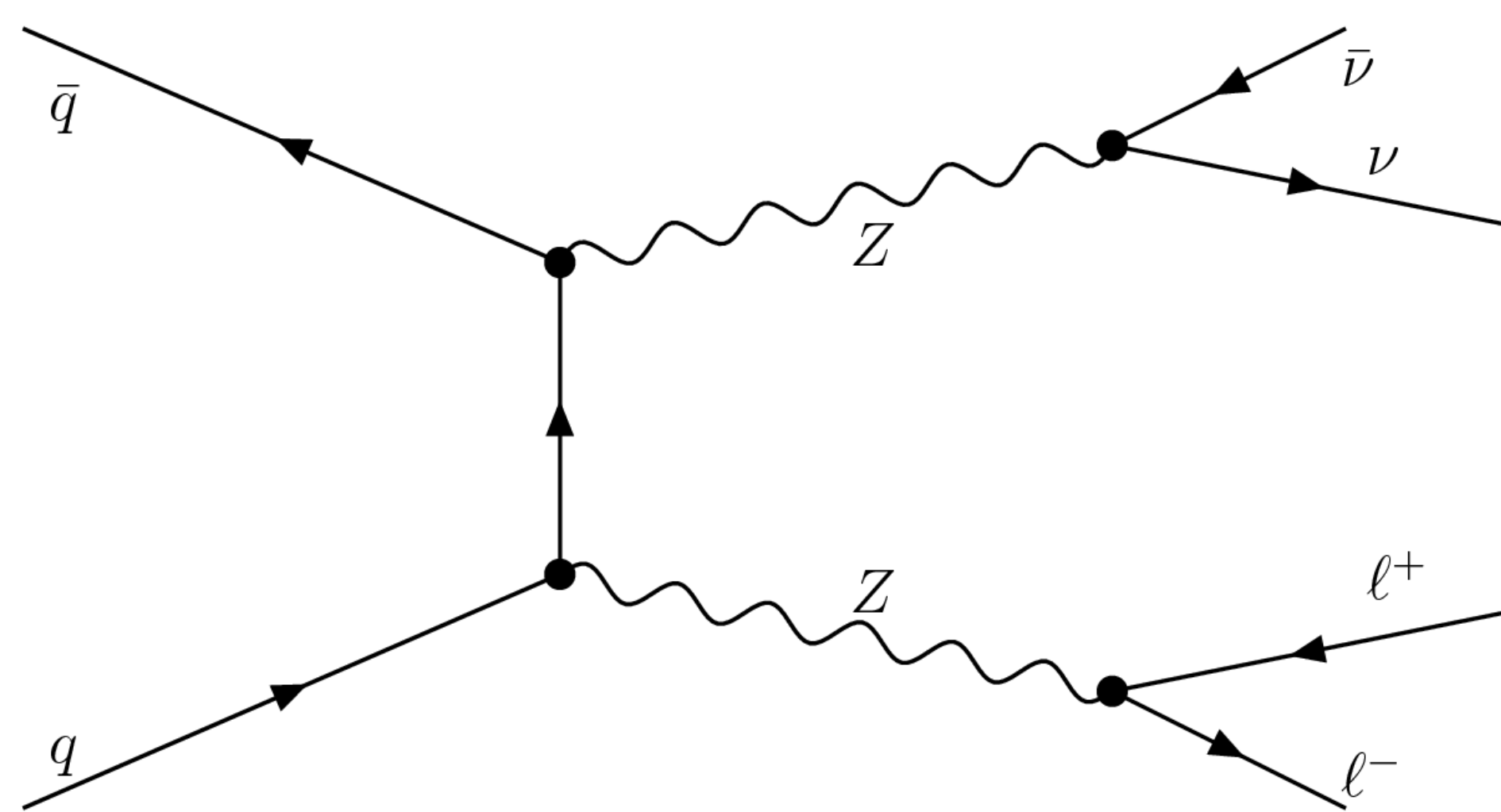
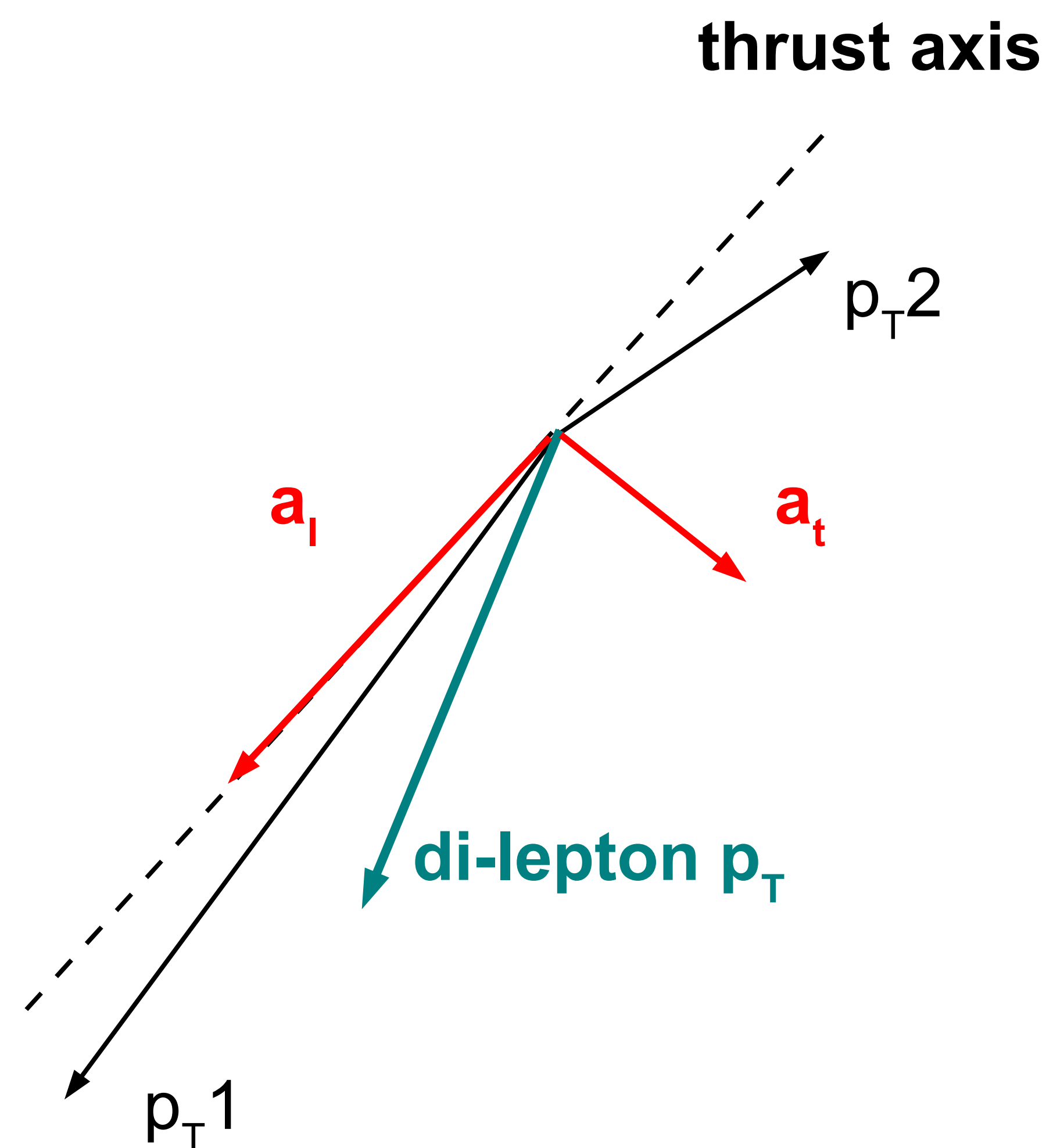


Motivating the Analysis

The ZZ di-boson process has the lowest cross section and is the last (non-Higgs) remaining unobserved di-boson process at the Tevatron. Additionally, it is an important background in Z+Higgs analyses.



With a cross section larger by more than four orders of magnitude, even infrequent mis-measurements of MET in **Inclusive Z** events can wipe out the **signal**



Rather than cutting on MET, define a new variable which corrects the di-lepton p_T for common sources of mis-measured MET

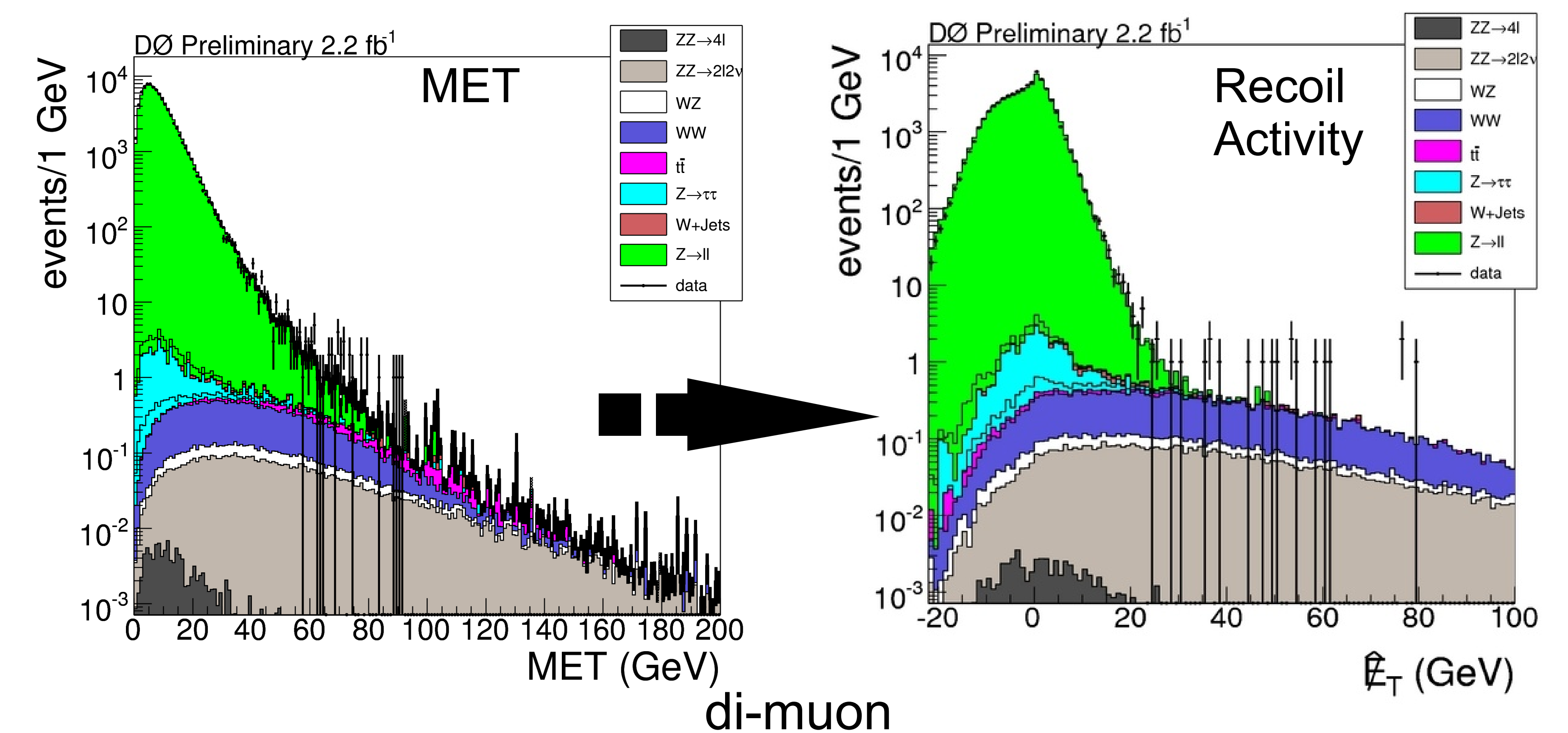
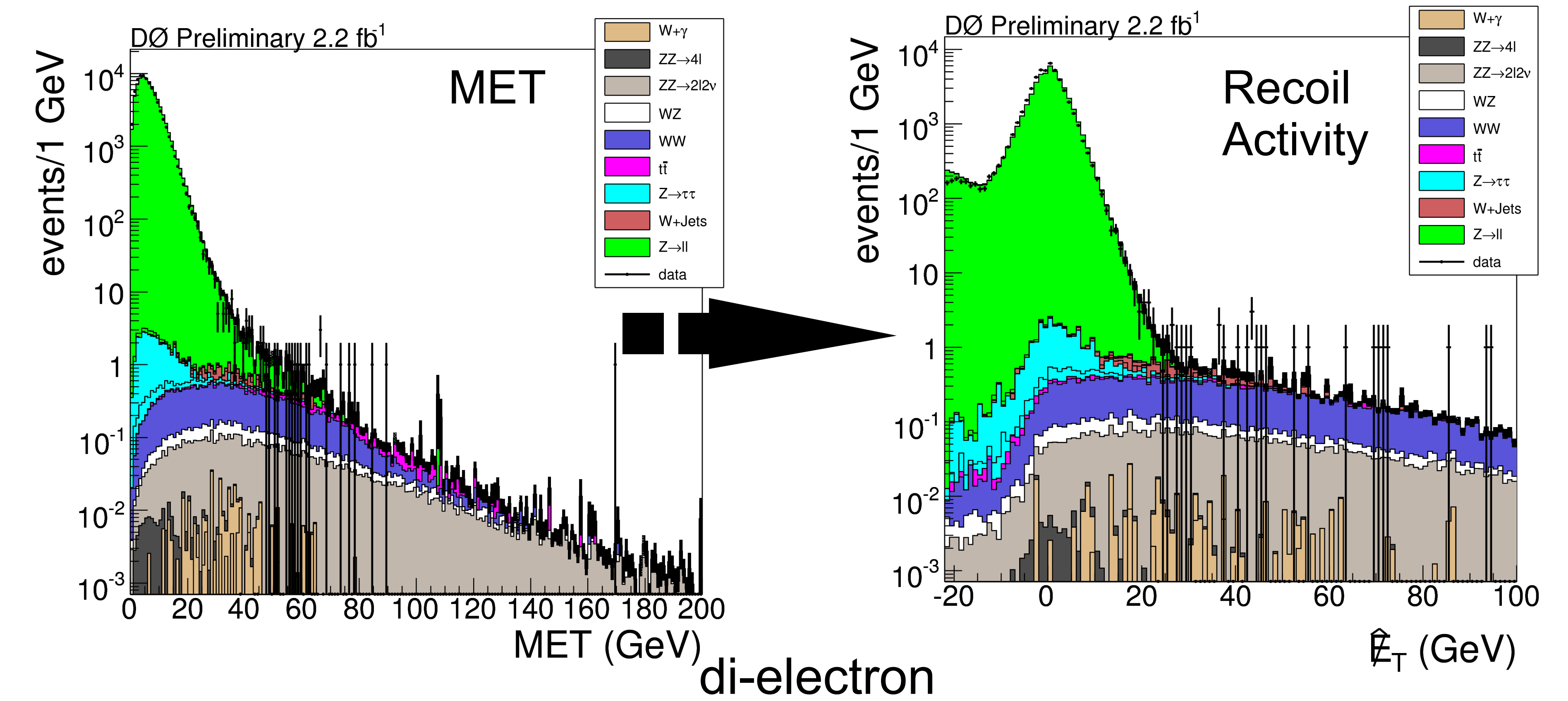
Defining Recoil Activity

- Decompose di-lepton p_T into 2 components with respect to thrust axis:
 - a_i : sensible to p_T mis-measurement
 - a_t : sensible to recoil activity mis-measurement
- Build a variable which gives more weight to a_t (add in quadrature with different weights)

- Balance against activity in the opposite hemisphere and correct using the corresponding uncertainties

Result:

By construction, all uncertainties and mis-reconstruction can ONLY reduce the value of our recoil activity



Cutting as low as 30 (35) GeV for the di-electron (di-muon) channel now excludes nearly all of the **Inclusive Z** background

A 4 variable likelihood is used to disambiguate the remaining backgrounds (primarily **WW** and **W+Jets**)

$$\sigma(p\bar{p} \rightarrow ZZ) = 2.1 \pm 1.1 \pm 0.4 \text{ pb}$$

With $+2.4\sigma$ significance