



# Computational Science & Engineering CSE Seminar at McGill

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## EXTENSIVE AIR SHOWER SIMULATIONS FOR HIGH ENERGY GAMMA-RAY ASTRONOMY

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2:30–3:30 pm

Macdonald-Harrington Building, Room G1

### Abstract

Gamma-ray astronomy offers insight into some of the most violent events in the universe. These includes stellar explosion (supernovae), black holes, pulsars, and distant quasars. The light emitted by these objects reaches energies of several tens of TeV (about  $10^{12}$  times the energy of visible light), but photon fluxes are extremely low. Therefore, detectors with huge collection areas are required. Arrays of Imaging Atmospheric Telescopes measure the secondary products of collisions of incoming gamma-rays with the atmosphere (so-called extensive air showers). Event reconstruction and background suppression for these instruments require a good understanding of the processes in the atmosphere. This is achieved by four dimensional simulations of the air shower. We present here the challenges of simulating extensive air showers and talk about applications of simulations in different background suppression methods (including several machine learning methods).

