

Edge artificial intelligence for scientific instrumentation



Prof. Audrey Corbeil Therrien

Université de Sherbrooke, Québec, Canada

Wednesday November 4th 2026, 14h00

Auditorium Joliot-Curie IJCLab –Bât. 100

Radiation and particle detectors let us observe the universe beyond what our senses can achieve. Scientists come up with new ways to collect information about our universe using detectors to transform particles into electrical signals and digital bits. These novel detectors are more precise, larger and offer much more range than their predecessors, resulting in large amounts of channels (millions) and data (>100 TB/s). Transmitting this raw data continuously to a compute system requires mechanical space, energy and a significant amount hardware, increasing costs and making some experiments non-viable.

My research group develops systems to distribute real-time compression and analysis algorithms along the data acquisition chain including right up at the edge of the detector, reducing data at or near the source. However, this approach presents several challenges with limited computing power and memory availability. We combine small AI models with carefully selected signal processing and compression algorithms to achieve very efficient smart acquisition systems capable of several orders of magnitude data reduction in a few microseconds.

Audrey Corbeil Therrien is an Associate Professor in the Department of Electrical and Computer Engineering at the Université de Sherbrooke in Québec, Canada. She currently holds the Tier-2 Canada Research Chair in real-time embedded intelligence for ultra-high rate detectors. She has worked at CERN (2015) in Geneva, Switzerland and at the SLAC National Accelerator Laboratory where she held a Banting Fellowship (2018-2020). Her research aims to improve real-time analyses at the edge with the integration of machine learning in high performance radiation instrumentation systems. She is part of several conference committees, and she is co-chair for the 2026 IEEE Nuclear Science Symposium. She has been strongly involved with the promotion of technical and scientific careers for diverse groups with Université de Sherbrooke, SLAC, Stanford University, local non-profits and at several conferences. She received several awards, the 2023 *Prix Honoris Genius* — *Relève* of the Ordre des Ingénieurs du Québec and the 2024 IEEE Women in Engineering Leadership Development Travel Grant.