Robot Physicist

Team: Manoj Kumar, Michele Ceru and Phil Yeres
Advisor: Kyle Cranmer

Project advisors:

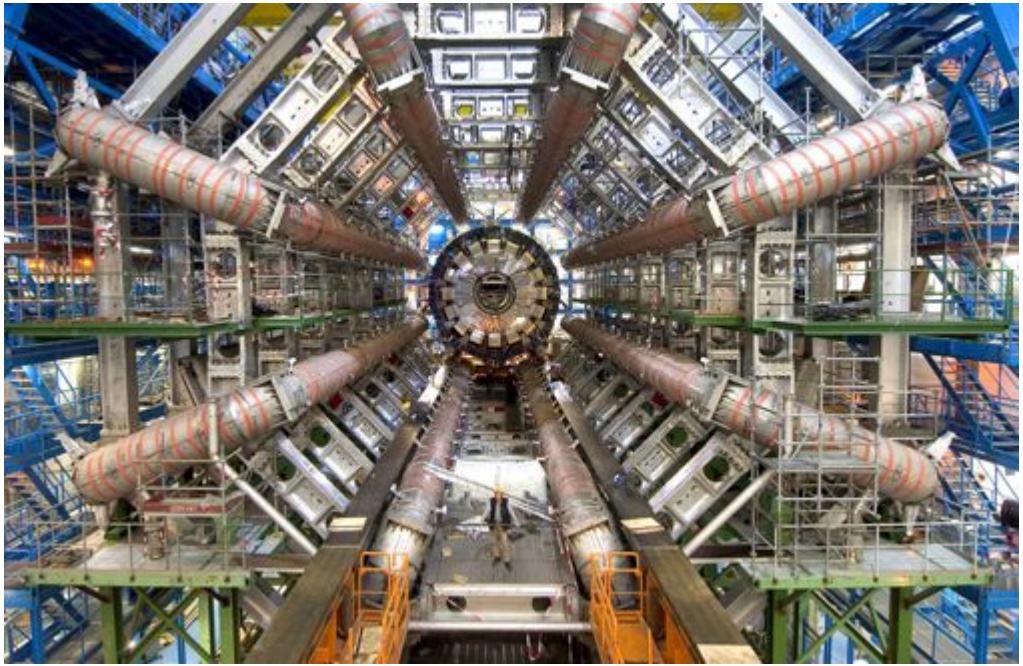
Kyle Cranmer

Brenden Lake

Particle Physics Experiments...

… are expensive to perform

Thus, it’s important to use simulations to predict the optimal experimental settings.



Experimental model components

1. Experimental configurations
2. Quantities that we would like to infer
3. Data generated from the experiment

Project phase 1: toy data

1. Using a known distribution we generate data from it for fixed theta and phi
2. Estimate P(X | theta, phi)
3. infer P(theta | X, phi) = P(X | theta, phi) P(theta | phi) / P(X | phi)
4. Run loops from 1-3 for different phi to find the max information gain

Project phase 2: physics data

- With real data, the ground truth P(X | theta, phi) is unknown
- We'll use likelihood-free inference to estimate P(theta | X, phi) using

  https://github.com/diana-hep/carl for higher dimensional X

Thanks!