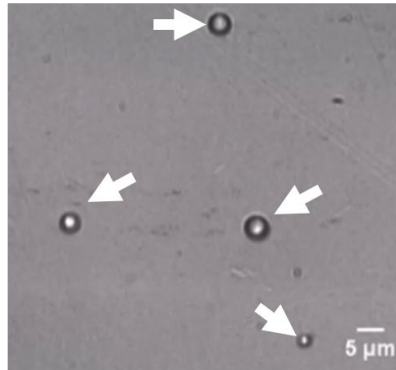


Ph.D. student position will be available, starting in the Fall 2021 in the group of Professor Helfield at the Department of Physics, Concordia University, Montreal, Canada.

Gas-filled, encapsulated microbubbles (white arrows) are between 1-10 μm in diameter. Microbubbles expand and contract in an ultrasound field, and these vibrations give rise to strong ultrasound scattered pressures. Bubble dynamics, including nonlinear vibrations, disruption, and local microstreaming, can be harnessed for diagnostic and therapeutic applications.



Our interdisciplinary group, situated within both the Department of Physics and Biology, works on the development of an image-guided, targeted drug/gene delivery platform using biomedical ultrasound for the treatment of cardiovascular disease and cancer. This involves using focused ultrasound and acoustically-sensitive agents to spatially and temporally target therapeutic delivery to regions of disease.

Ultrasound-triggered microbubble vibration physics towards enhanced local drug delivery

Sonoporation, the reversible and transient opening of cell plasma membranes using ultrasound and microbubbles, is an exciting new approach to targeted and local therapeutic delivery in cancer and cardiovascular disease applications. The proposed project seeks to investigate the physics of acoustically-triggered microbubble vibration and its relation to sonoporation and local drug delivery. This is accomplished by recording the scattering of ultrasound from microbubbles, including harmonic and subharmonic emissions, and correlating these with cell membrane perforation measures. Students will gain expertise in ultrasound imaging, signal analysis, physical acoustics, bubble synthesis and characterization, cell culturing and fluorescence microscopy.

Concordia Department of Physics is a growing department in a university with rapidly increasing rating. We offer research-based M.Sc. and Ph.D. programs. Our faculty members conduct research in the areas of Condensed Matter Physics (theoretical and experimental), Molecular Biophysics, Medical Physics / Imaging, Photonics, Theoretical High Energy Physics, Computational Physics and Physics Education.

Successful applicants will be offered financial packages consisting of RA, TA and various awards of at least 20,000 CAD per year (often more), for 4 years (Ph.D.) or 2 years (M.Sc.). International students will be offered tuition remissions or other awards to compensate for the international tuition fees.

Please contact Dr. Brandon Helfield (brandon.helfield@concordia.ca) or Professor Valter Zazubovits, Graduate Program Director (valter.zazubovits@concordia.ca) for more information.