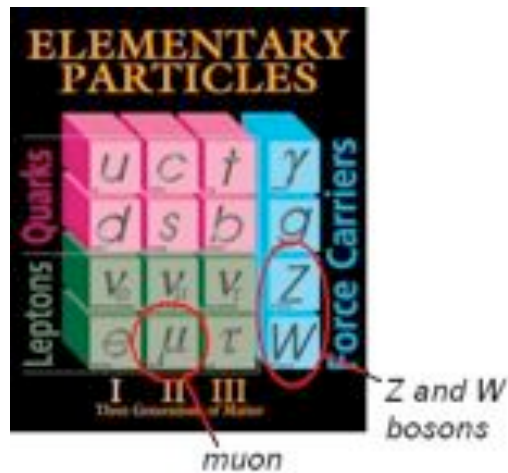


ATLAS muon event in the LHC: What is it? Z, W, or background? Information and Data Sheet

What are Z and W bosons?

The Z and W bosons are the particles responsible for radioactive decay. They are unstable by themselves and decay into muons and other things.



What are muons?

Muons are like electrons but with much more mass. They do not interact much with other matter, which is why they do not deposit energy in the detector.

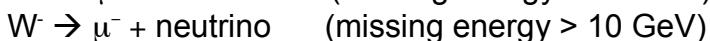
How do Z bosons decay?

Z bosons are uncharged, so when they decay into muons, they must decay into both a positive and a negative muon (there are no neutral muons); thus a Z always decays into two muons. Hardly any energy is lost in the detector when this happens. The reaction is written like this:



How do W bosons decay?

W bosons are charged, so they decay into either positive or negative muons; in order to conserve something called “lepton number”, they must also emit neutrinos, which are energetic cousins of the electron and the muon with almost no mass. They interact with other matter hardly at all: our detector does not pick them up. They are recorded, instead, as “missing energy” or “missing E_T ”. The W decays are written like this:



Record your data

Data	W decays	Z decays	background
Set 1A			
Set 2A			
Set 3A			
Set 1B			
Set 2B			
Set 3B			
Totals:			

How does the number of Z events compare to the number of W events?