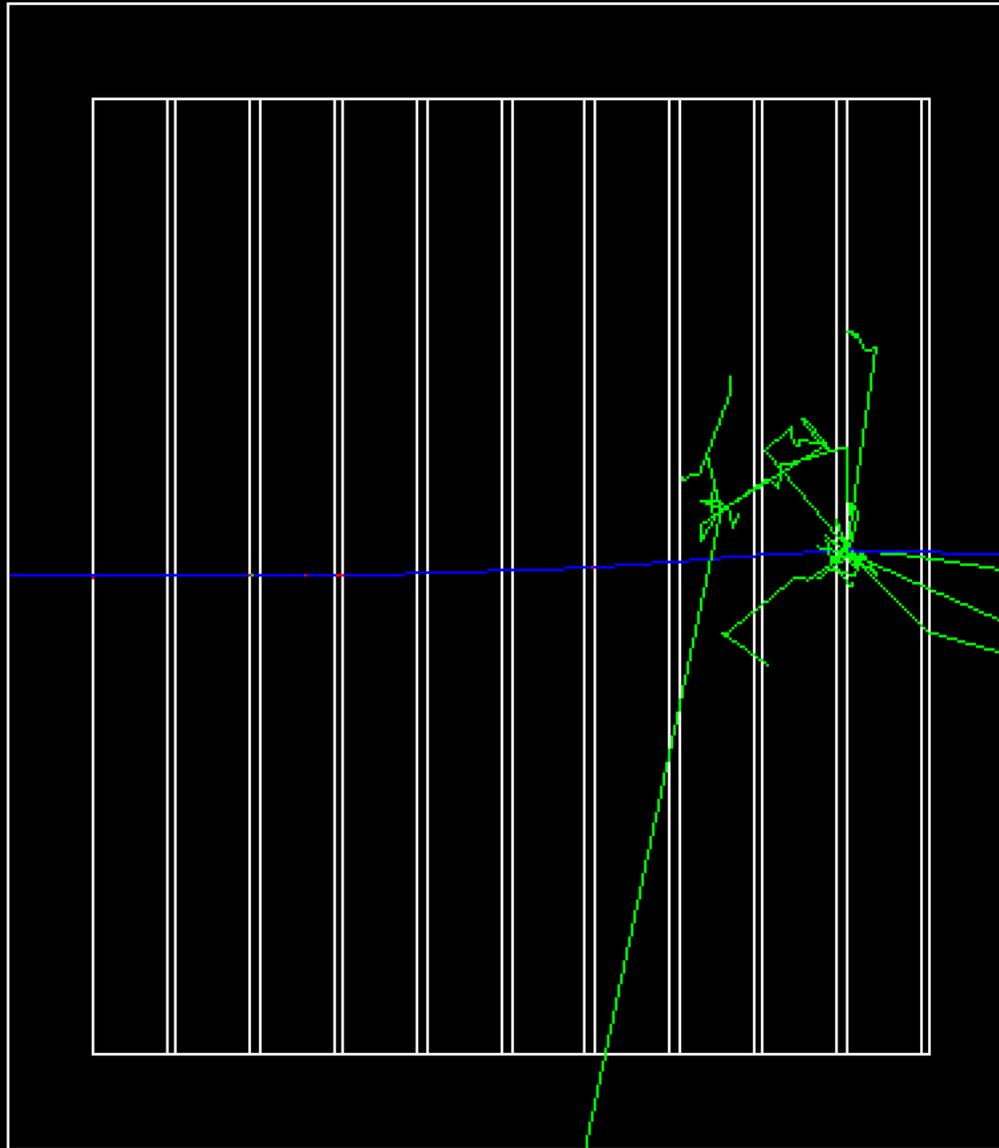


Hadr05 : longitudinal sampling calorimeter

- It is the hadronic equivalent of TestEm3. It demonstrates
 - how to collect energy deposition
 - how to survey energy flow
- Basic features. Should have been present since a long time ...
- **Geometry** as **generic** as possible (same as TestEm3)
- Physics via **Physics Constructors**
- G4particleGun
- Scoring via user hooks (eg. **UserAction classes**) and histograms
- Interactivity and visualization

```
## Macro file for "Hadr05.cc : Copper-liquidArgon 50 layers
#
/control/verbose 1
/run/verbose 1
/process/em/verbose 0
/process/had/verbose 0
#
/testhadr/det/setNbOfLayers 50
/testhadr/det/setNbOfAbsor 2
/testhadr/det/setAbsor 1 Copper 31 mm
/testhadr/det/setAbsor 2 liquidArgon 4 mm
/testhadr/det/setSizeYZ 1.5 m
#
/run/initialize
#
/testhadr/gun/setDefault
/gun/particle proton
/gun/energy 5 GeV
#
/analysis/setFileName Cu-IAr
/analysis/h1/set 1 100 3. 5. GeV #edep in absor1
/analysis/h1/set 2 100 0. 500. MeV #edep in absor2
/analysis/h1/set 11 52 0. 52. none #long. profile in absor1
/analysis/h1/set 12 52 0. 52. none #long. profile in absor2
/analysis/h1/set 21 102 0. 102. none #energy flow
#
/run/printProgress 100
/run/beamOn 1000
```

Proton (1 GeV)
In Cu-IAr



-----> The calorimeter is 50 layers of:

Copper: 3.1 cm ---> sum = 1.55 m = 108 Radl = 9.944 NuclearInteractionLength
liquidArgon: 4 mm ---> sum = 20 cm = 1.428 Radl = 0.2334 NuclearInteractionLength
total thickness = 1.75 m = 109.4 Radl = 10.18 NuclearInteractionLength
transverse sizeYZ = 1.5 m

Run Summary ---> The run is 1000 proton of 5 GeV through calorimeter

Process calls frequency :

Decay=	5221	Radioactivation=	4220183	Rayl=	217355
Transportation=	5579758	annihil=	76920	compt=	2651326
conv=	62997	dInelastic=	63	eBrem=	455629
eloni=	6352756	hBertiniCaptureAtRest=	840	hloni=	827460
hadElastic=	3897307	ionloni=	4191922	kaon+Inelastic=	3
kaon0LInelastic=	10	kaon0SInelastic=	3	lambdaInelastic=	8
msc=	397230	muloni=	10468	muMinusCaptureAtRest=	11
nCapture=	31886	neutronInelastic=	81713	phot=	932748
pi+Inelastic=	1048	pi-Inelastic=	1018	protonInelastic=	3908
sigma+Inelastic=	1	tInelastic=	11		

	material	Edep	rmsE	sqrt(E0(GeV))*rmsE/Edep	total tracklen
1	Copper	4.178 GeV	271.2 MeV	14.51 +- 0.459 %	2.06 m +- 42.8 cm
2	liquidArgon	84.903 MeV	30.78 MeV	81.08 +- 2.56 %	25.78 cm +- 7.59 cm

total Edep = 4.263 GeV

leakage : primary = 0 eV +- 0 eV secondaries = 269.7 MeV +- 0 eV ---> total = 269.7 MeV

total energy released : edep + leak = 4.533 GeV