

Detector related talks for ACFA7

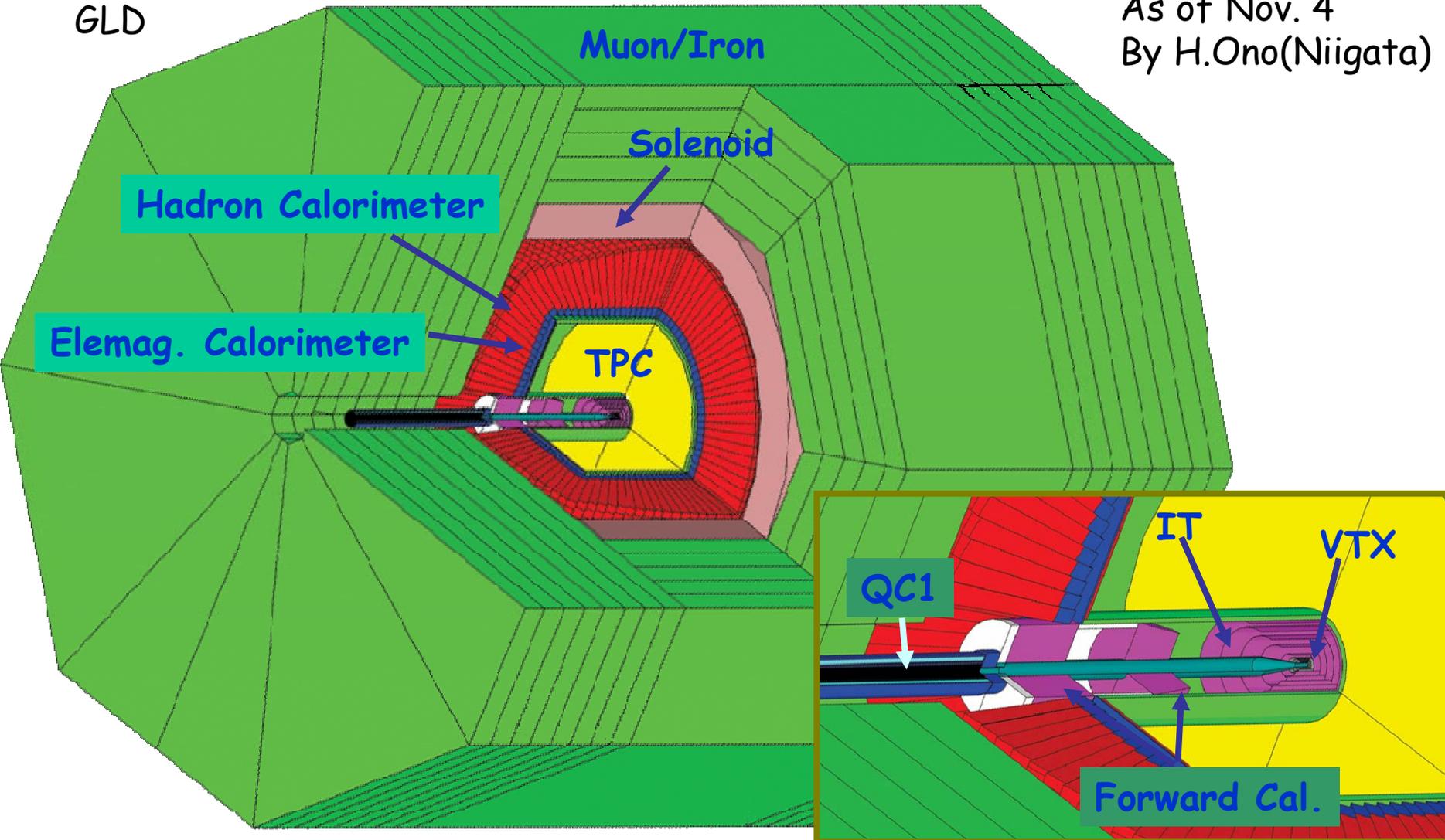
- 3 Detector concepts talks
- 4 Reviews talks (VTX, CAL, Tracking, IT)
- Parallel session
 - 1) **VTX, Tracking** : 4 talks
 - 2) **CAL** : 9 talks
 - 3) **Simulation** : 5 talks
 - 4) **IR** : 6 talks
- **Others**
 - SiD re-launch Meeting
 - Large/Huge Detector Kick-off meeting
 - Detector Concept Umbrella Meeting

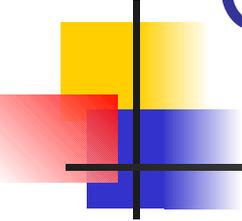


Standard Geometry of Jupiter

GLD

As of Nov. 4
By H.Ono(Niigata)





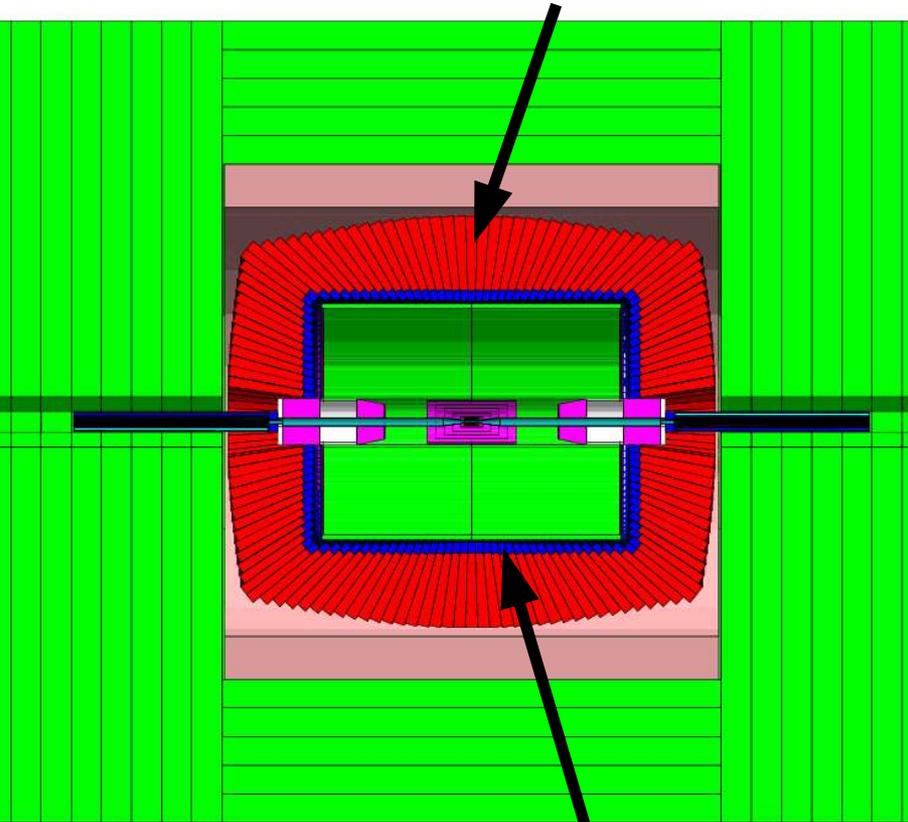
Calorimeter configuration

- ▶ EMCAL: 38 layers (4mm Pb: 1mm Scint), approx. $27X_0$
- ▶ HCAL: 130 layers (8mm Pb: 2mm Scint), approx. $6\lambda_0$
- ▶ Transverse granularity: 4cmx4cm
- ▶ Can easily switch between GLC-3T and GLD configurations

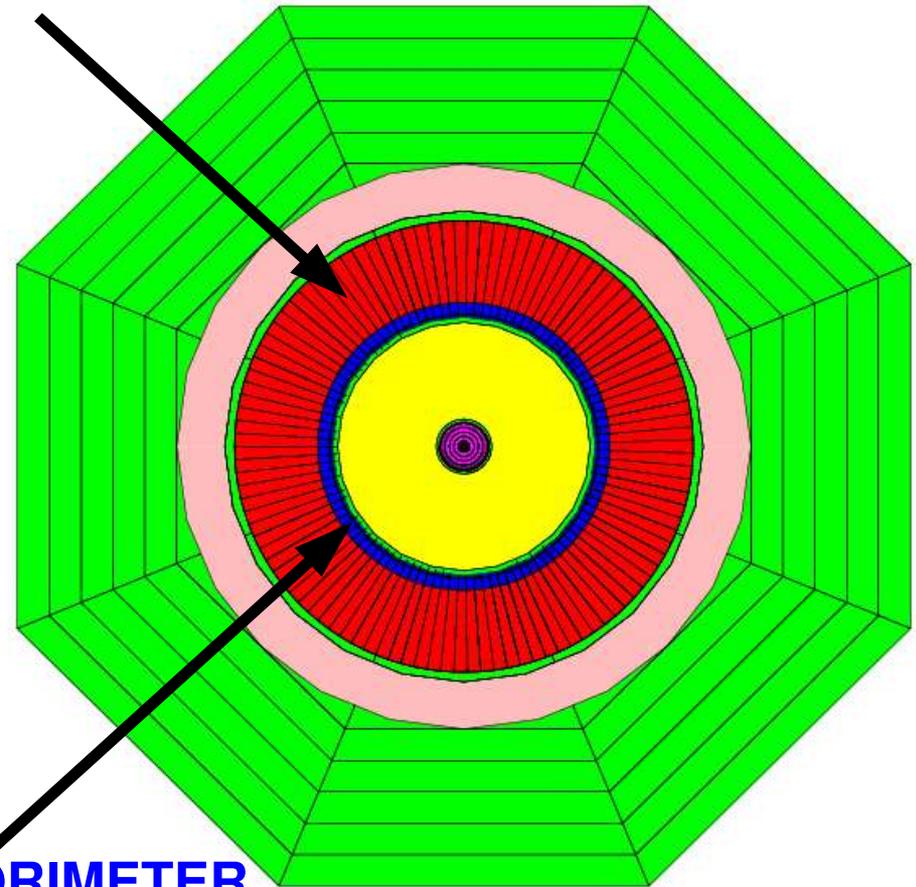
Calorimeter View

We implemented a pointing tower geometry (ideal case).

HADRON CALORIMETER



ELECTROMAGNETIC CALORIMETER





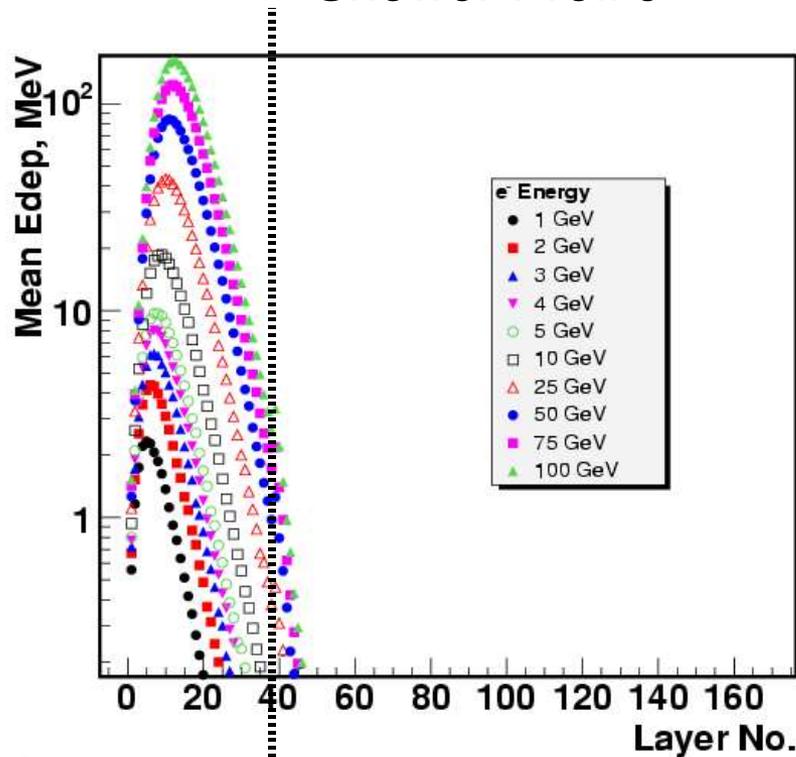
Performance of Jupiter

- With a standard configuration,
 - ◆ ~9000sec to generate 100 ZH events at 350 GeV
 - ◆ Memory size: 60~100 MBytes
 - ◆ Output data size exceeds 2G Bytes at ~0.5K events
 - Need to reduce output data size or JSF update to support multiple-file output
 - Without output, run more than 5000 events
- Problems/To do for future improvements
 - ◆ It takes ~ 3 min for the geometry initialization. Increase significantly when we use smaller segmentation. The reason of long CPU time is under investigation.
 - ◆ The standard cut value for the range in Calorimeter is 1mm. It has to be $O(1) \mu\text{m}$ to get reasonable ECAL resolution of ~15%.
 - ◆ Geometries yet to be installed:
 - Muon, Forward trackers
 - Improvements of the geometries already implemented. -> Use XML interface

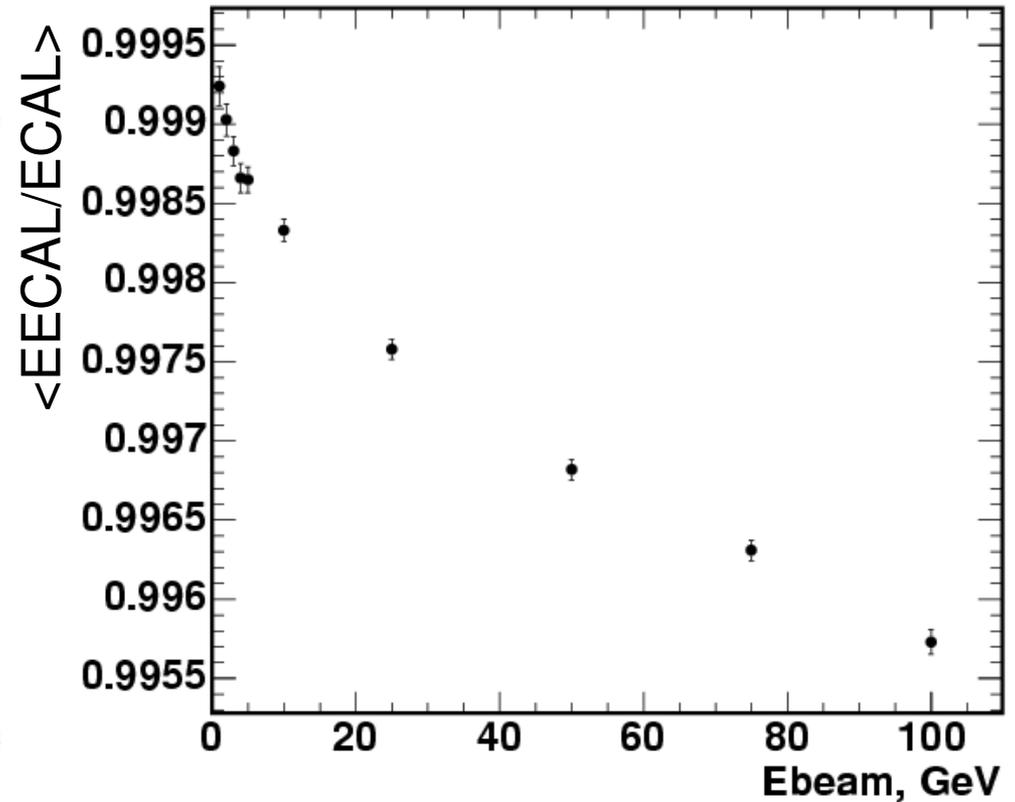
Electron Shower Containment in EMCAL

Energy Deposit Fraction in EMCAL

Shower Profile



ECAL Layers HCAL Layers



EM shower due to electron is well contained in EMCAL for 99% of events.



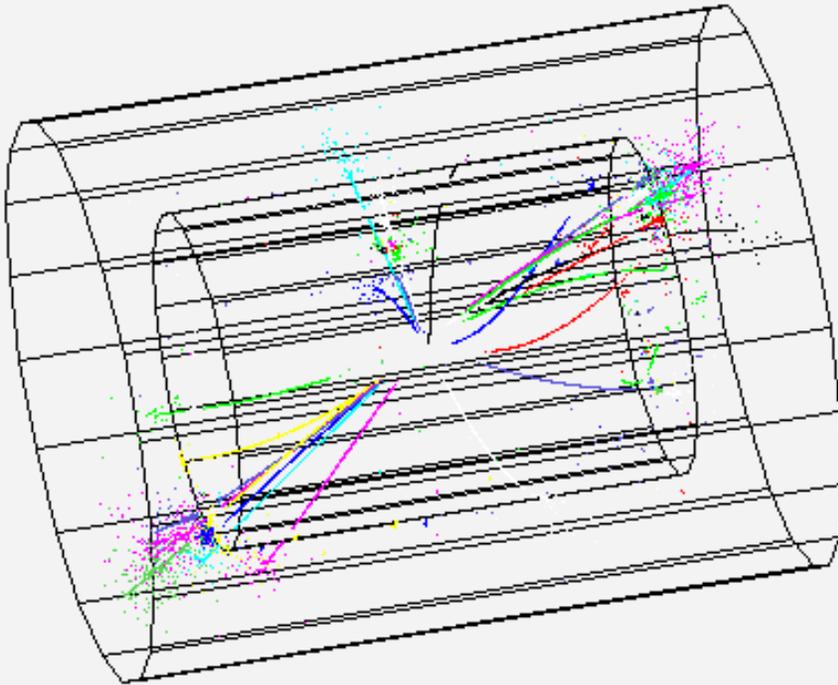
Status of Metis

- Current aim is to prepare a minimum set of Metis modules for studies of Particle Flow Algorithm.
- Novice users will be able to do physics analysis using information of PFO classes.
- As a first step, a cheated track finder and a cluster maker, etc are in preparation in order to know ultimate performance.
- Each module is independent, thus shall be easy to implement different reconstruction algorithm according to interests



Cheated PFO analysis

ZH event at $E_{cm}=500$ GeV



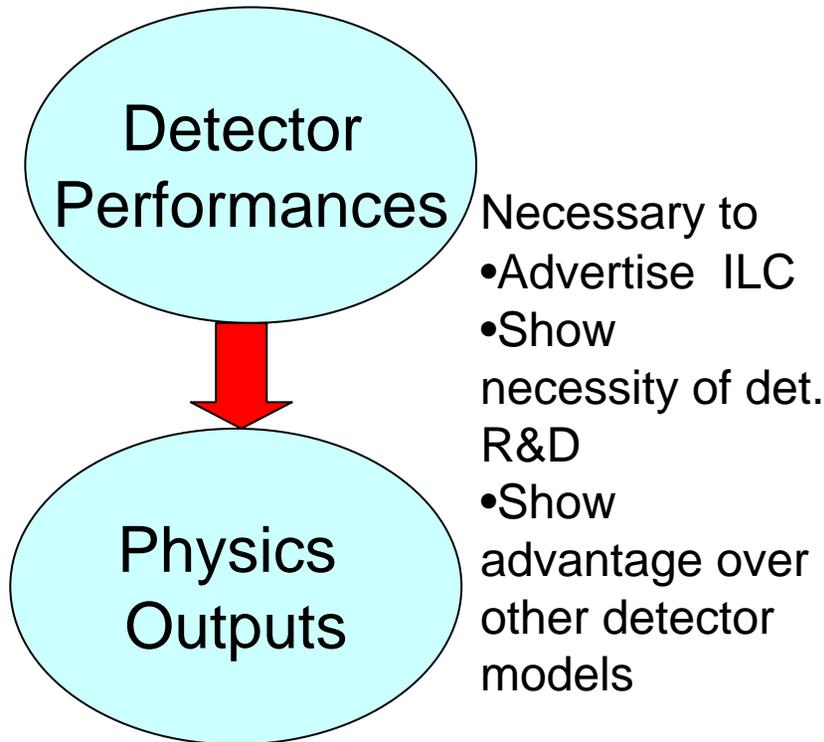
By K.Fujii(KEK), S.Yamamoto(GUAS),
A.Yamaguchi(Tsukuba)

- Exact hit points of TPC and CAL are displayed.
- Hits belong to the same PFO are shown with the same color
- A framework of event display in JSF is used.

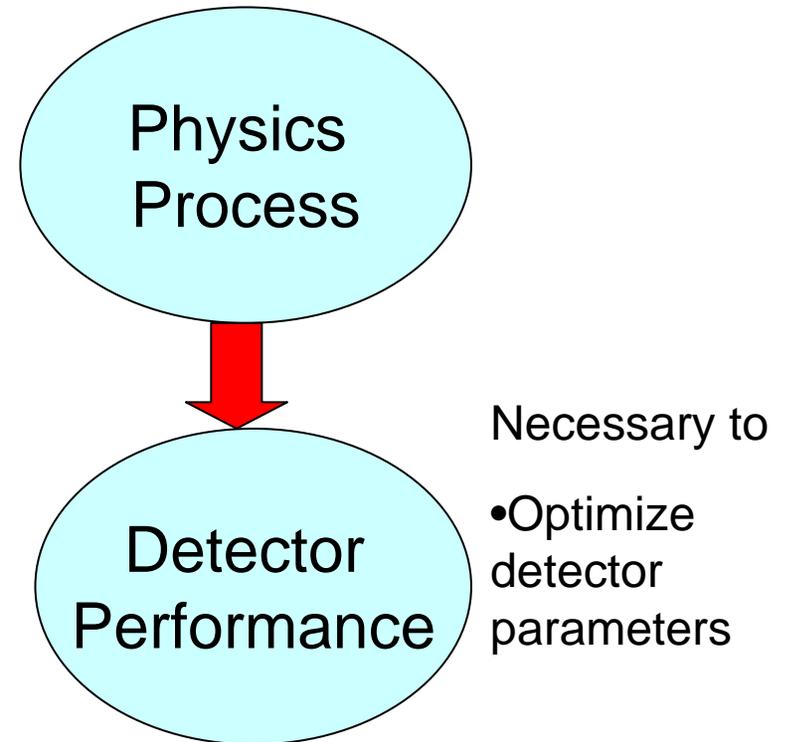


Two aspects of “Benchmark”

- Physics benchmark



- Detector benchmark



Many detector performances can be determined only when the physics process is specified

Guideline of selection of detector benchmark process



- Select minimum set of candidate physics processes without duplication of final-state topology (event shape) for the detector benchmark:
 - Topology means “two light quark jets”, “two tau jets with missing E”, etc.
 - Select processes which give measure of detector performance more directly and less analysis-dependently
- Make a matrix “Detector performance”– “Physics process”
- Study on the matrix elements relevant to each detector performance



Summary

- Processes needed for detector benchmark
 - $e^+e^- \rightarrow ZH$ ($M_H=120\text{GeV}$, $E_{\text{CM}}=500\text{GeV}$)
 - $e^+e^- \rightarrow \tau \tau$ ($E_{\text{CM}}=500\text{GeV}$, $\Delta m=10\text{GeV}$)
 - $e^+e^- \rightarrow \tau \tau, qq, cc, bb$ ($E_{\text{CM}}=50 - 500\text{GeV}$)