Hadronic Contamination @70 GeV e+

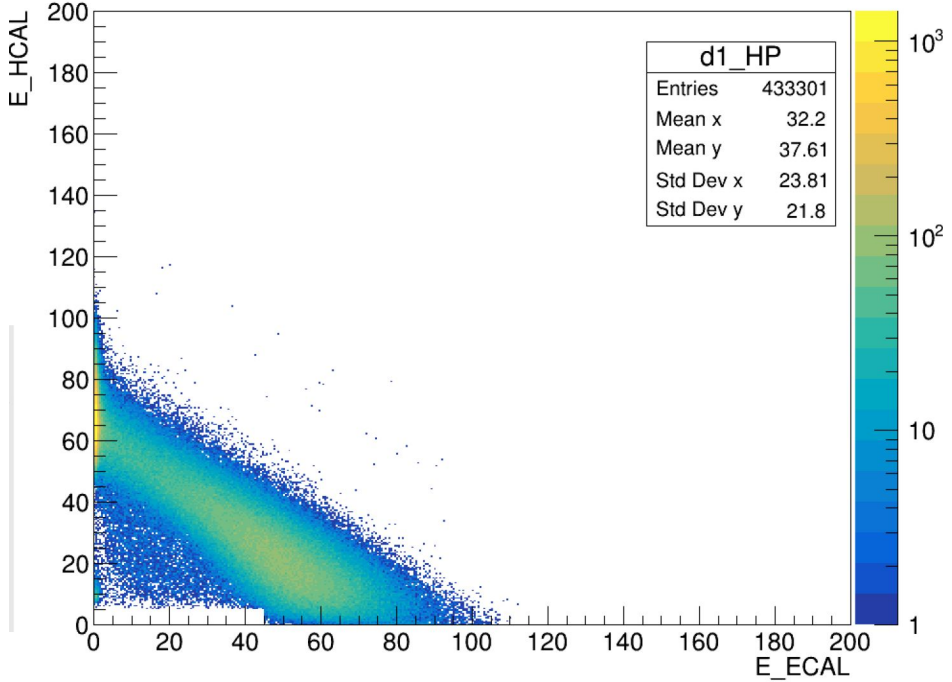
Acquired data, positive charge configuration

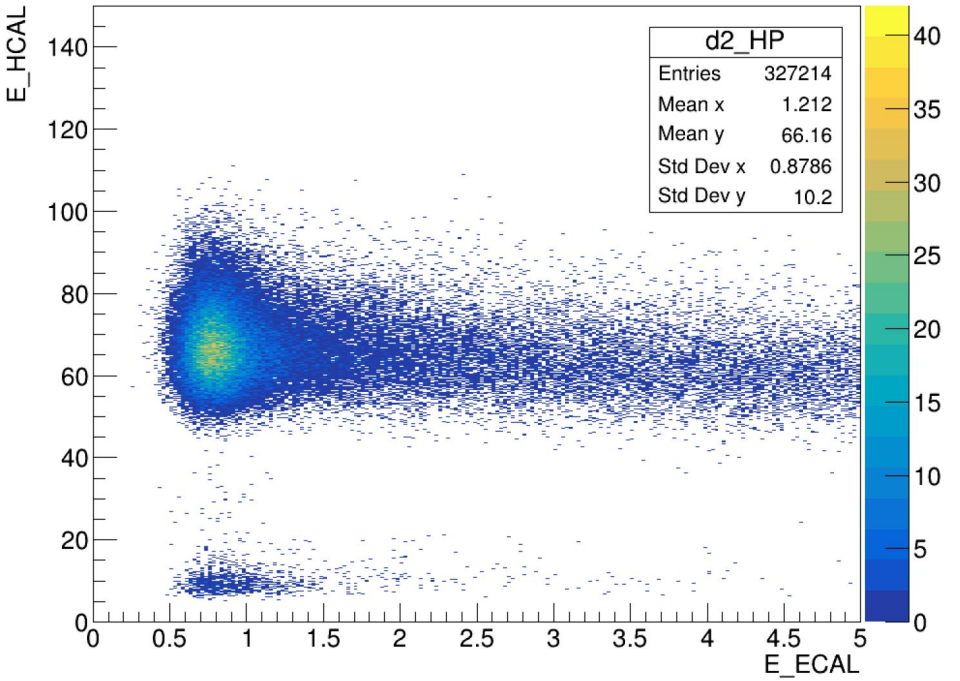
- 70 GeV e^+ beam-only trigger data
  - 27 runs (including 3 calibration runs)
  - 4.1 x 10^6 selected events
- 70 GeV h^+ beam
  - 1 calibration run
  - 3.3 x 10^5 selected events

```
.Filter("triggerSources==2");
.Filter(filterTriggerTime, { "masterT" });
.Filter(filterTrackQuality, { "mom_genfit_upMM", "pvalue_genfit_upMM" })
.Filter("abs(mom_genfit_upMM-70)<5")
.Filter("abs(inangle_genfit_upMM)<3.")
.Filter(filterStrawMult, { "mpStraw3X", "mpStraw3Y" })
.Filter("Sum(VHCAL_ene) < 1.5")
.Filter(filterStrawMult, { "mpStraw4X", "mpStraw4Y" })
.Filter(filterECALcenter, { "ECAL_eneT" })
```

h^+ calibration run (9572)

- Impinging hadrons (π^+,p) or μ^+
- e^+ are totally absent

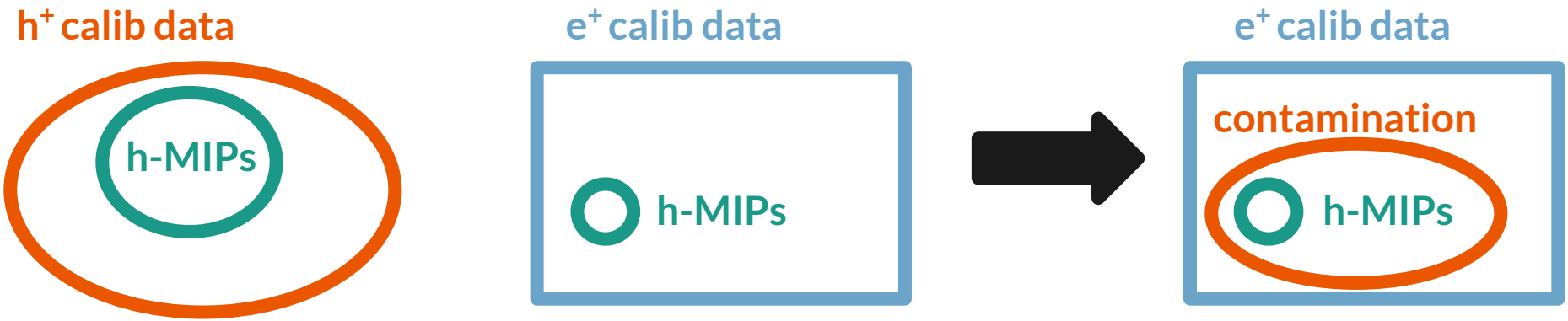




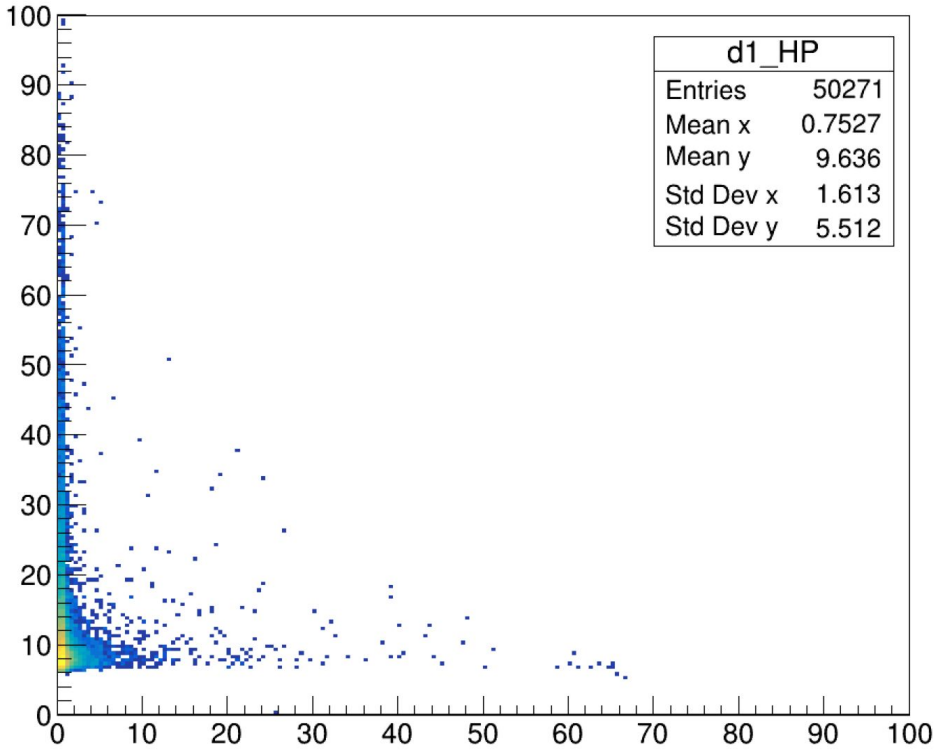
Hadronic MIP-like events selection

```
//Define columns
d0_runh = d0_runh.Define("ECAL_eneT",     EcalEneInTime,  { "ECAL_ene", "ECAL_t0", "ECAL_tE", "ECAL_tSigma" });
d0_runh = d0_runh.Define("HCAL_eneT",     HcalEneInTime,  { "HCAL_ene", "HCAL_t0", "HCAL_tE", "HCAL_tSigma" });
d0_runh = d0_runh.Define("eecal_T", "Sum(ECAL_eneT)");
d0_runh = d0_runh.Define("eecal_inn_T", "ECAL_eneT[14]+ECAL_eneT[44]");
d0_runh = d0_runh.Define("eecal_out_T", "eecal_T-eecal_inn_T");
d0_runh = d0_runh.Define("ehcal012_T", "Sum(Take(HCAL_eneT,27))"); //take first 9+9+9 energies: HC0, HC1, HC2
```

- 0.2 < E_inn < {1.5,2.0,2.5}
- E_out < {0.5,1.0,1.5}
- E_HCAL > {30.0,40.0,50.0}



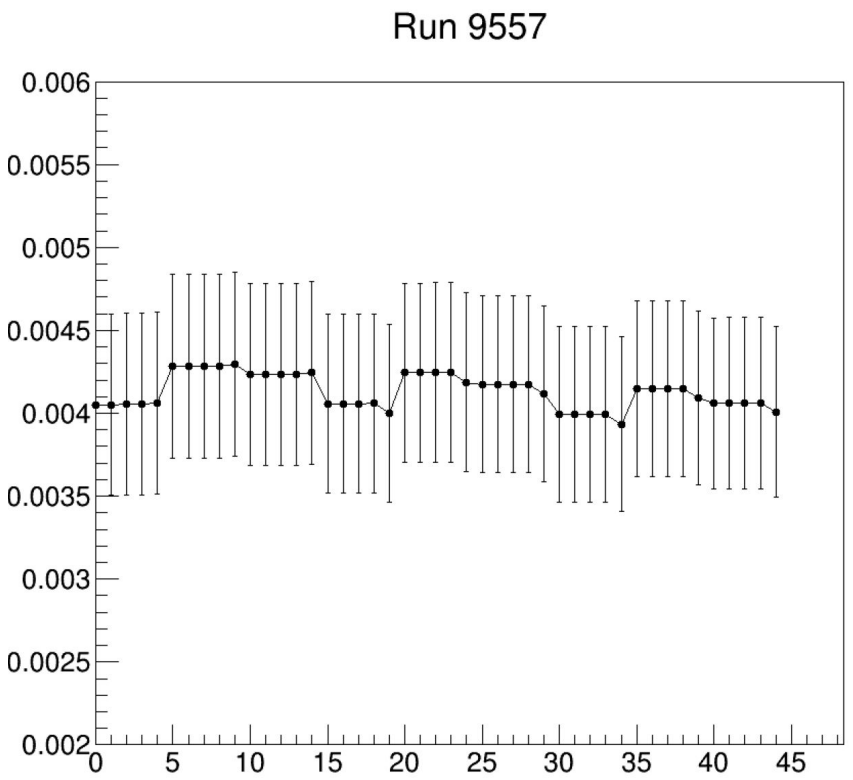
μ^+ events subtraction



- ~50k MC events
- Same data selection
- f(μ_MIP) = 0.972±0.008 (sys)
- f(h_MIP) = 0.008±0.003 (sys)
- corrections on data

Systematic study

```
Hadronic MIP cuts:  E_inn< 2 GeV -- E_out< 1 GeV -- E_hacal >45 GeV
----- HADRON RUN -----
All events: 327214
MIP-like  events: 80385
MIP-like +  h-like events: 79214
MIP-like + mu-like events: 1171
All    mu events: 1208.51 +/- 9.50286
Mis-ID mu events: 9.90761 +/- 3.83474
N nume events: 79204.1 +/- 3.83474
N deno events: 326005 +/- 9.50286
Fraction: 0.242953 +/- 0.000751122 +/- 3.76895e-05
----- POSITRON RUN -----
All events: 60360
MIP-like  events: 63
MIP-like +  h-like events: 62
MIP-like + mu-like events: 1
All    mu events: 1.03203 +/- 0.00811517
Mis-ID mu events: 0.00846081 +/- 0.00327476
N nume events: 61.9915 +/- 0.00327476
N deno events: 60359 +/- 0.00811517
Fraction: 0.00102705 +/- 0.000130377 +/- 1.08786e-07
----- COMPARISON -----
Hadronic Contamination RUN 9557: 0.00424529 +/- 0.000541361
```



- Statistical errors dominate the uncertainty

All Runs && Full statistics

h/e = 0.00457 ±5e-05 (sys) ± 7e-05 (stat)