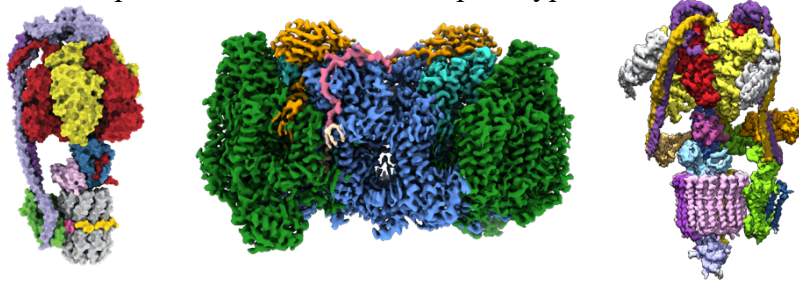


Cryo-EM of dynamic energy-transducing membrane protein complexes

The Rubinstein Laboratory at The Hospital for Sick Children in Toronto uses and develops cryo-EM methods to study large and dynamic membrane protein complexes involved in bioenergetics. Current research directions include studies of oxidative phosphorylation^{1–6}, particularly in the context of mycobacterial infection, and the structure and regulation of proton pumping V-type ATPase^{7–11}, particularly in the contexts of neurobiology and lysosomal biology. We are developing new ways of looking at membrane protein complexes to understand how their dynamics control their function. Our method development efforts include work on specimen preparation^{12–14}, imaging¹⁵, and image analysis^{16,17}. We have close academic collaborations related to bioenergetics, medicinal chemistry, and computer science. We also have research agreements with start-up companies and a large instrument manufacturer, which provides us with access to prototype instruments not found elsewhere.



The ideal candidate should have or be about to obtain a PhD where they used biophysical methods to study biological molecules such as proteins or lipids (e.g. cryo-EM, X-ray crystallography, NMR spectroscopy, or other spectroscopy methods). Comfort with scientific computing is an advantage. They should have an interest in both biological structure and cryo-EM methods. They should enjoy working with highly-developed instruments and software but also enjoy developing new experiments where new instruments and/or software may need to be created.

Infrastructure in the laboratory includes outstanding access to cryo-EM screening microscopes (a TF20 with Gatan K2 Summit camera and a soon-to-be-installed Glacios with Falcon 4i camera) and a dedicated data collection microscope (Krios G3i with a Falcon 4i camera). We have numerous commercial specimen preparation devices as well as home-built computer controlled devices^{13,14}. We also have outstanding access to biophysical, nanofabrication, and cell biology infrastructure.

The Hospital for Sick Children's Research Institute is located in the heart of downtown Toronto and includes approximately 2,000 researchers, students, postdoctoral fellow, and staff. The Hospital is one of the largest paediatric hospitals in the world and was ranked the top paediatric health care centre in the world by Newsweek's 2021 World's Best Hospitals list. The Hospital and Research Institute are affiliated with the University of Toronto, a top research University. Toronto is Canada's largest city and North America's 4th largest city (after Mexico City, New York, and Los Angeles). It is one of the world's most multicultural centers with vibrant arts and culture communities. Despite its size, it is also one of North America's safest cities.

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