

Case Study: $Z' \rightarrow \text{DiTop} \rightarrow \text{'SemiLeptonic Decay'}$

- The Z-prime is massive, and it decays to two top quarks.
- A Top quark nearly always decays to a W-boson and a bottom quark.
- The bottom quark is detected by the *hadronic calorimeter* {orange felt}...
- ...while the W-boson has two choices:
 - 1) W-boson \rightarrow electron/muon + neutrino (leptonic decay) {Tigger's side}.
 - Electrons are detected in the *electromagnetic calorimeter* {blue felt}.
 - Muons are detected by the *muon spectrometer* {red felt}.
 - Neutrinos cannot be detected by conventional methods. They are estimated by calculating the *missing energy* {black pipe cleaner}.
 - 2) W-boson \rightarrow pair of light quarks (hadronic decay) {Piglet's side}.
 - Light quarks are detected in the *hadronic calorimeter* {orange felt}.

