The **Department of Physics and Atmospheric Science** at **Dalhousie University** in **Halifax, Nova Scotia** has traditions in both pure and applied research with close ties and cross-appointments to the Departments of Chemistry, Oceanography, and the Faculties of Engineering and Medicine. This fosters an ideal environment to tackle some of the most important challenges faced by society and to undertake necessary fundamental research. We are ranked among the top physics departments in Canada and provide students with cutting-edge research opportunities.

Thesis-based MSc and PhD degrees are offered, as well as **Certificate program** in Medical Physics that prepares students with a PhD in physics for admission to medical physics residency training programs. Our Medical Physics offerings are **CAMPEP-accredited**.

Halifax is a beautiful city on the east coast of Canada. Dalhousie is a 20-minute walk from downtown. The city boasts a youthful spirit, rich history, a scenic waterfront, and easy access to the outdoors.

Applications are accepted year-round. However, students applying to the Medical Physics program are encouraged to apply by mid-January. We have a pre-application process to help students identify potential supervisors. Go to **dal.ca/physics**, click Programs and follow the links. You can also email us at physics@dal.ca.

Biophysics and Medical Physics

Biophysics is an interdisciplinary and collaborative field that applies the techniques and approaches of physics to understand biological systems. Our faculty study the brain, imaging techniques, aging, fibres, tissues, and medical materials. **Medical Physics** is concerned with applying physics to medicine, commonly in the diagnosis and treatment of human disease. Our MSc, PhD and Certificate programs are CAMPEP-accredited.

Name	Research	Experimental	Theoretical	Computational	Clinical
BARDOUILLE, TIMOTHY tim.bardouille@dal.ca	Non-invasive human brain imaging, Magnetoencephalography, Motor control, Pathology, Aging, Big data, Machine learning	🟥		🔷	
BEYEA, STEVEN steven.beyea@dal.ca	MRI, Magnetic resonance, Medical imaging, Diagnostics, Image reconstruction, Image analysis	🟥			🟣
BREWER, KIMBERLY brewerk@dal.ca	Magnetic resonance imaging (MRI), Positron emission tomography (PET), Molecular imaging, Machine learning, Theranostics	🟥			🟣
CHERPAK, AMANDA amanda.cherpak@nshealth.ca	Total marrow irradiation, 3D printing in brachytherapy, Advanced imaging and adaptive planning				🟣
CHYTYK-PRAZNIK, KRISTA krista.chytyk-praznik@nshealth.ca	HDR brachytherapy, 3D-printing, Total marrow irradiation, Dosimetric verification				🟣
HASHMI, JAVERIA javeria.hashmi@dal.ca	Theoretical neuroscience, Graphs, Network analysis, Computational neuroscience, Neuroimaging, Functional MRI, Cognition, Pain	🟥		🔷	🟣
HEWITT, KEVIN kevin.hewitt@dal.ca	Spectroscopic techniques, Molecular markers, Raman spectroscopy, 3D Molecular imaging, Protein tracking	🟥			
KREPLAK, LAURENT kreplak@dal.ca	Experimental soft matter physics, Protein fibres, Tissue engineering, Atomic force microscopy, Nanomechanics	🟥			
LABRIE, DANIEL daniel.labrie@dal.ca	Dental materials, Micron-sized organic fiber, Mechanical properties	🟥			
MACDONALD, LEE lee.macdonald@nshealth.ca	Adaptive radiotherapy, Dynamic trajectory radiation therapy, Conformal Aperture SRS, Motion Management and Dose Robustness				🟣
MONAJEMI, THALAT thalat.monajemi@nshealth.ca	Fundamental properties of organic plastic scintillators, Novel organic scintillator-based radiation detectors, radiation dosimetry				🟣
RIOUX, JAMES james.rioux@dal.ca	Magnetic resonance imaging, Quantitative MRI, Image reconstruction, Contrast mechanisms, Image processing & analysis, Machine learning	🟥		🔷	🟣
RUTENBERG, ANDREW andrew.rutenberg@dal.ca	Aging and mortality, Complex systems, Statistical physics, Biological systems, Soft-matter physics, Collagen fibrils, Machine learning		🔺	🔷	
SATTARIVAND, MIKE mike.sattarivand@nshealth.ca	Image guided radiation therapy, Dual energy x-ray imaging, Stereoscopic image guidance, Ethos Hyper Sight imaging	🟥			🟣
STEVENS, TYNAN tynan.stevens@nshealth.ca	Radiotherapy, Medical imaging, Machine learning, Artificial intelligence, Treatment planning				🟣
SYME, ALASDAIR alasdair.syme@nshealth.ca	Radiation detectors, Radiation dosimetry, Trajectory radiotherapy, Radioembolization	🟥			🟣
THOMAS, CHRIS chris.thomas@nshealth.ca	Trajectory optimization of radiotherapy delivery systems, AI for radiotherapy, Stereotactic radiotherapy				🟣

Atmospheric Science and Astrophysics

Atmospheric Science research programs at Dal involved the Arctic, satellite remote sensing, modelling, Mars, air quality, greenhouse gas emissions and climate change. Our students have access to computational and field facilities, and regularly participate in national and international programs. **Astrophysics** students are involved in both international ground and space-based observatories that study the physics of the universe, including galaxy formation and evolution.

		Experimental	Theoretical	Computational
BENNETT, PHILIP philip.bennett@dal.ca	Stellar Atmospheres and winds, Ultraviolet spectroscopy, Radiative transfer, Computational models	🟥	🔺	🔷
CHANG, RACHEL rachel.chang@dal.ca	Aerosol sources, processing, and sinks, Fog and cloud processes	🟥		🔷
DUCK, THOMAS J. tduck@dal.ca	Microwave satellite remote sensing, Arctic climate, Sea ice, Water vapour, Radiative transfer and retrieval theory, Machine learning	🟥		🔷
HELBIG, MANUEL manuel.helbig@dal.ca	Climate change, Land-atmosphere interactions, Boundary layer meteorology, Coupled carbon and water cycle	🟥		
OLIVER, ERIC eric.oliver@dal.ca	Ocean and climate variability, Extreme events, Predictability of climate variations, Influence of modes of variability		🔺	🔷
ZHOU, XIAOLI xiaoli.zhou@noaa.gov	Cloud physics and dynamics, Cloud-aerosol interaction, Marine boundary layer, Climate, Large eddy simulation, Remote sensing	🟥		🔷

Condensed Matter and Materials Physics

Condensed Matter and Materials Physics students with advanced degrees are highly sought-after by Canadian and International companies, as well as by academia. Our interdisciplinary program has faculty working on a broad array of topics both fundamental and applied in nature. Access to world-class facilities provides students with excellent training opportunities, including those afforded by the Clean Technologies Research Institute.

		Experimental	Theoretical	Computational
DAHN, JEFF jeff.dahn@dal.ca	Lithium and sodium-ion batteries, Synchrotron studies, Material synthesis, Multi-decade lifetime batteries, Operando studies	🟥		
FREUND, MICHAEL michael.freund@dal.ca	Electrochemistry, Surface science, Electronic polymers, Organic electronics, Chemical sensing, Machine olfaction	🟥		
HALL, KIMBERLEY kimberley.hall@dal.ca	Quantum technology, Ultrafast spectroscopy, Quantum light sources, Solar cell materials, 2D materials, Carrier relaxation and transport	🟥		
HILL, IAN ian.hill@dal.ca	Organic solar cells, Perovskite solar cells, Organic electronics, Organic electronic radiation dosimeters, Redox flow batteries	🟥		
JOHNSON, ERIN R. erin.johnson@dal.ca	Density-functional theory, Intermolecular interactions, Molecular crystals, Layered solids, Electrides		🔺	🔷
KOLEILAT, GHADA ghada.koleilat@dal.ca	Advanced materials for solar cells, Photodetectors, Wearable energy generators	🟥		
MAASSEN, JESSE jmaassen@dal.ca	Materials physics, Electron and thermal transport, Energy conversion, First-principles modeling		🔺	🔷
MACDONELL, RYAN rymac@dal.ca	Photochemistry, Theoretical chemistry, Quantum molecular dynamics, Simulation of spectroscopy, Quantum computing.		🔺	🔷
METZGER, MICHAEL michael.metzger@dal.ca	Energy storage, Electrochemistry, Lithium-ion batteries, Sodium-ion batteries, Method development	🟥		
MONCHESKY, THEODORE theodore.monchesky@dal.ca	Growth, characterization and modelling of topological magnetic thin films including skyrmions and frustrated antiferromagnets	🟥		
OBROVAC, MARK N. mark.obrovac@dal.ca	Li-ion and Na-ion battery materials, Sustainable materials synthesis, Layered oxides, Nanocomposite materials, Materials characterization	🟥		
PONOMARENKO, SERGEY serpo@dal.ca	Nonlinear physics, Statistical optics, Structured random light, Rogue waves and extreme events, Self-similarity and multifractality, Optical imaging		🔺	
XIAO, PENGHAO penghao.xiao@dal.ca	Atomistic simulation, Thermal dynamics and kinetics, Machine learning, Materials Performance and degradation, Li-ion batteries, Alloys		🔺	🔷
YANG, CHONGYIN c.yang@dal.ca	Rechargeable batteries, Energy storage, Battery materials	🟥		
ZWANZIGER, JOSEF W. jzwanzig@dal.ca	Nuclear magnetic resonance, Optical studies, Thermal analysis, Materials, Optical glass, Concrete composites	🟥		