Coding for $W^+W^-\gamma$ Acceptance Corrections

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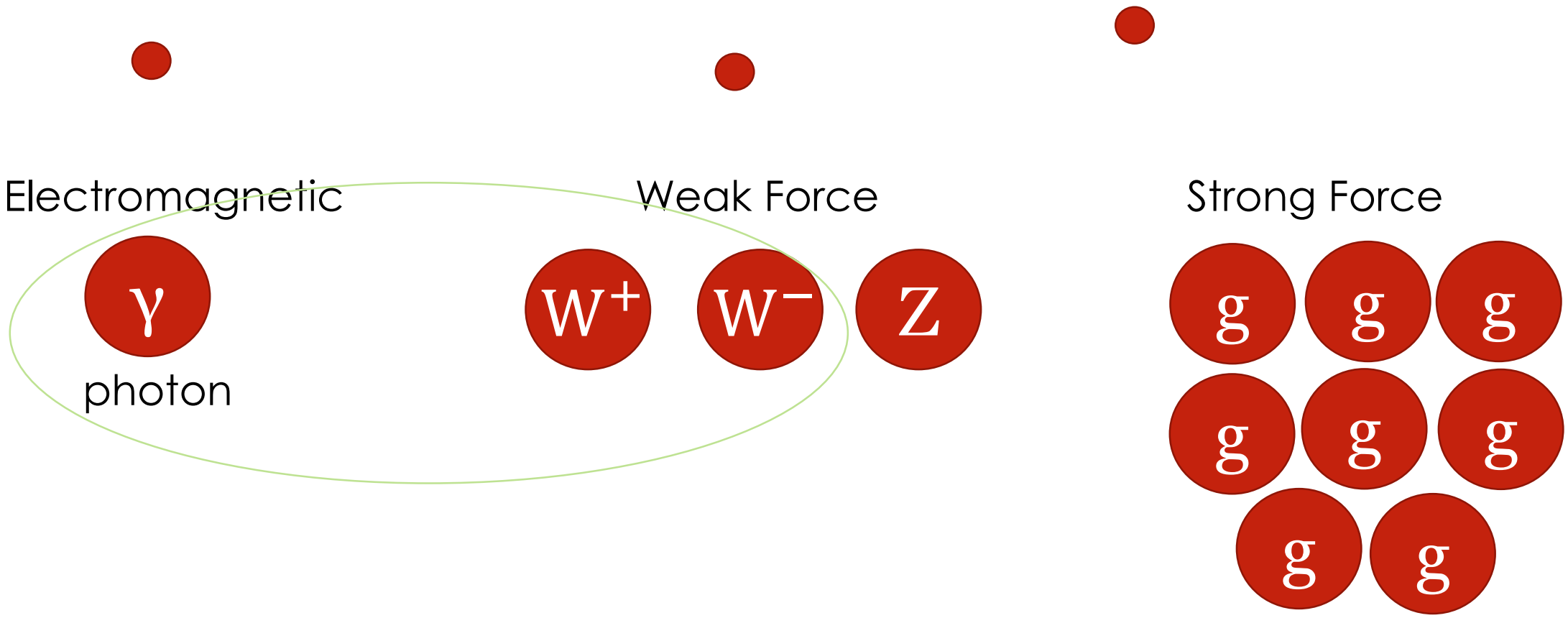
THE PARTICLES OF THE STANDARD MODEL

- Two types of fundamental particles:

FORCE CARRIER PARTICLES

- Spin 1 particles, bosons

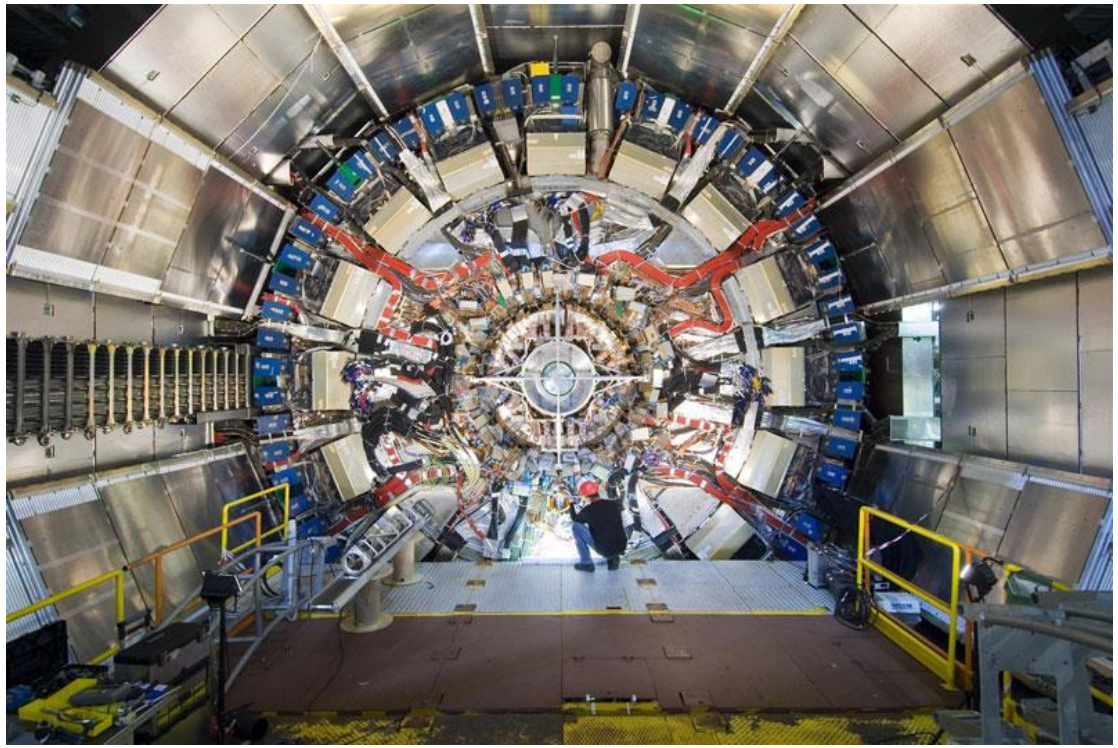


HOW DISCOVERIES ARE MADE

- Particle colliders provide energy to make massive particles
- Massive particles decay quickly to fundamental ones
- Those are tracked and measured
- All data provided in distributions
- Discovery criteria: 5σ, $3 * 10^{-7}$, or 1 in 3.5 million chance of a fluke.
- We define $\sigma = \frac{s}{\sqrt{b}}$

s=signal, b=background

See Caroline's Talk for more details



https://atlas.cern/discover/detector/inner-detector

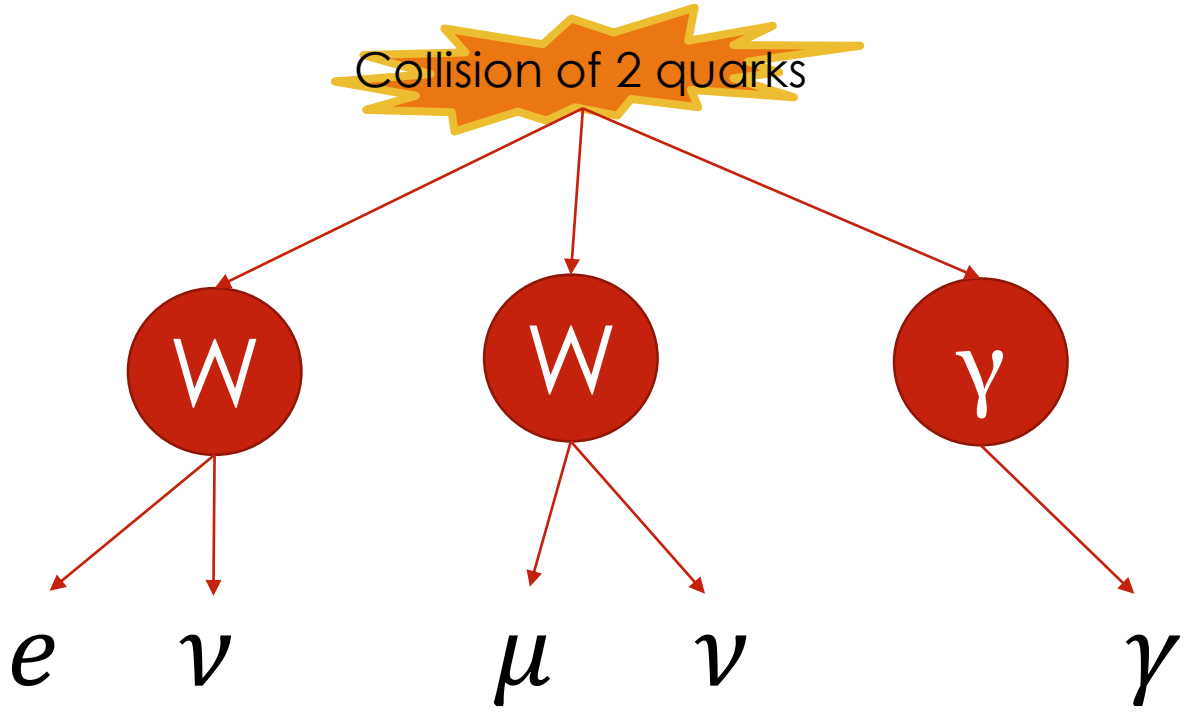
THE WWγ DECAY MODE

W Characteristics:

- High Mass: 80.37 GeV
- Charge: ± 1
- Decay within $10^{-25} s$

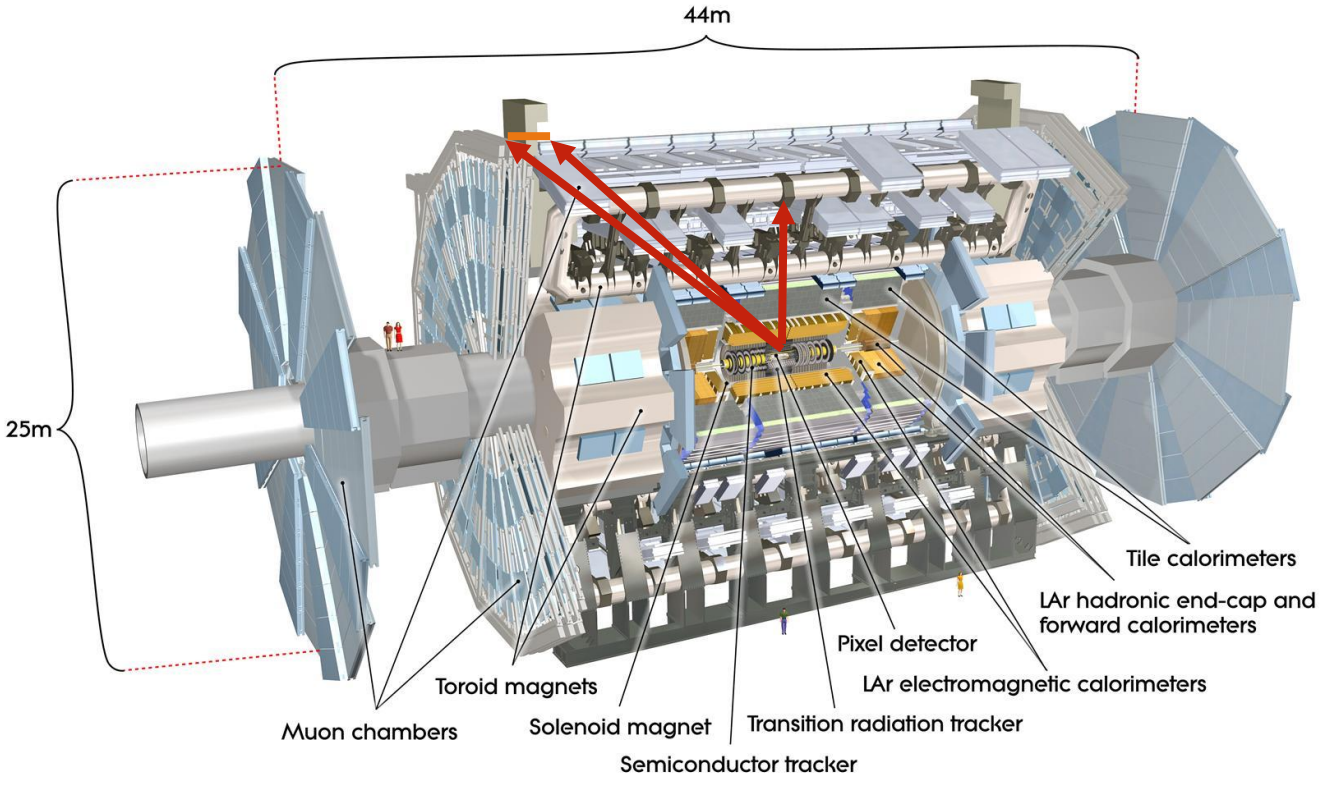
W Detection

- We detect this final combination
- Cross section - probability

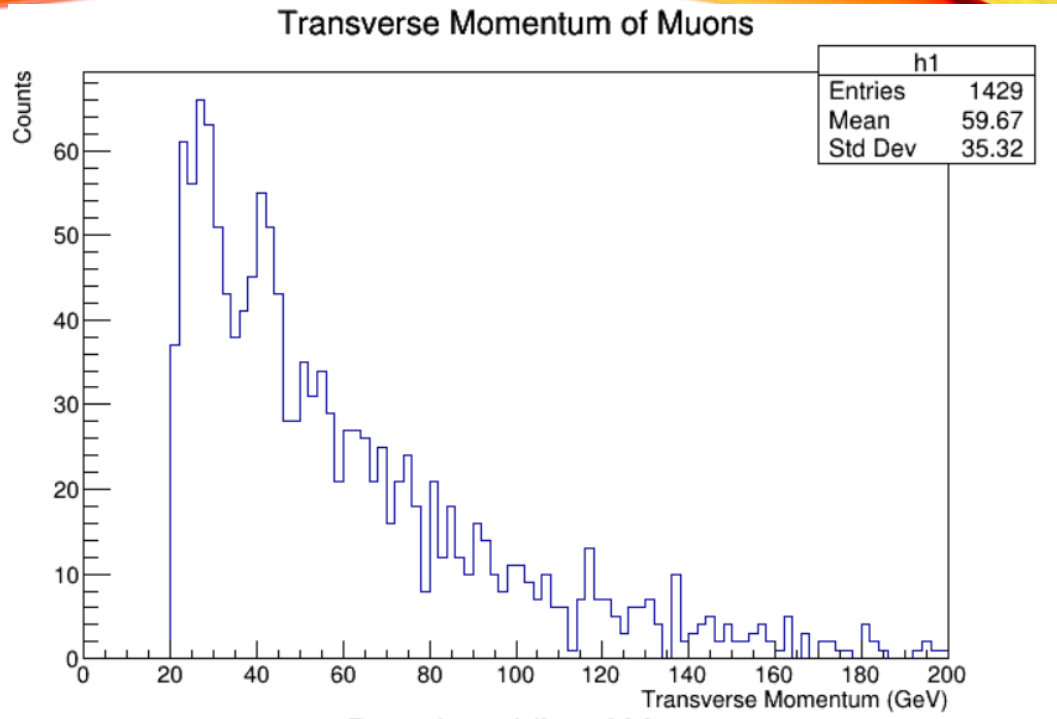


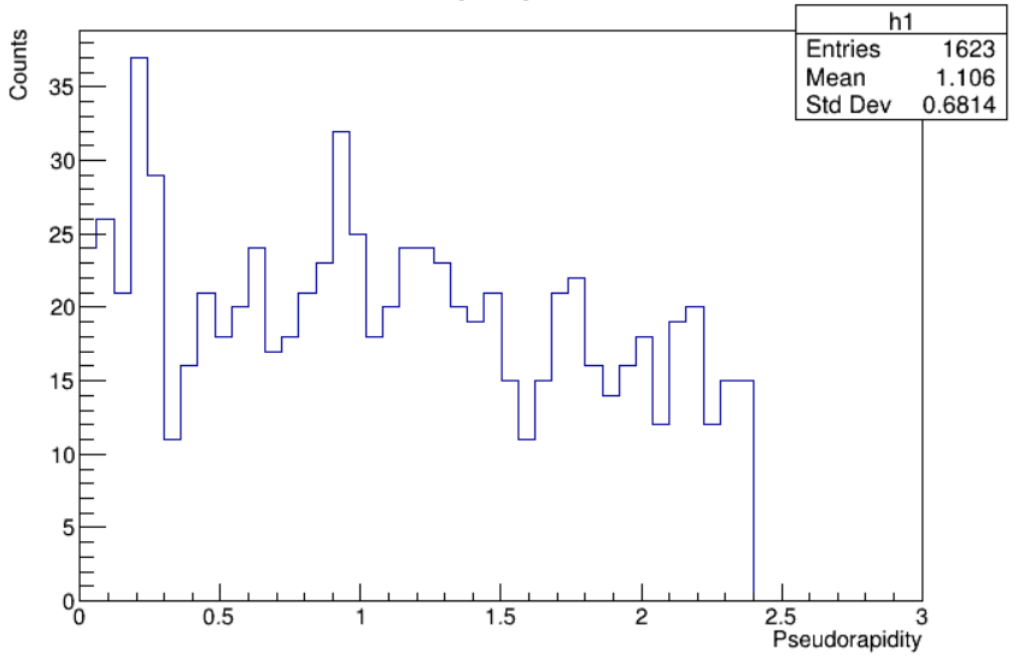
SELECTION CUTS

- Increase signal-to-noise and sigma by removing data that is likely background.
- Take into account the geometry of the detector



https://cds.cern.ch/images/CERN-GE-0803012-01





MY PROJECT

- Monte Carlo- probabilistic simulation:
  - Evaluating Selection Cuts
  - Finding Detector Effects
  - Creating an Acceptance Correction
- Our results can now be compared to results from other detectors
- Last thing before publication