

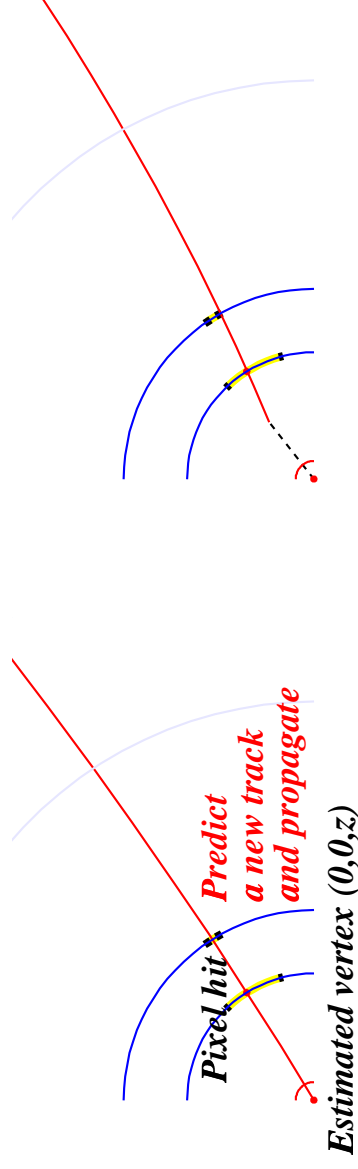
Electron triggers on $H \rightarrow \tau\tau \rightarrow e X$ channels



- Specific τ triggers trigger on τ -leptons decaying into **hadrons**.
- τ -leptons decaying into **electrons** are supposed to be triggered with the standard electron trigger.
- The trigger channels envisaged for triggering $H \rightarrow \tau\tau \rightarrow e X$ events:
 - single electron trigger
 - electron (> 17 GeV) + jet (> 44 GeV) trigger
- Efficiency for tau decay electrons?
- Can we recover the efficiency loss?

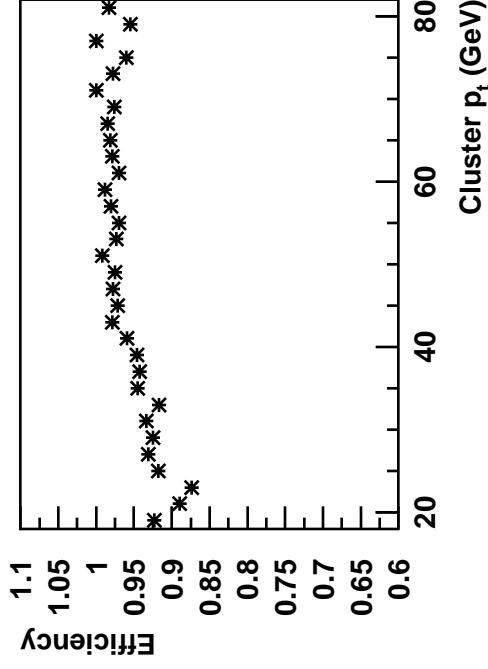
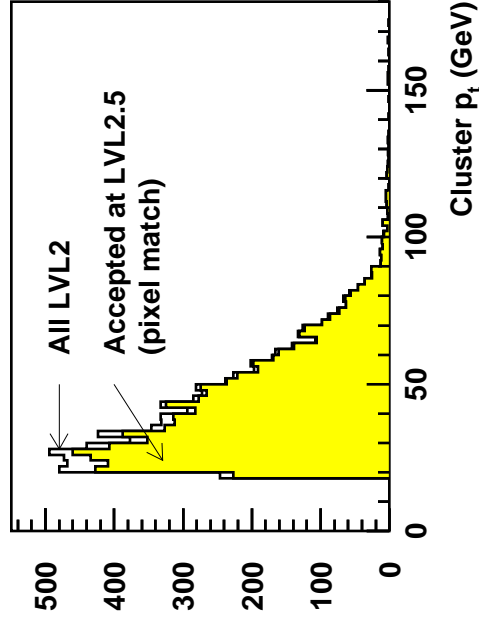
Tau decay electrons in the electron trigger

- The standard electron trigger relies on the pixel hits corresponding to the ECAL cluster
- ... and assumes that the electron comes from the **primary vertex**.
- The electrons from the τ decays come from a **displaced vertex**.

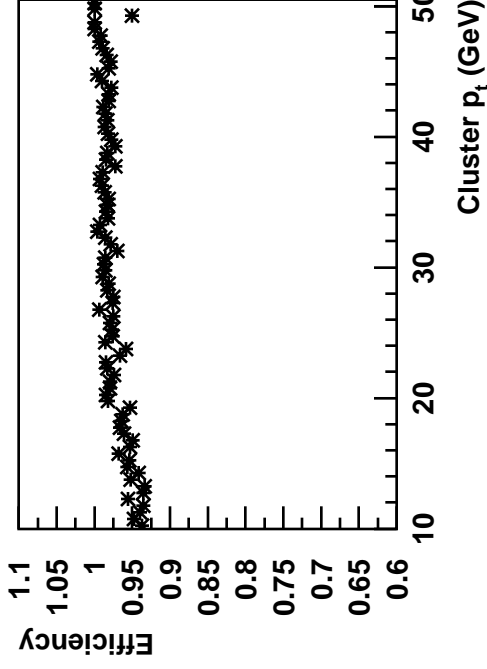
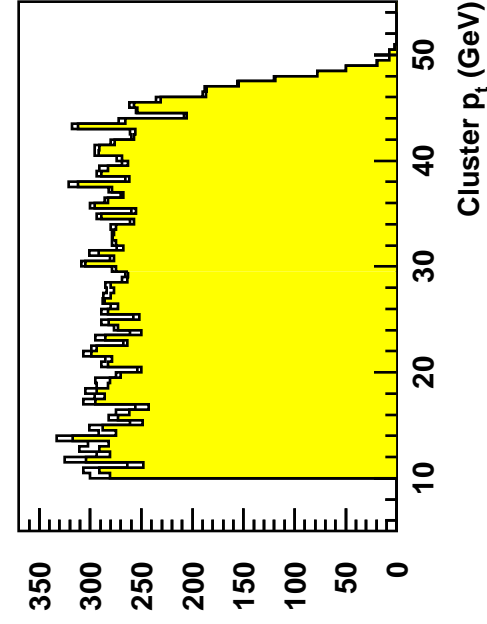


- The default search area in the 2nd pixel layer ± 0.001 rad results in a loss of efficiency for tau decay electrons.

The efficiency loss



Electrons from τ 's
($H \rightarrow \tau\tau \rightarrow e\mu$,
 $m_H = 200$ GeV)



Single electrons

Can the pixel match cut be loosened?

- The effect of loosening the 2nd search area limits
 - default ± 0.001 : giving 97.9% efficiency for single electron sample 10 GeV $< p_T < 50$ GeV

Electrons from τ 's ($p_T > 19$ GeV)	± 0.001	± 0.002	± 0.003
	94.7%	97.7%	98.1%
Electrons from τ 's (19 GeV $< p_T < 50$ GeV)	89.9%	94.5%	95.1%
Jet rejection* at 10^{34}	9.9	7.3	5.5

* Preliminary results from a new ORCA6 jet sample (only 20 – 30 GeV p_T bin), consider only the relative size of the rejection, not the absolute values which may change.

Summary

- p_T dependent loss of efficiency for tau decay electrons in the electron trigger level “2.5” (pixel match)
 - Efficiency ≈ 95 % for $p_T > 19$ GeV, whereas 98% for electrons from the primary vertex.
 - The loss will be more significant for a sample including lower p_T values.
- The loss could be recovered by loosening the pixel match parameters
 - However, preliminary results indicate that the loss in the jet rejection is large.