# BiophysTO Lunchtime Seminar Series

**Date**

Thursday, October 18, 2018
12:00 pm (noon)

**Location**

McLennan Physical Labs, MP606
60 St George Street

**Pizza & refreshments provided**


## Prof. Paul Francois

**McGill University**


# Immune recognition, antagonism and machine learning


T cells have to take life or death decisions upon interaction with immune ligands. However, immune decisions also present surprising blind spots, where antagonistic ligands can hide agonists. Similar blind spots have been recently identified in other complex classifiers, including machine learning algorithms. We draw a formal analogy between some classes of neural network classifiers used in machine learning, and the general class of adaptive proofreading models that we have previously proposed for immune detection. Then, we apply machine-learning inspired adversarial strategies to models of ligand discrimination. We uncover the existence of two qualitatively classification regimes (adversarial vs ambiguous) characterized by the presence or absence of a critical point. These regimes are reminiscent of the "feature-to-prototype" transition identified in machine learning, corresponding to two strategies in ligand antagonism (broad vs. specialized). Overall, our work connects evolved cellular decision-making to classification in machine learning, showing that behaviours close to the decision boundary can be understood through the same mechanisms.


**Host:**
**Prof. Sid Goyal**