

PATRIOT



Physics Archives & Tools Required to Investigate Our Theories

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<http://cepa.fnal.gov/patriot>

PATRIOT aims to provide *better theory predictions* of physics events for the high- P_T physics program of **Run2 @ Fermilab**. Patriot uses a *new generation* of Monte Carlo tools to calculate the hard structure of high- P_T events and event generators to make particle level predictions. Central to Patriot is an *enstore or mass storage* repository for datasets of events in **StdHep-format**. These common files are processed through the CDF and D0 and detector and triggering simulations, and are being integrated into the common data handling system **SAM**.

Motivation

- Generating *accurate* samples of Monte Carlo events can be time-consuming and complicated
- A Monte Carlo Databases:
 - Prevents mistakes
 - Avoids needless duplication of effort
 - Allows a common estimate of theory errors
 - Simplifies combination of CDF and D0 data
 - Gets the best theoretical predictions to the experiments quickly
 - Enables new signature-based search strategies

- Patriot is a Database of Standard Model predictions for high- P_T processes
 - Particle-level Events
 - Ready for processing through detector simulations
 - Different Generators (Madgraph, Alpgen, ...)
 - Different Levels of Generation (partons, showers, particles)
 - Documentation
 - assumptions, approximations, range of validity
 - Templates (for large-scale processing of events)
- Accessible by experimentalists & theorists

$\sigma(W+jets)$ (pb)

ME-MC	W+0j	W+1j	W+2j	W+3j	W+4j	W+5j
ALPGEN	2046±1	522.6±0.6	146.1±0.3	41.5±0.2	11.55±0.07	3.13±0.02
GRAPPA	2042±4	525.4±0.6	146.8±0.3	40.2±0.3		
MadGraph	2044±5	525.4±1.1	146.1±0.3	41.8±0.1		
MCFM(LO)	2044±1	526.3±0.5	147.2±0.3	41.8±0.2		

Different Monte Carlo tools

Different Physics Benchmarks

Trusted Theory Predictions

Look for new physics in different boxes: want *a priori* estimates of Standard Model event rates



Quaero
A General Interface to HEP Data

Motivation Interface Manual
Algorithm FewKDE OptimalBinning
Development Examples

LEP-II
 Aleph Delphi L3 Opal

Pythia Input: Signal File:

Backgrounds: qq e+e- l+l- 1ph 4f multi-ph 2ph

HERA
 H1 ZEUS

Pythia Input: Signal File:

Backgrounds: jj pj ww cc nc ww

TEV-II
 D0 CDF

Pythia Input: Signal File:

Backgrounds: jj pj pp ww z ww tt

Requestor

Name: Institution:

Email: Model:

The Payoff

Better Theory
JHEP 0405: 040, 2004
 SM, P. Richardson
 Matching Matrix Elements and Parton Showers with Herwig & Pythia

Fully Simulated CDF & D0 Events

