

CU tile calorimeter study

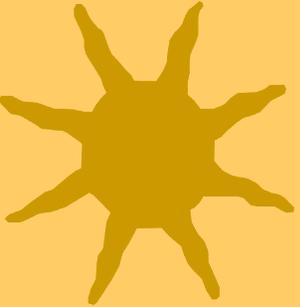
Toshinori Abe

University of Colorado

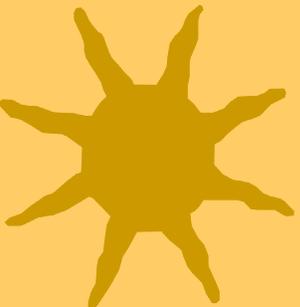
Nov. 8, 2002



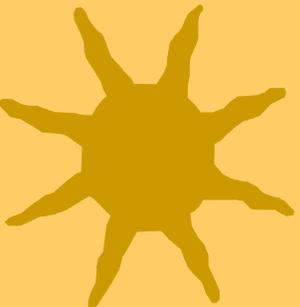
Introduction



★ CU group is interesting in developing tile sampling calorimeter for a future linear collider.



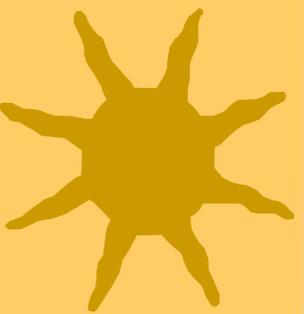
★ We propose a new design of the tile calorimeter for energy flow.



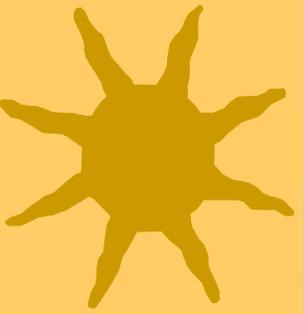
★ In this talk, I will present recent studies of the calorimeter.



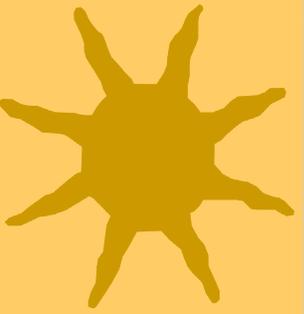
Topics of Discussion



- ★ Energy flow analysis
- ★ Design of a tile calorimeter



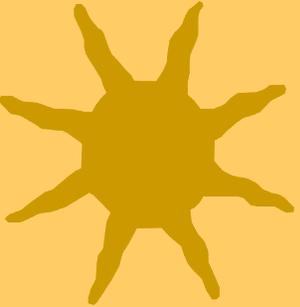
- ★ GEANT4 setup
- ★ Position resolution
- ★ W mass reconstruction



- ★ Cost vs. performance
- ★ Summary



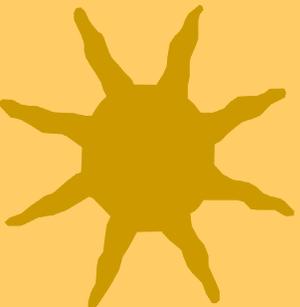
Energy flow analysis



★ Typical idea of energy flow.

charged particles → tracker

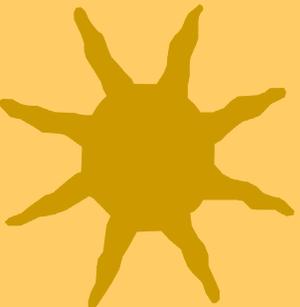
neutral particles → calorimeter



★ What information can calorimeters provide?

Energy → important! (jet energy, etc)

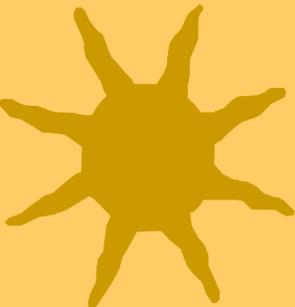
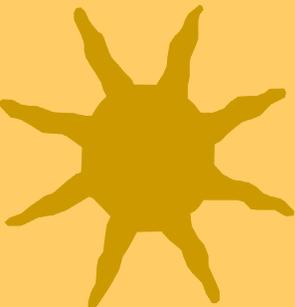
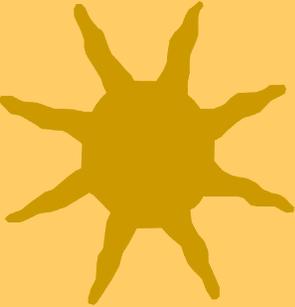
position → important! (jet direction, etc)



(direction and longitudinal shower shape) for
sampling calorimeter



Energy flow (cont.)



- ★ Experience of ALEPH says photon reconstruction is important because:

Typical multi-jet event

charged particles carry 64% $E \rightarrow$ tracker

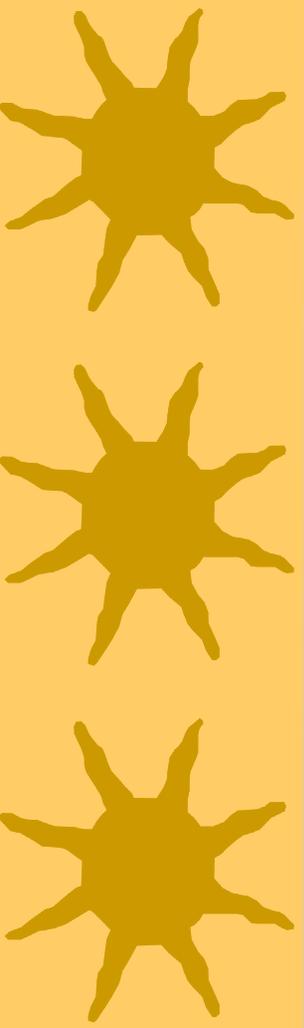
photons carry 25% $E \rightarrow$ EM cal.

neutral hadrons carry 11% $E \rightarrow$ HAD cal.

- ★ Excellent position resolution helps to distinguish between charged and neutral clusters.
- ★ What position resolution do we need?



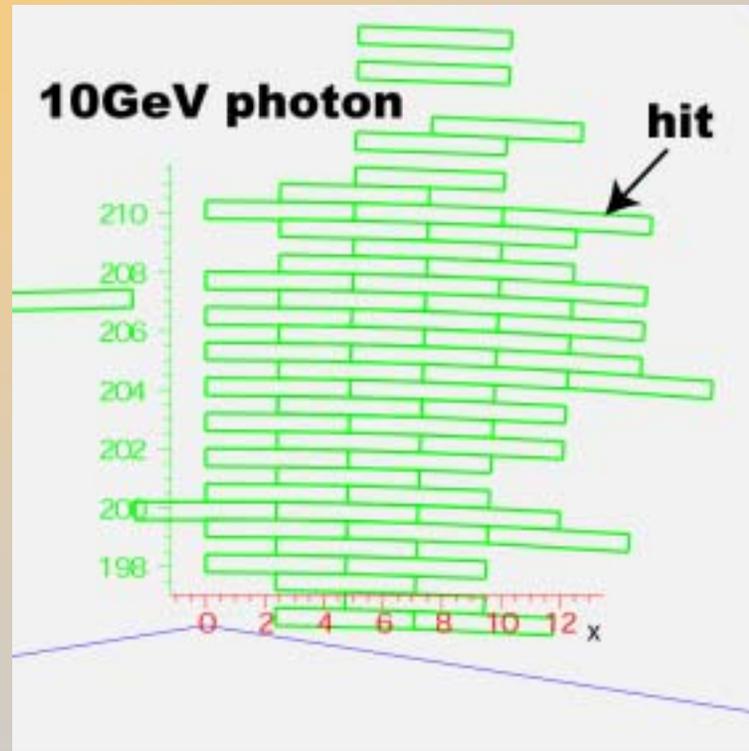
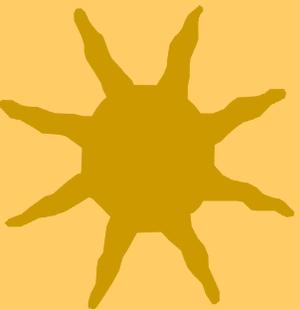
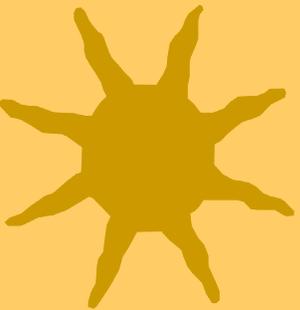
Design of calorimeter



- ★ W + scinti.
- ★ There are half size offset layer by layer to improve position resolution.



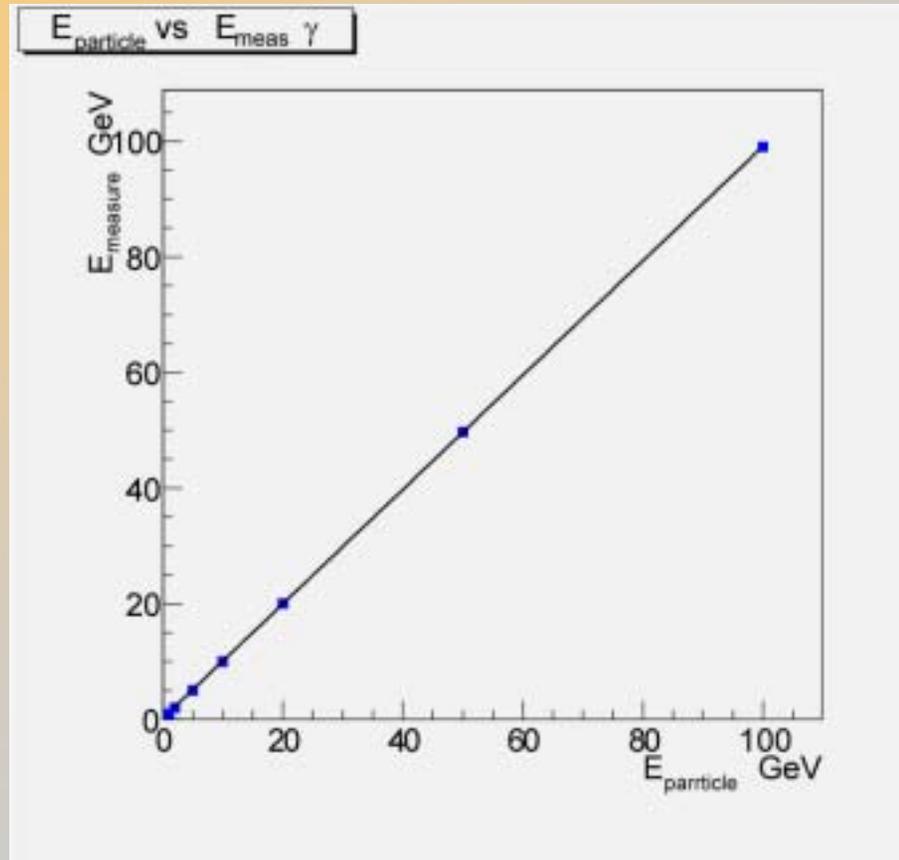
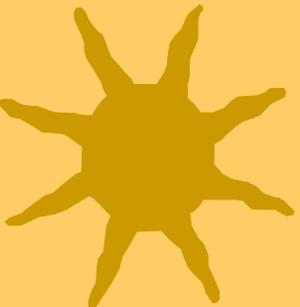
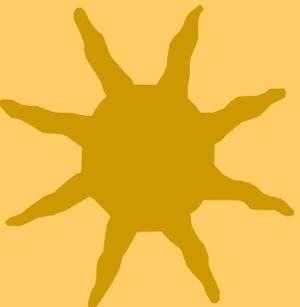
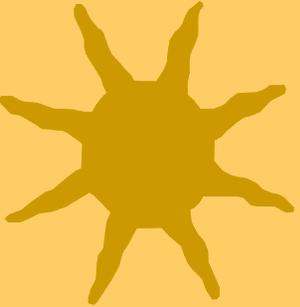
GEANT4 setup



★ XML file is written to setup CU calorimeter.

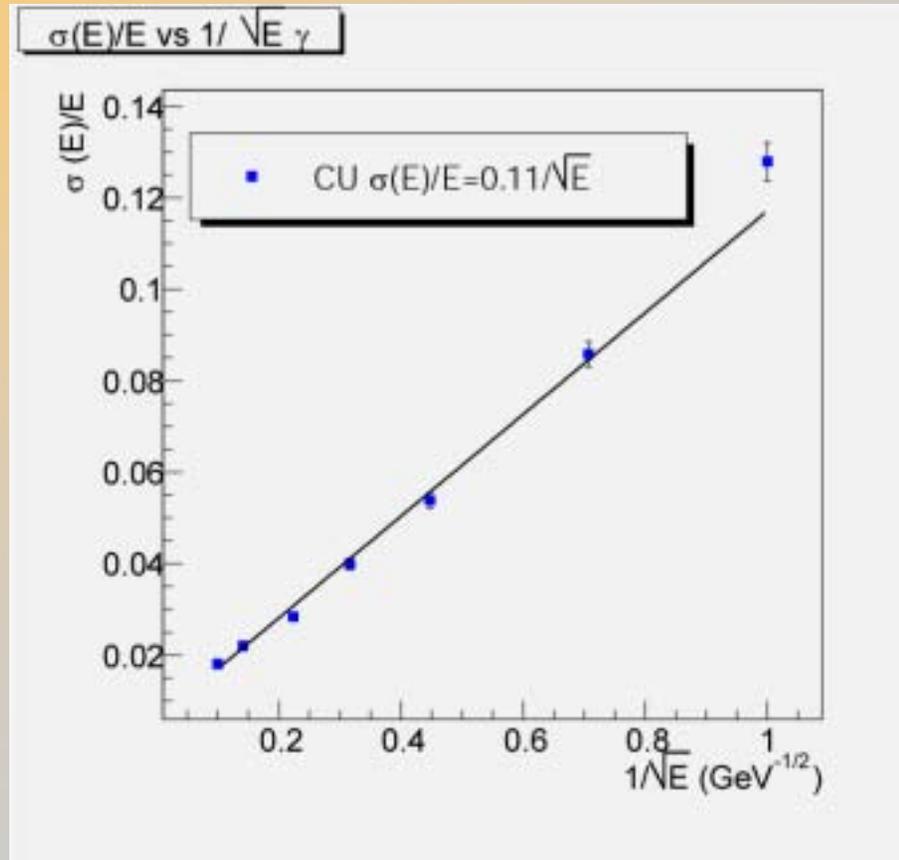
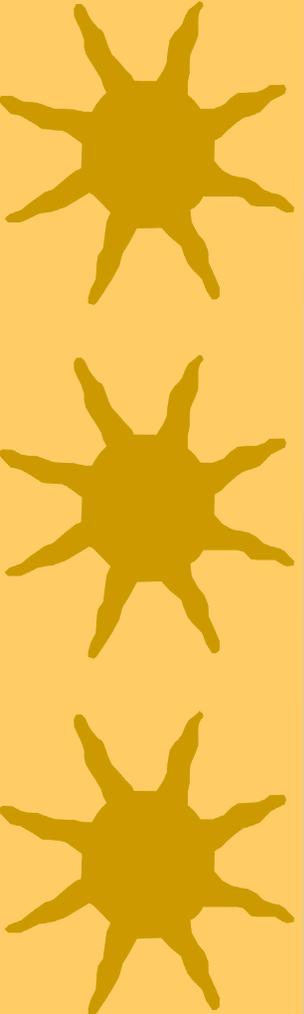


Energy linearity



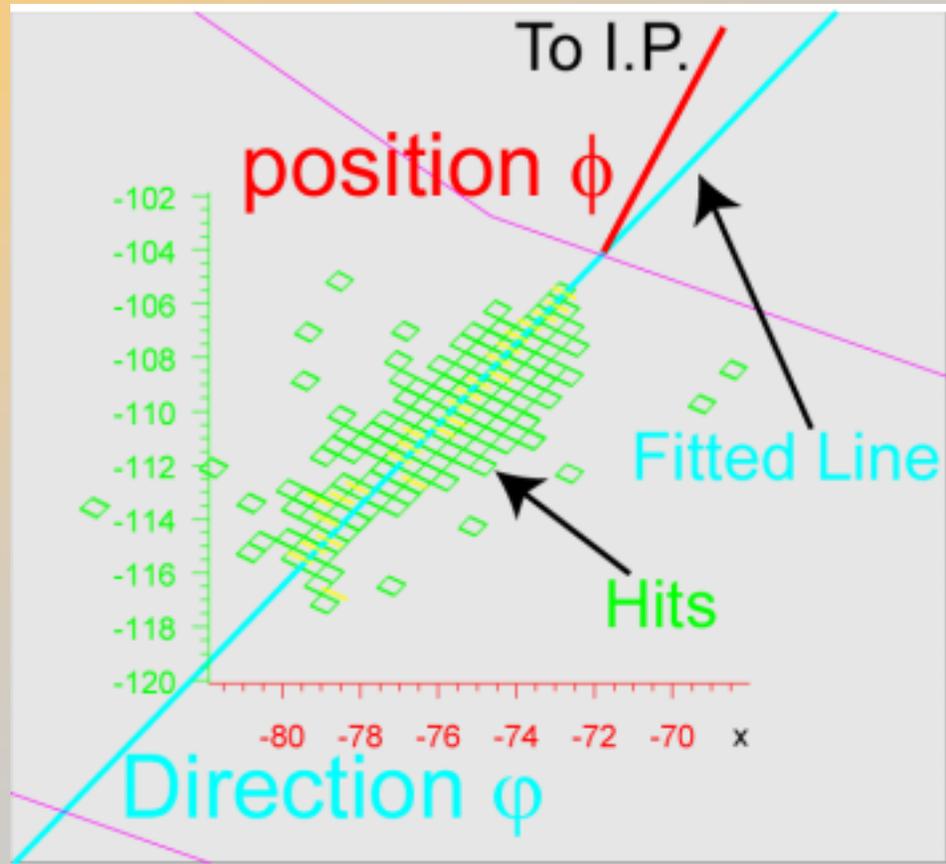
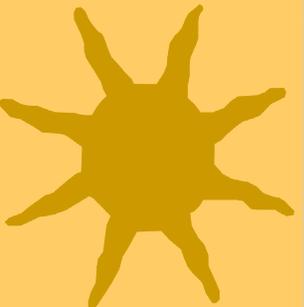
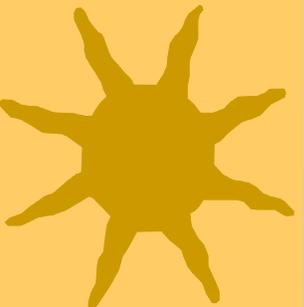
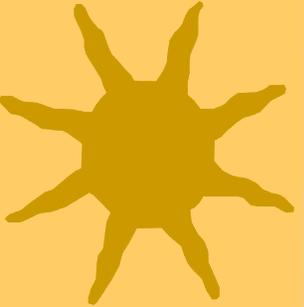


Energy resolution



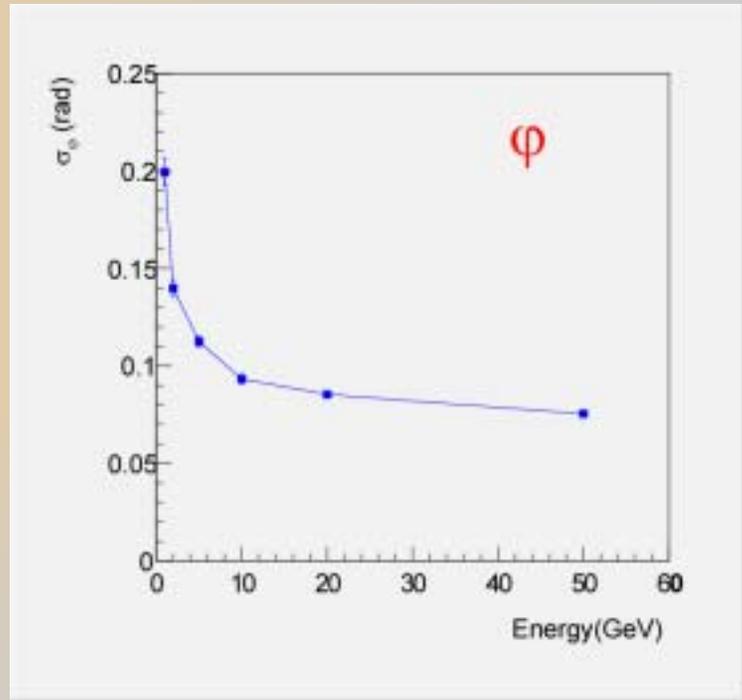
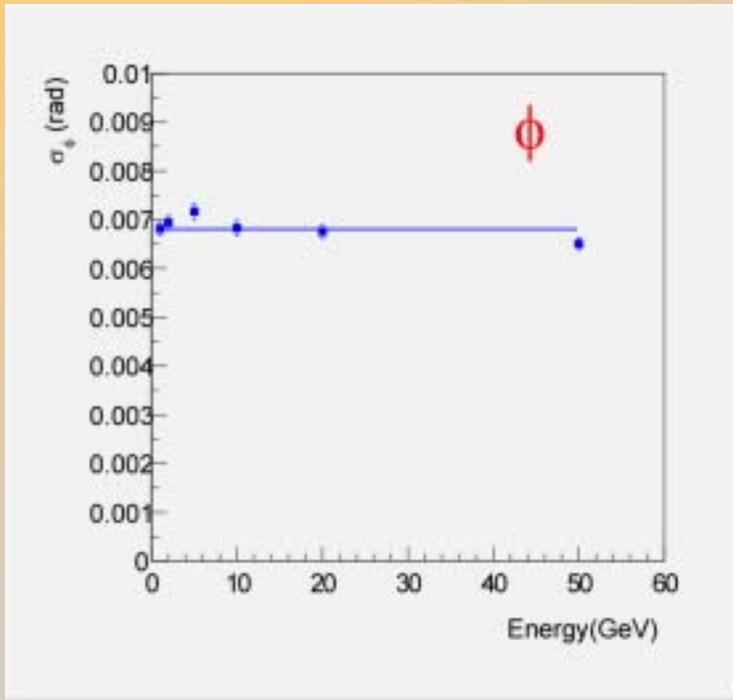
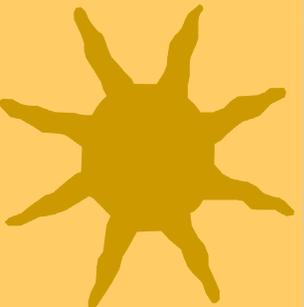
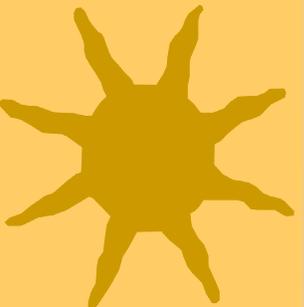
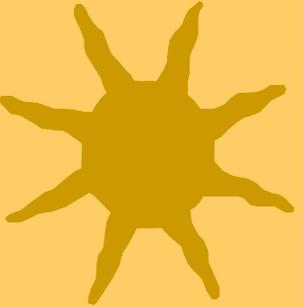


Position resolution





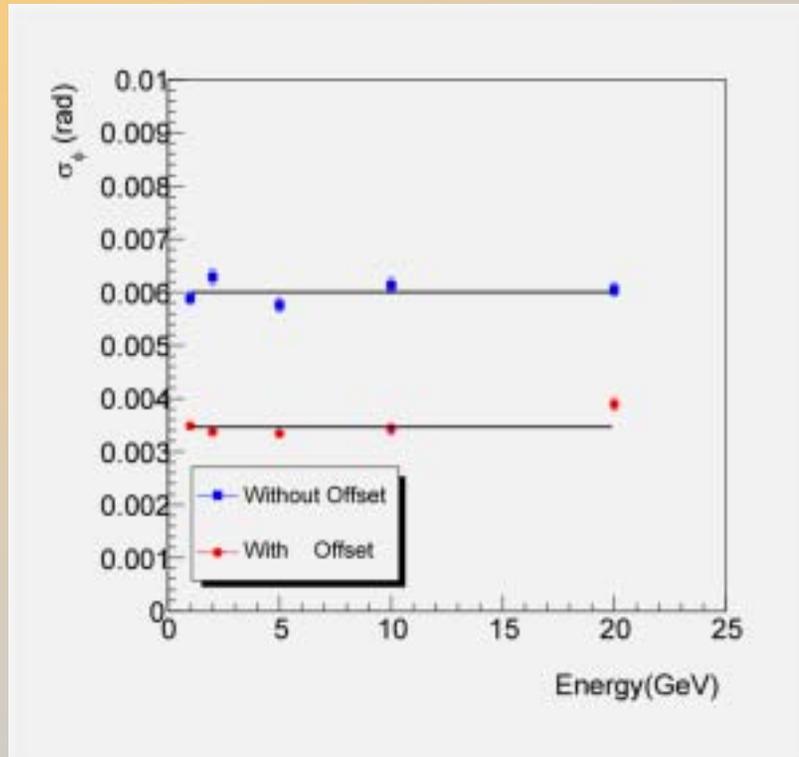
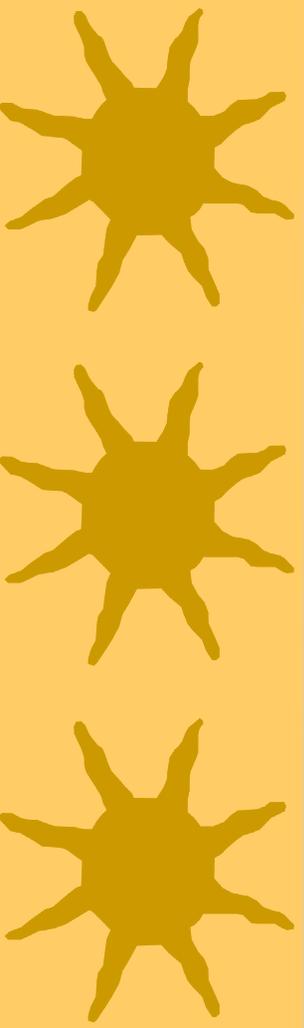
Position resolution (cont.)



★ ϕ gives better resolution than φ . So we will use ϕ . (But φ is important to GMSB.)



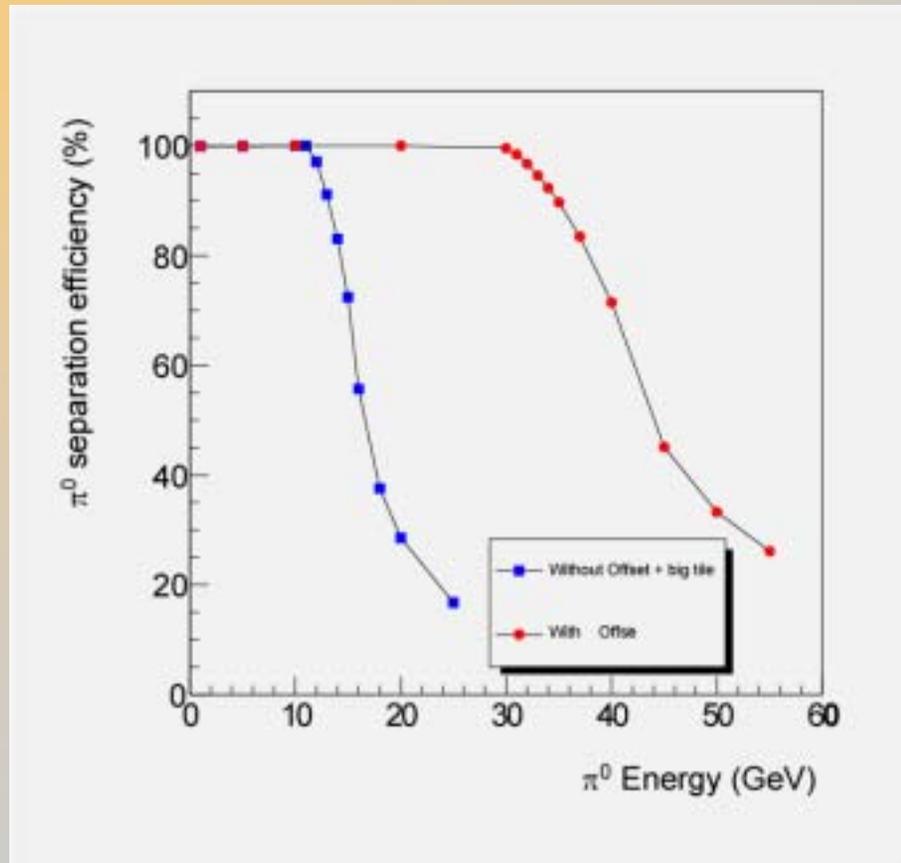
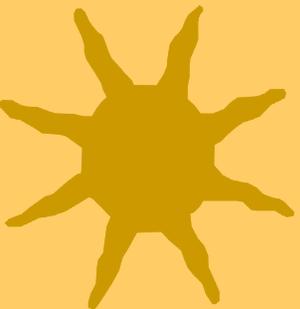
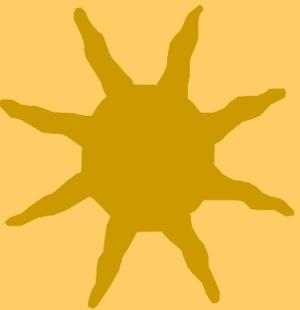
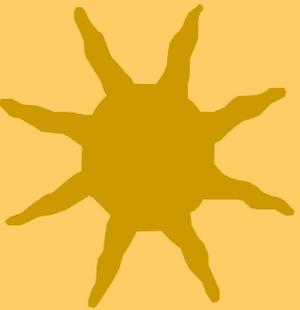
Position resolution (cont.)



★ CU design gives better resolution than normal design.

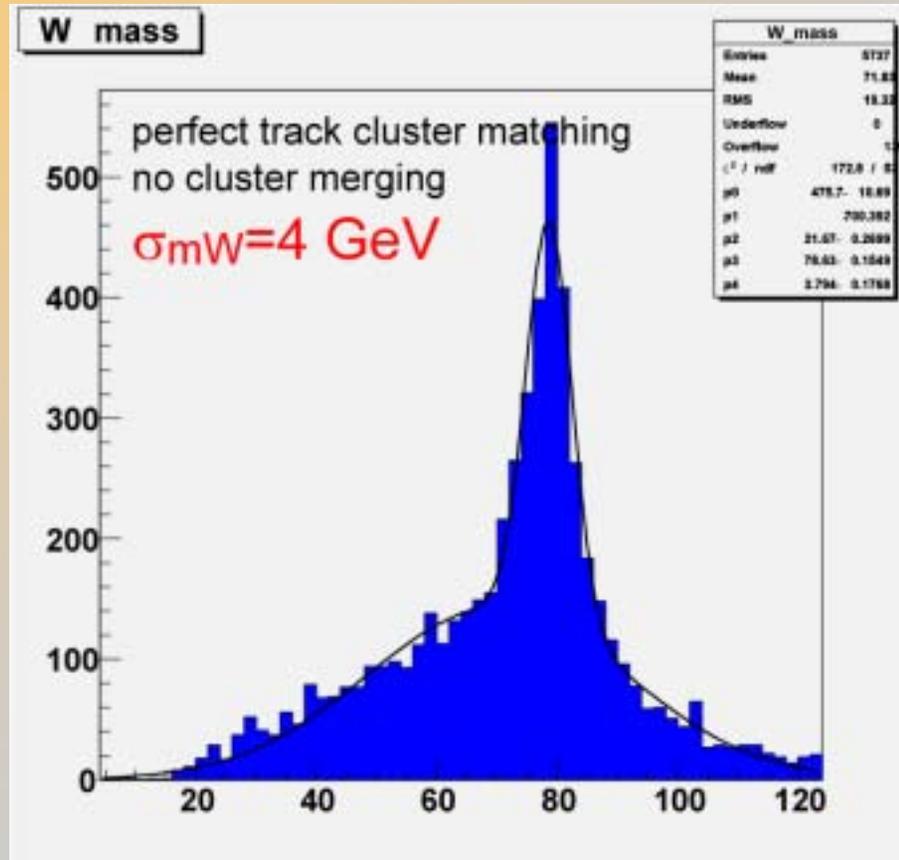
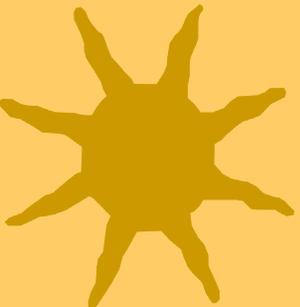
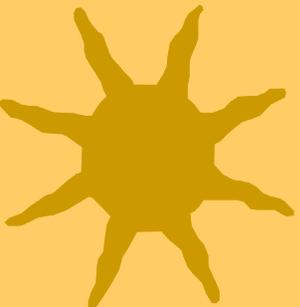
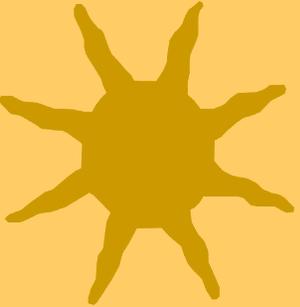


π^0 separation



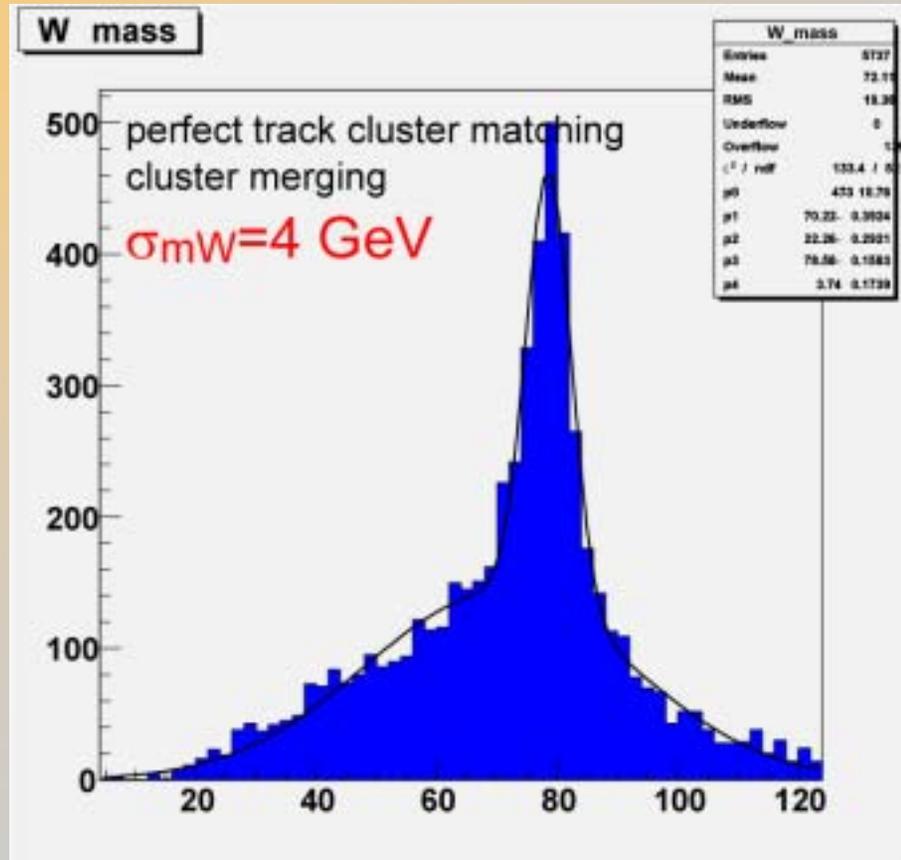
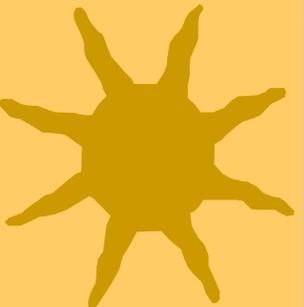
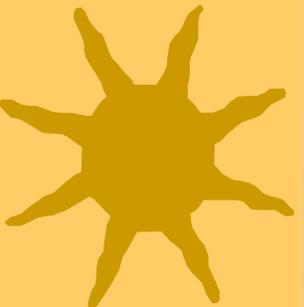
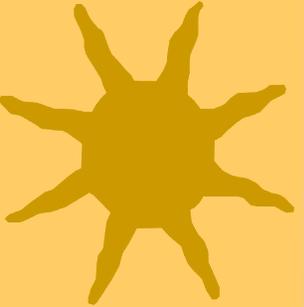


W mass reconstruction



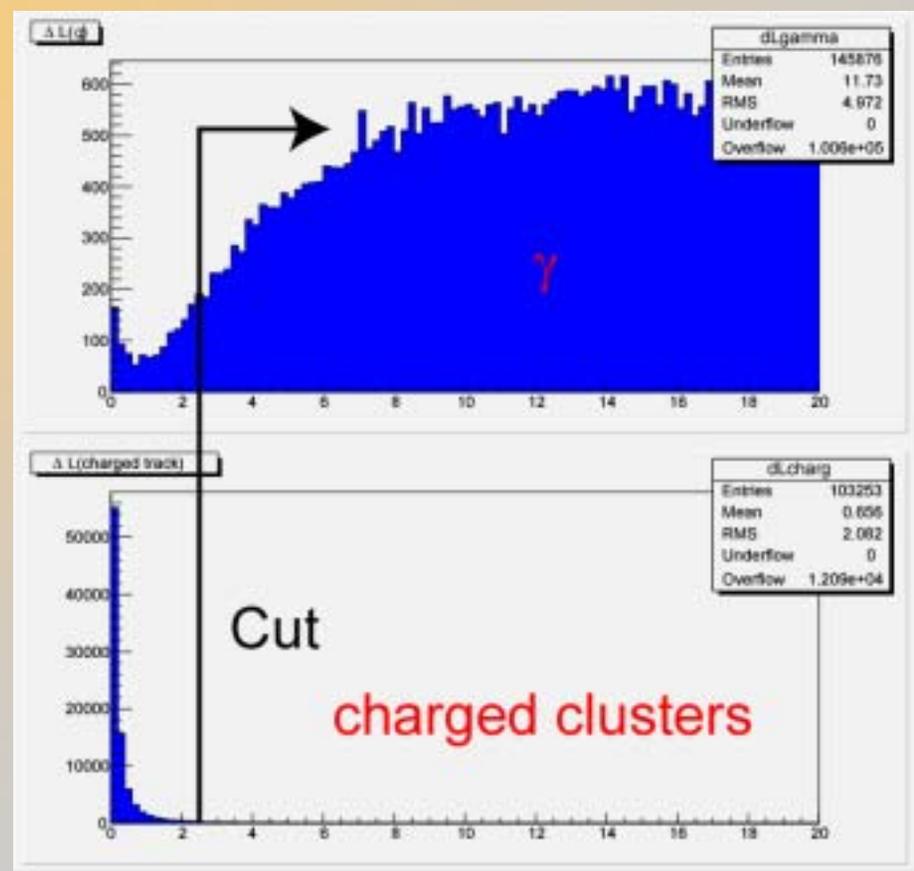
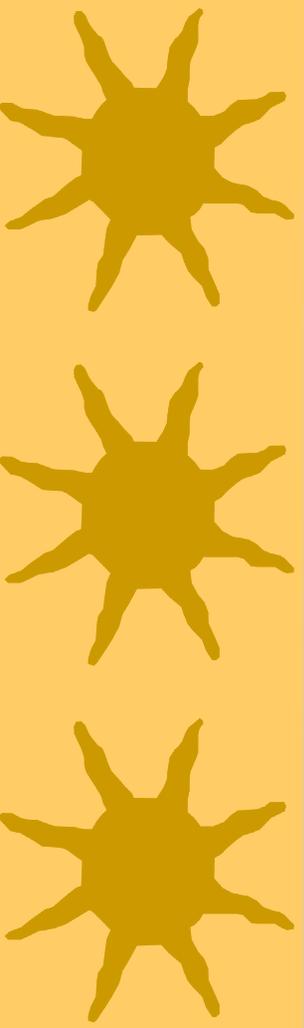


W mass reconstruction (cont.)



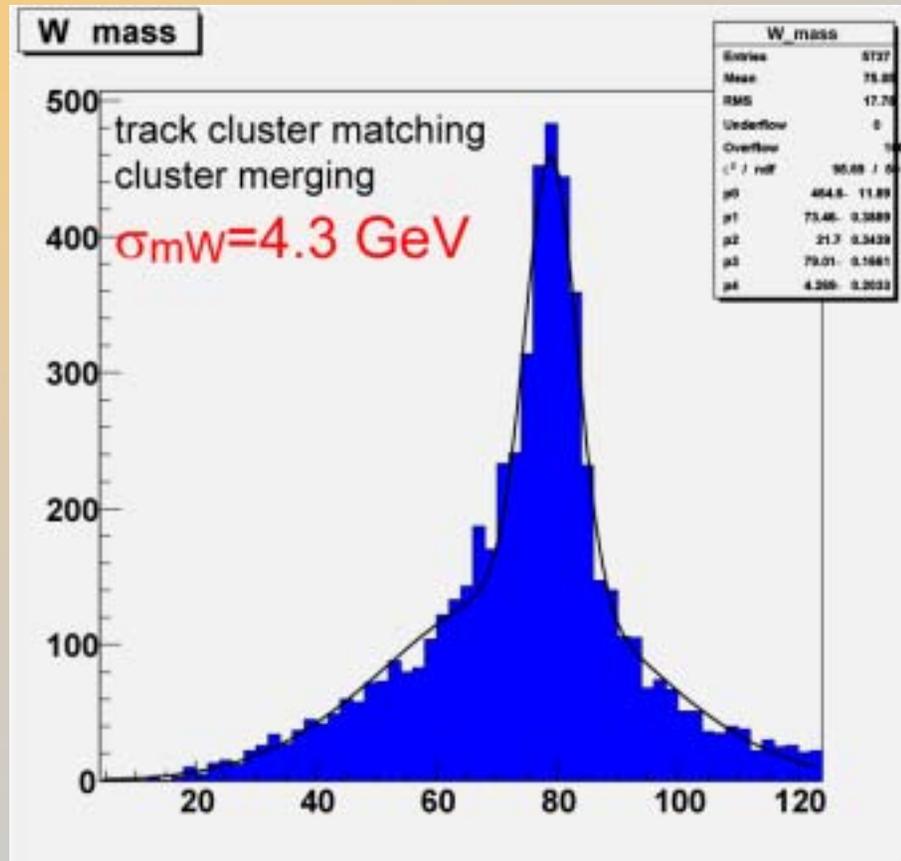
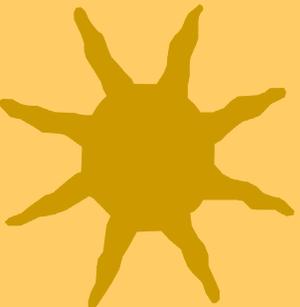
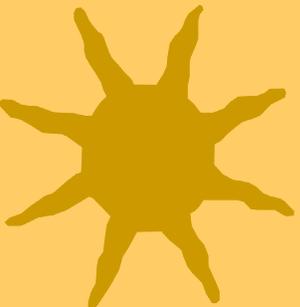
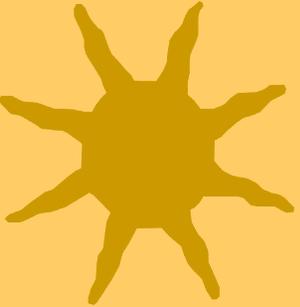


Track cluster matching



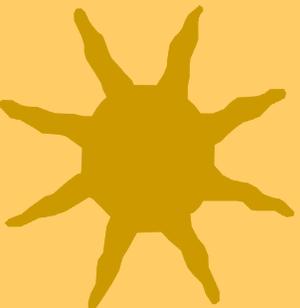
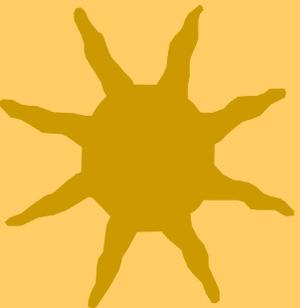
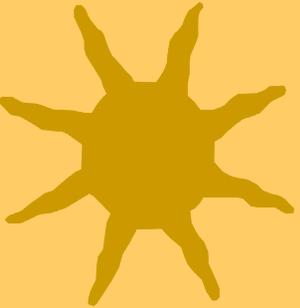


W mass reconstruction III



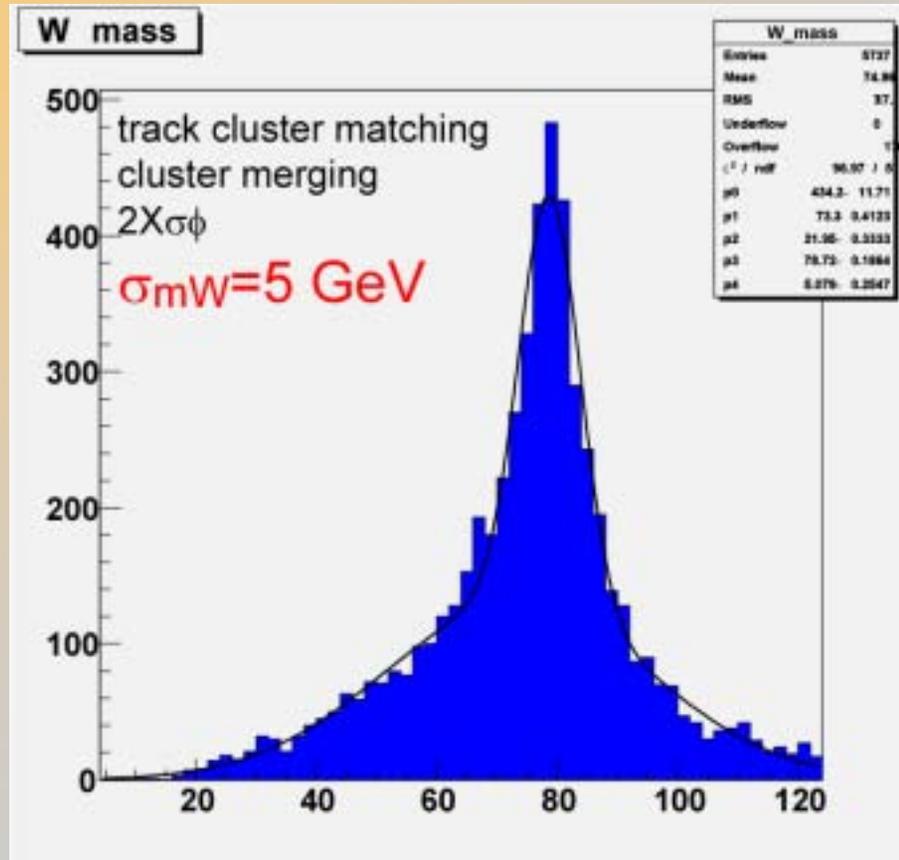
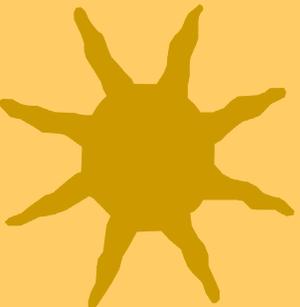
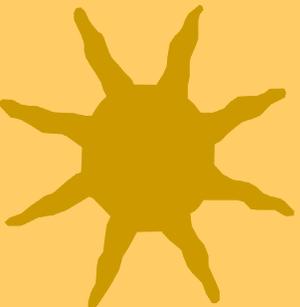
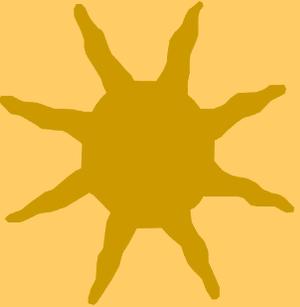


Track cluster matching



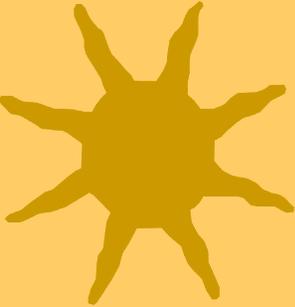


W mass reconstruction

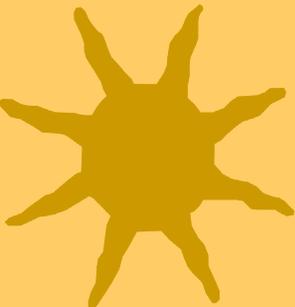
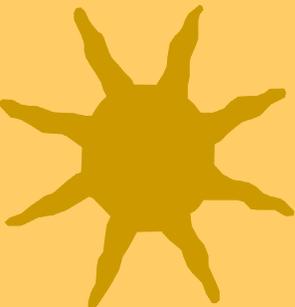




Real Life

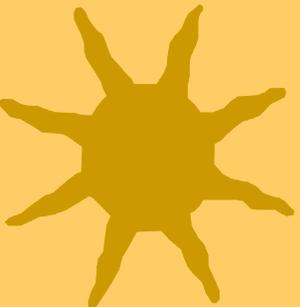
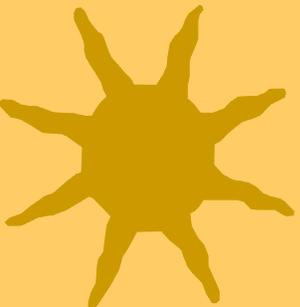
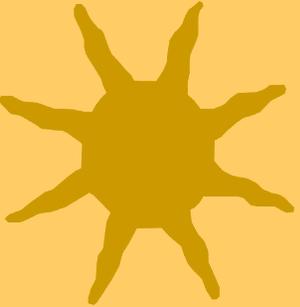


- ★ Give an example or real life anecdote
- ★ Sympathize with the audience's situation if appropriate





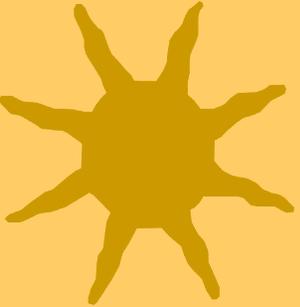
What This Means



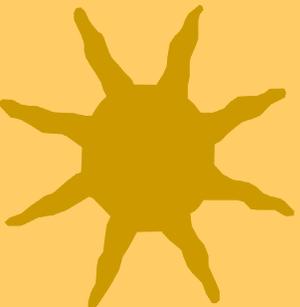
- ★ Add a strong statement that summarizes how you feel or think about this topic
- ★ Summarize key points you want your audience to remember



Next Steps



★ Summarize any actions required of your audience



★ Summarize any follow up action items required of you

