

Higgstralum with hadronic final topologies

ILD software & analysis meeting

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Overview, preliminary results

- Inspired in previous analysis done by our group¹
- Wanting to apply the knowledge we have got from the test-beams data analysis.
- We have started to work in the possible improvements of the ILCSoft reconstruction algorithms.
- Our goal is to asses the energy reconstruction if we include the incident angle of the jet on the detector surface as an input variable.
- We have got promissing results from the CERN 2018 SDHCAL test-beam (a note is being written).
- Higgstralum signal events with $Z \rightarrow q\bar{q}$ identification and recoil-mass performance are for the moment our test variables.

¹<https://www.theses.fr/2019LYSE1013>

Signal samples

- We have started with the latest MC-2020 MonteCarlo production.
- For the moment only **o1** samples are available.[1] (see backup slides)
- Our detector Model would be ILD-l5-o2 with the SDHCAL
- In order to make progress we have started to check our workflows with the o1 simulation.

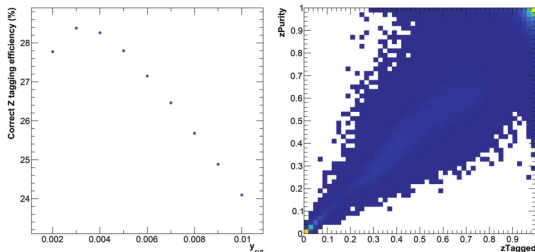
[1]/ilc/prod/ilc/mc-2020/ild/dst-merged/250-SetA/higgs/ILD_l5_o1_v02/v02-02/.

Z identification

- Two variables are defined in order to identify correctly jets associated to a Z bosson.

$$Z_{tag} = \frac{E_Z^{j1,j2}}{E_Z^{total}} \quad Z_{purity} = \frac{E_Z^{j1,j2}}{E^{j1,j2}}$$

- We run all over the possible jet combinatorial possibilities.
- And we choose the pair that give us the best values Z_{tag} and $Z_{purity} \approx 1$.
- The algorithm used in this study was *fast jet* and a parameter optimization, y_{cut} , has to be done in order to maximize the Z tag efficiency.



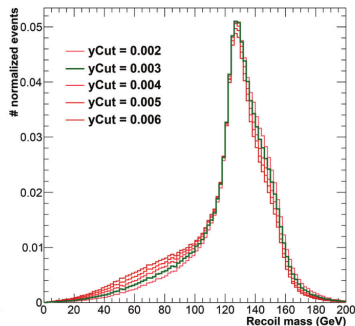
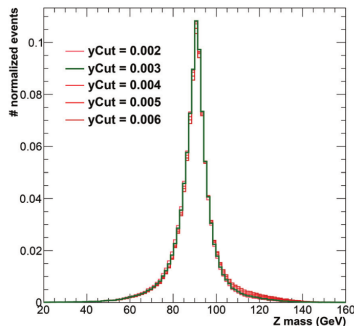
Z identification with o1 MC-2020 results

aca iría el mejor plot que tengamos de la recoil mass con los analysis de Hector

Recoil Mass

$$m_{rec}^2 = [\sqrt{s} - E_Z]^2 - \vec{p}_Z^2 \quad (1)$$

- The link with the MC-truth objects has been done....
- The cuts...
- Previously obtained results with ILCXXX in 2019



Recoil mass o1 MC-2020 results

aca iría el mejor plot que tengamos de la recoil mass con los analysis de Hector

Test beam 2018 results

aca iría el mejor plot que tengamos mostrando el efecto del ángulo de incidencia.

Conclusions

- Our goal is to take this analysis to the very end. Background simulation and cross section measurements with its correspondent uncertainties.
- Timing is also a variable that we would like to consider.

Backup

Backup



o2 crash reproduced

aca el output que obtenemos del bash script que nos ha enviado Akiya