LumiCal objectives for simulation study

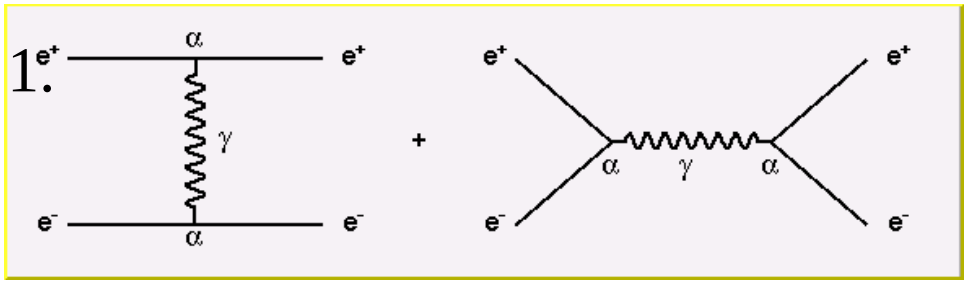
2017.11.24
Suen Hou
IPAS

LumiCal detection

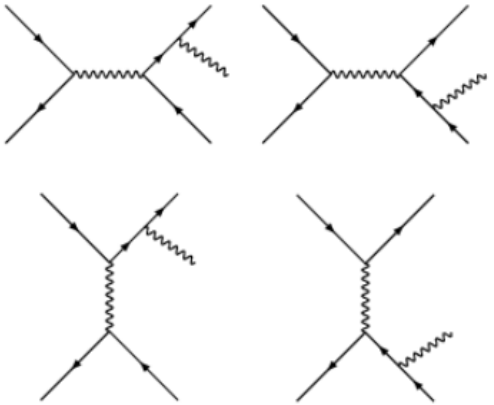
Detection objects by a LumiCal on one side of IP: $e^{\pm}$, γ

1. Bhabha scattered electrons $e^{\pm}$ of E_{beam}
2. Bhabha electron + final state radiation $e^{\pm}$ + γ, combined = E_{beam}
3. Two photo, single tagged $e^{\pm}$, of less than E_{beam} + central tracking/Ecal
4. WW run, radiative Z production ee → Zγ

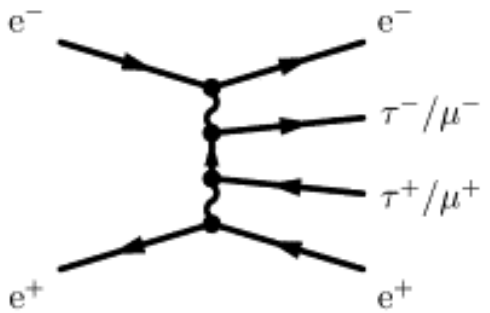
1.



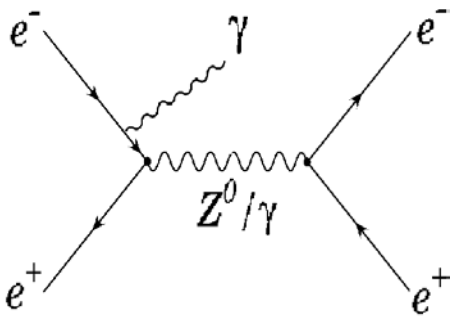
2.



3.



4.



LumiCal as a Si-W

Detector assembly:

first layer: high resolution tracking for electron hit r, φ position

energy resolution: Si-wafer detector charged particles only
each is a MIP of Landau ionization charge
EM shower = # of charged particles.

$e^{\pm}$, γ Identification:

photon has no signal on Si-wafer

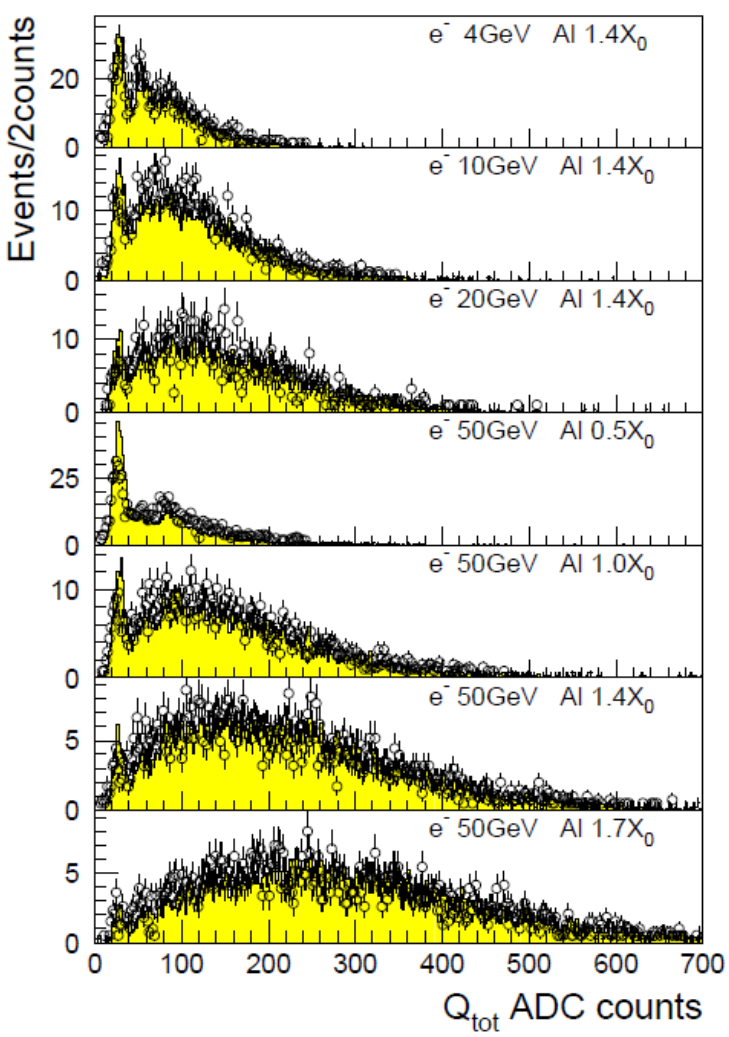
photon fragmentation after ~1 X_0

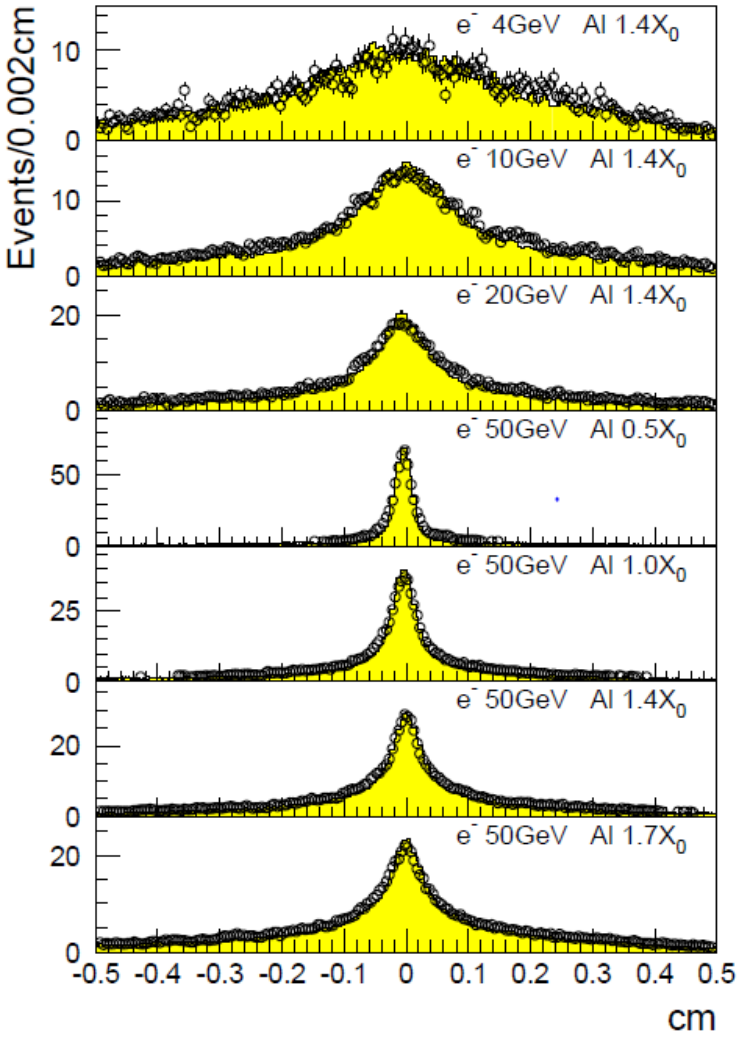
photon ID: EM shower with no 1st layer hits

photon spatial resolution: Calo segmentation

LumiCal lateral shower distribution

Lateral shower distribution behind a *1.4 X_0 Al* absorber
Data vs MC (histogram)





LumiCal Calo segmentaion

Calo segmentation:

- detection of photon, to be separated from electron
- radiation electron, shower size of diameter ~1 cm
  to distinguish overlap, Calo segmentation shall be <1 cm