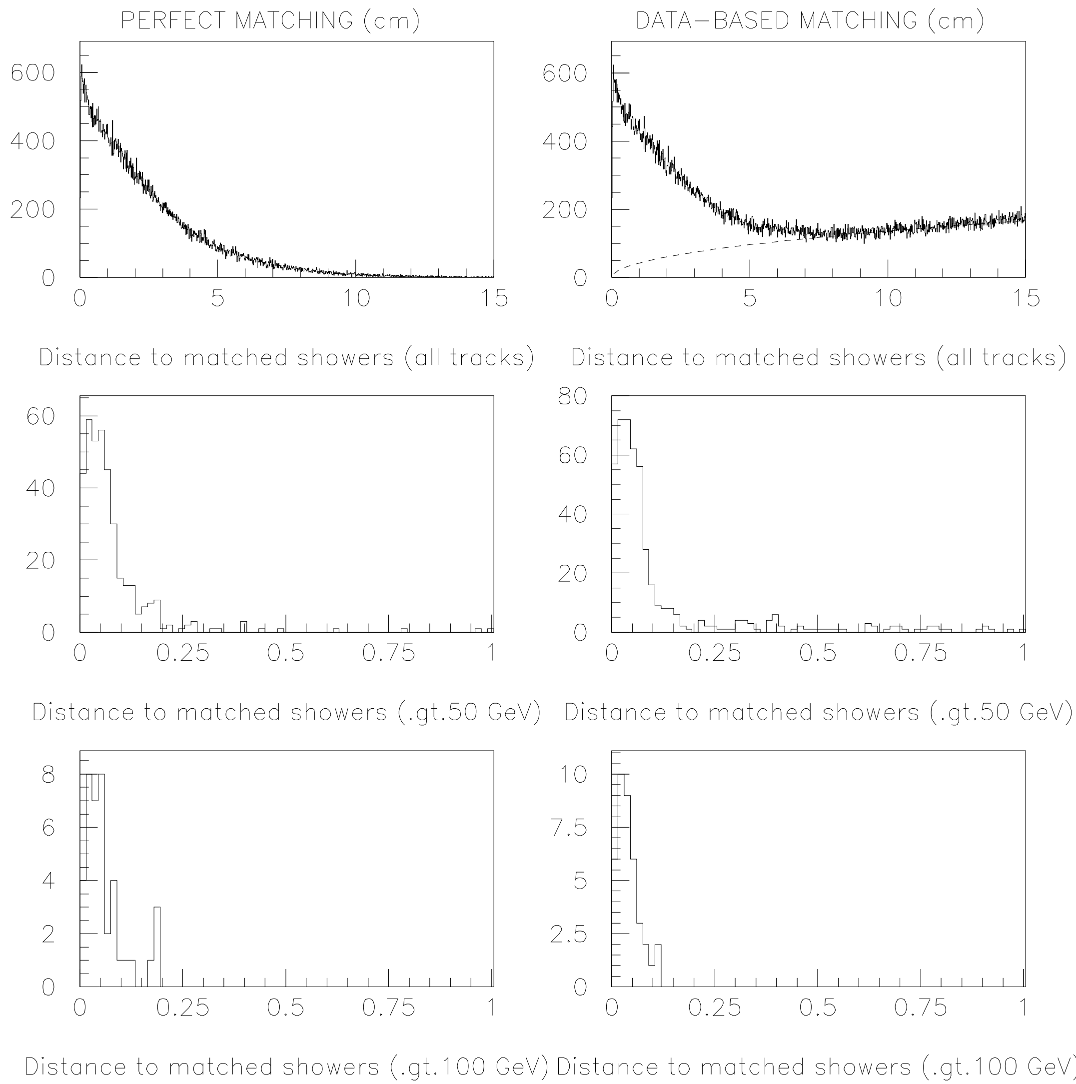
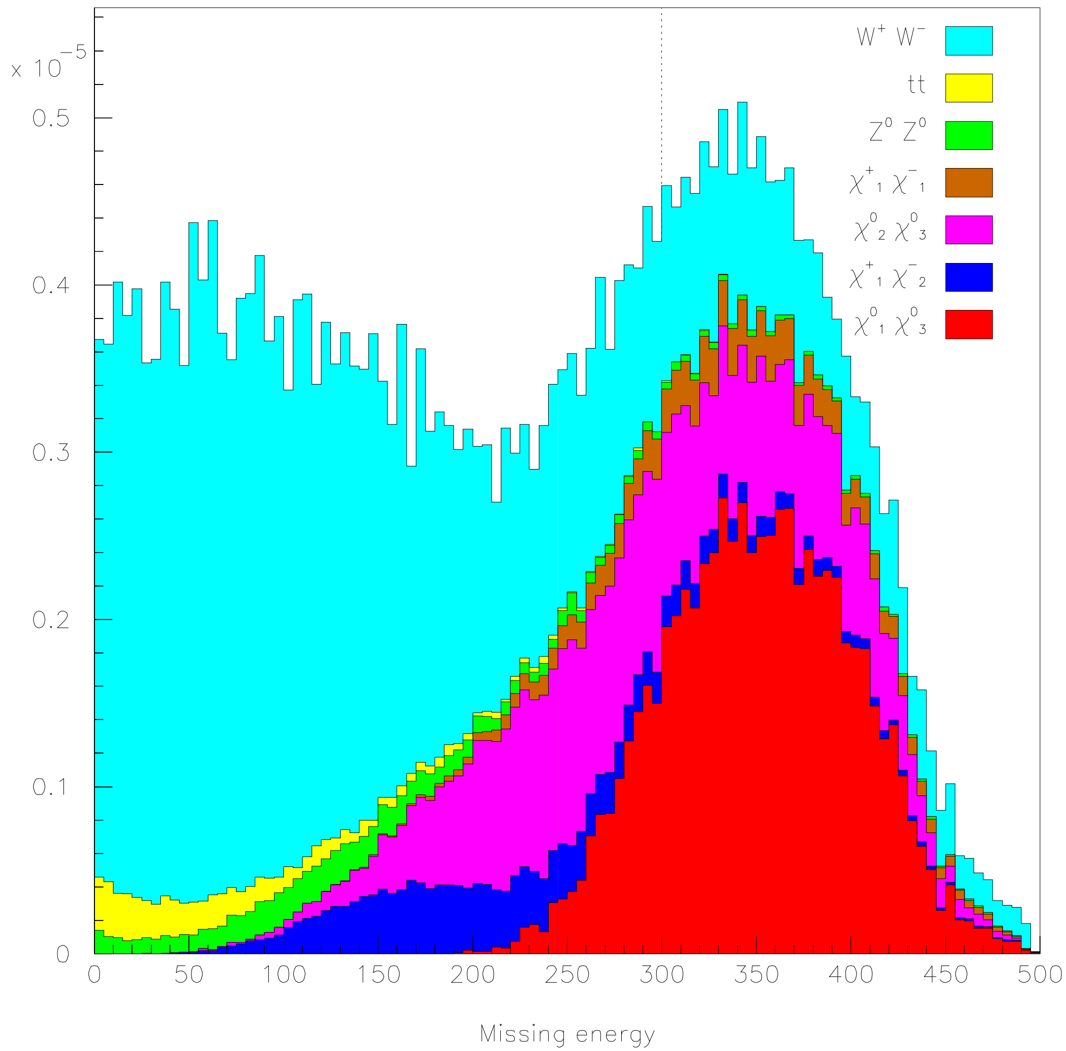


We have two new producers for track/cluster matching!

`LCDPerfectTrackClusterMatchingProd` and `LCDTrackClusterMatchingProd` have the same interface, but the former does MC truth matching and the latter finds the closest track to a given cluster.

Distance to closest shower distribution is wide for all tracks (default cut is 5 cm), but it is much narrower (2 mm!) for very energetic tracks.

(Fakes under data-matched particles are above assumed to scale as $\sqrt{r}$.)

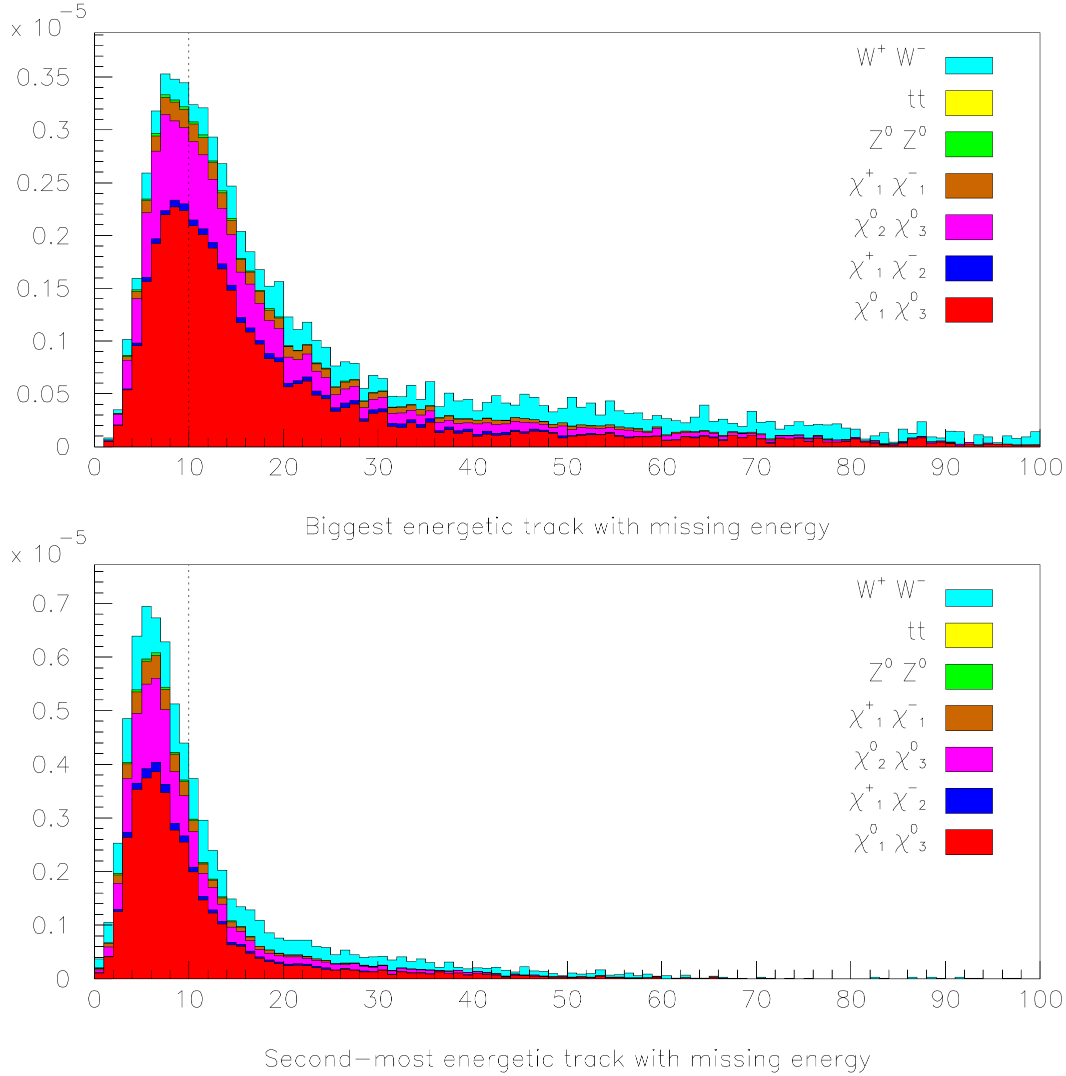


Progressing through $\chi^0{}_1\chi^0{}_3$ cuts (red is signal):

Now that we have isolated showers determined from data, we can redefine missing energy as Σ isolated showers + Σ all tracks. The result is nearly the same as Laura's MC truth-matching.

Put a cut at 300 GeV.

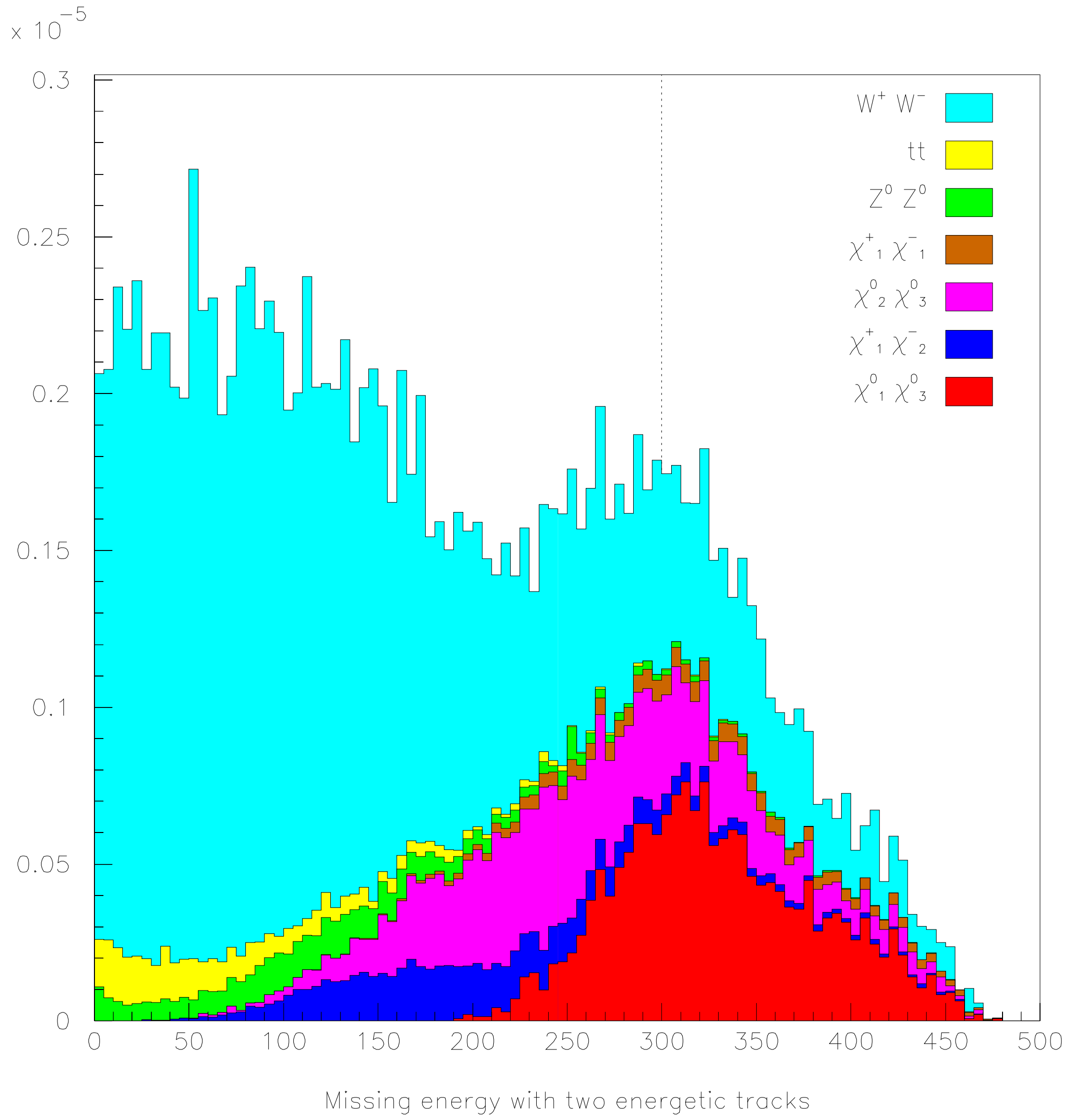
(The vertical axis is 500 fb^{-1} / 100 bins.)



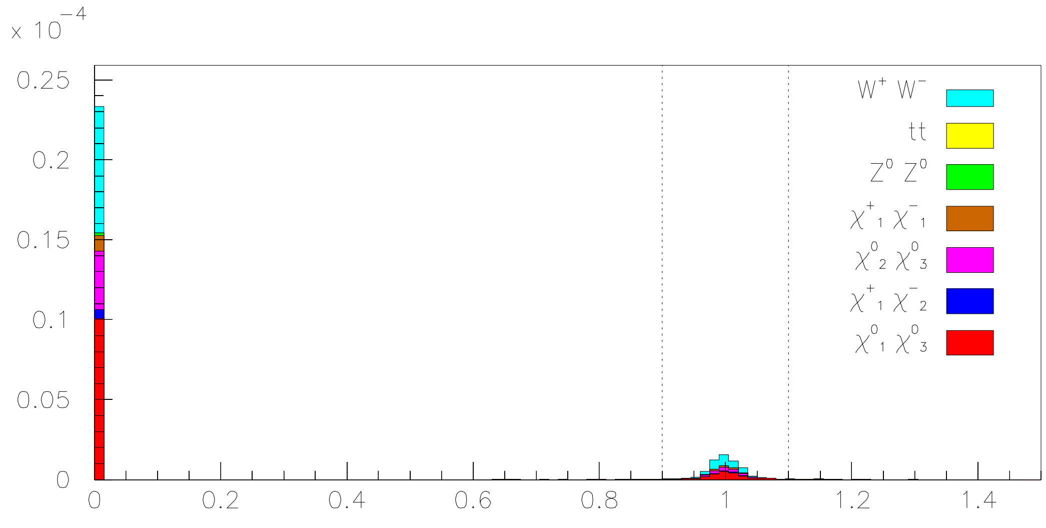
Discriminate against $\chi^0{}_2\chi^0{}_3$ by requiring top two tracks to have > 10 GeV each.

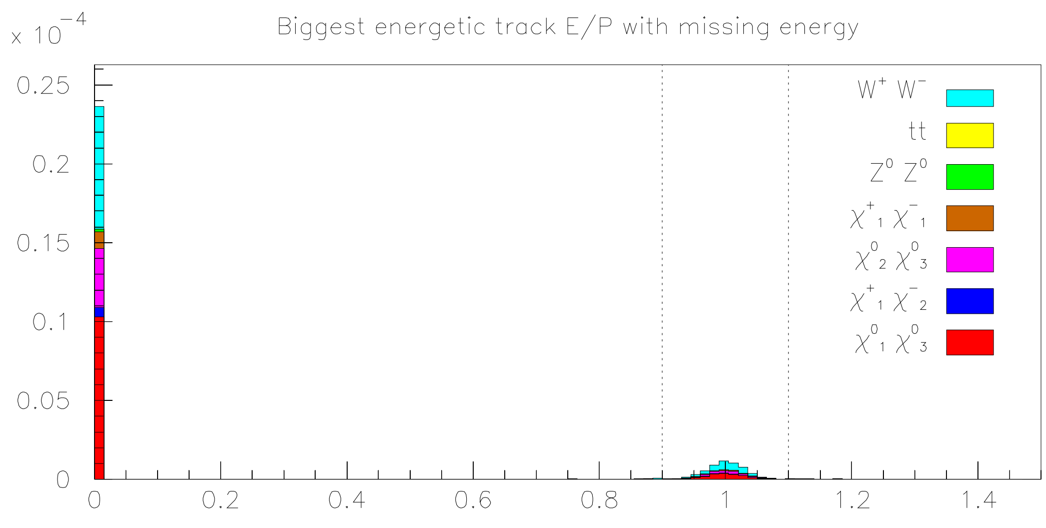
This also improves cluster matching signal to noise (re: first slide).

(These are *post*-discovery cuts.)



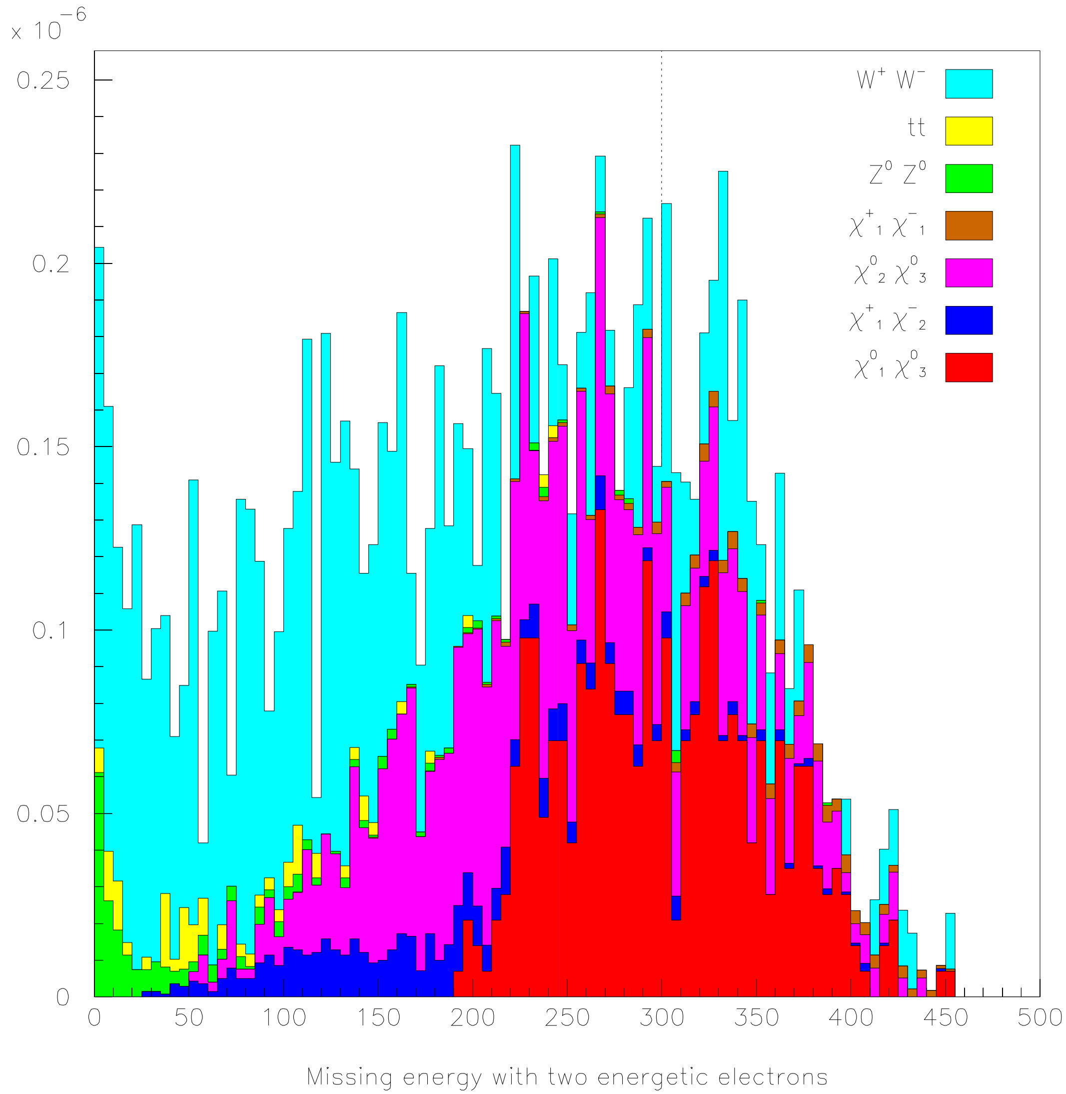
Back to missing energy as a touchstone: $\chi^0{}_2\chi^0{}_3$ contamination above 300 GeV reduced.



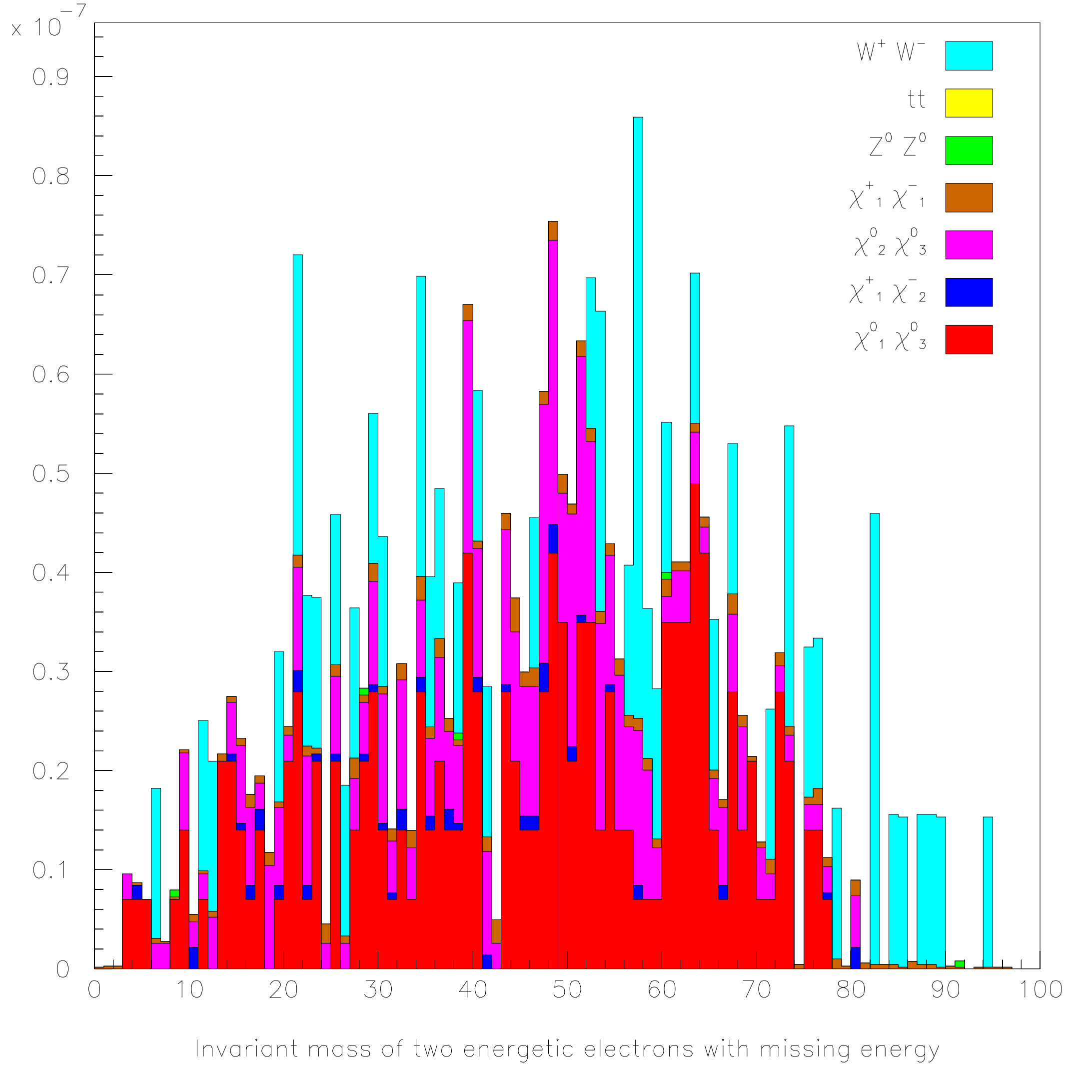


Divide Z^0Z^0 background in four and signal in half by requiring that both high-energy particles be electrons.

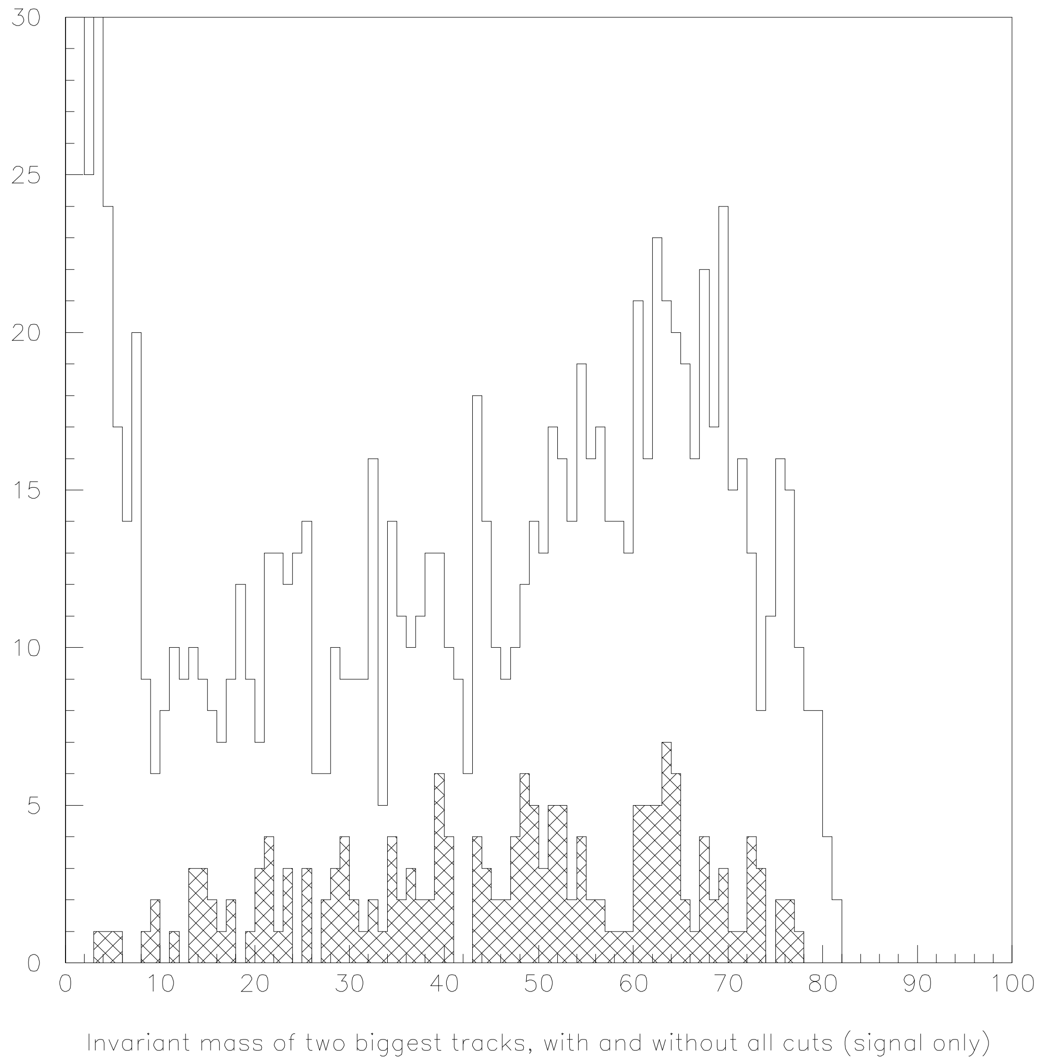
As Laura noticed earlier, each MC particle produces a shower in the EM calorimeter *xor* the hadron calorimeter, making it easy to identify electrons but very hard to identify muons. Presumably, there will be some efficient way to identify muons at the linear collider: so presumably we could double this, losing no signal.



Now look at the missing energy distribution. It's maybe more than half signal!



This is the invariant mass distribution of the top two electrons. We're looking for the cut-off at 80 GeV.



The cut-off isn't significantly shifted by our cuts. (The gap is statistical fluctuations in the small signal MC sample.)