kirkham, M., Heroux, L., Ruiz-Rodriguez, M., Huq, A., AGES: Automated Gas Environment System for in situ neutron powder diffraction. Review of Scientific Instruments 2018, 89 (9).

Huq A., Hodges J. P., Gourdon O., Heroux L POWGEN: a third-generation high resolution high-throughput powder diffraction instrument at the Spallation Neutron Source, Zeitschrift für Kristallographie Proceedings **1**, 127-135 (2011).

D Rawat, V Krungleviciute, L Heroux, M Bulut, M Calbi, A Migone Dependence of Single-Walled Carbon Nanotube Adsorption Kinetics on Temperature and Binding Energy Langmuir; 24 (23), pp 13465–13469 (2008)

Luke Heroux, [Vaiva Krungleviciute](http://lib.bioinfo.pl/auth:Krungleviciute,V), [M Mercedes Calbi](http://lib.bioinfo.pl/auth:Calbi,MM), [Aldo D Migone](http://lib.bioinfo.pl/auth:Migone,AD) CF4 on Carbon Nanotubes: Physisorption on Grooves and External Surfaces.

J Phys Chem B Condens Matter Mater Surf Interfaces Biophys. 110, 12597-12602 (2006)

V. Krungleviciute, L. Heroux, S. Talapatra, A.D. Migone Gas Adsorption on HiPco Nanotubes: Surface Area Determinations, and Neon Second Layer Data

Nanoletters 4, 1133 (2004)

**AWARDS**

* Oak Ridge National Laboratory Significant Event Award 2010 – Development and implementation of ITEM system.
* Oak Ridge National Laboratory Significant Event Award 2009 – Completion of POWGEN project.

**PROFESSIONAL AFFILIATIONS**

* Neutron Scattering Society of America
* American Chemical Society
* Breakthrough Electrolytes for Energy Storage – Energy Frontier Research Center and Student Research Organization
  + BEES SRO Leadership Team 2018-2020