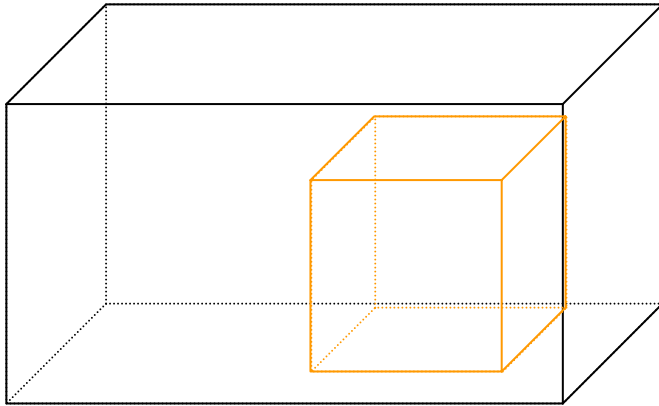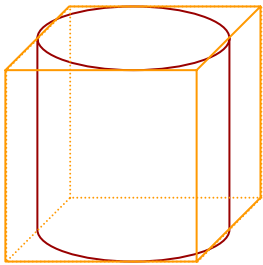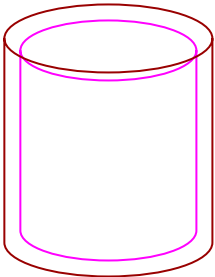# Geant4 HEC Volumes in the Testbeam
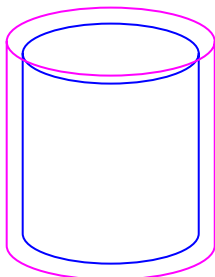## (LArG4TB stand-alone)
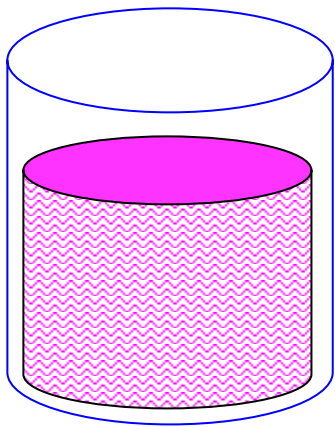

World
Cryostat
Mother Vol.
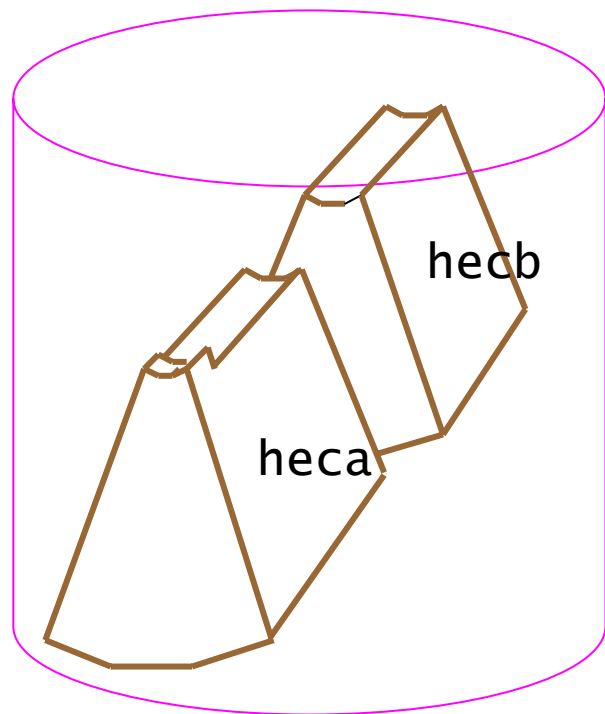

Cryostat
Mother Vol.
Cryo. Warm Wall

Cryo. Warm Wall
Cryo. Vacuum

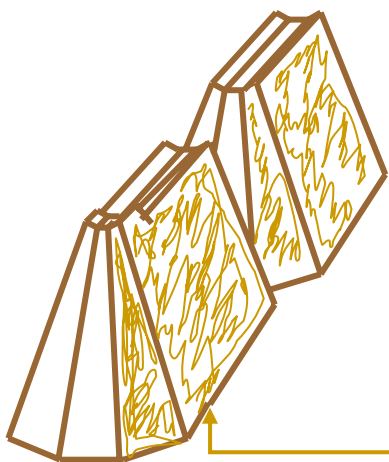Cryo. Vacuum
Cryo. Cold Wall

Cryo. Cold Wall
LAr = "Leak.Det"

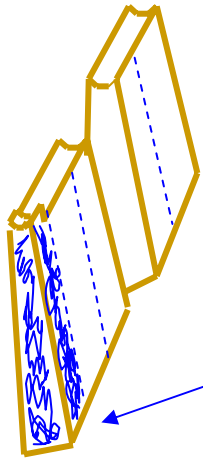LAr = "Leak.Det"
HEC wheel segments

hecb

heca

G4UnionSolid:
(heca & hecb) = hecm

Module inside each wheel segment:

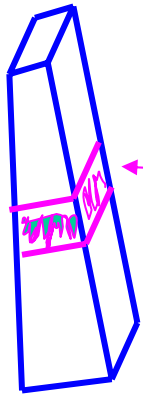hens

(hlar)=1/2φ section of hens

Depth within module:

hemo

Eta section within one depth:
heta   (hine)
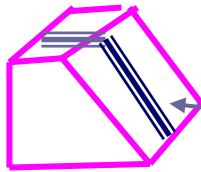
1 plate-gap structure within one eta section:
(hzdv)
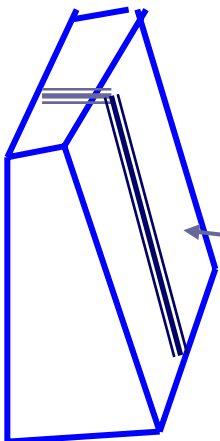
1 sensitive gap in a depth:
(hlar)
(Contains: hkpt,hcop)

Each gap contains:

- Cu shower plate (hshp)
- LAr gap (hlar)

    Each LAr gap contains :
    - Cu PAD boards (hcop)
    - Kapton (hkpt)

A particle entering the HEC sees:

```
hfpl   (front Cu plate)
hlar   (lar)
hkpt   (kapton)
hlar   (lar)
hkpt   (kapton)
hcop   (copper)
hkpt   (kapton)
hlar   (lar)
hkpt   (kapton)
hlar   (lar)
hshp   (Cu shower plate)
```

Each Hit in LAr is identified by:
(hlar, hzdv, heta, hemo, hens)

Each Hit in Cu is identified by:
(-1, hzdv, -1, hemo, hens)

Each Hit in Cu Fr.Pl. is identified by:
(-1, 8, -1, hemo, hens)

For each Hit record:
deposited energy
position(x,y,x)

n.b.
Hits in kapton/ROB boards do not
seem to get recorded. But in the
Athena version that seems fixed…

In order to separate Hadronic energy
from em. Energy on a cell-by cell basis,
have to make the eta and phi information
available for the Cu plates.
At the moment, the energy in the plates
Is just stored for the plate number.

Then the two energies (Cu/LAr)
can be written into separate Ntuple
entries.

But: It would be best to move to Athena
first, because different methods
are invoked there, and it looks like
The eta and phi information is more
readily available.
Geometry concept and philosophy are
also a bit different, but easier to
understand and include more things
(tie-rods)