Status report on

DNNROI sigproc

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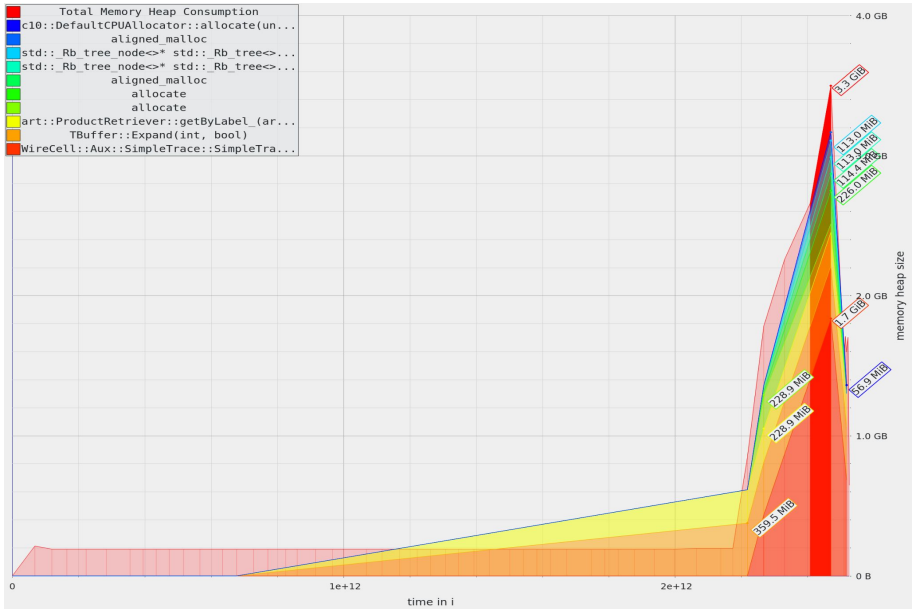
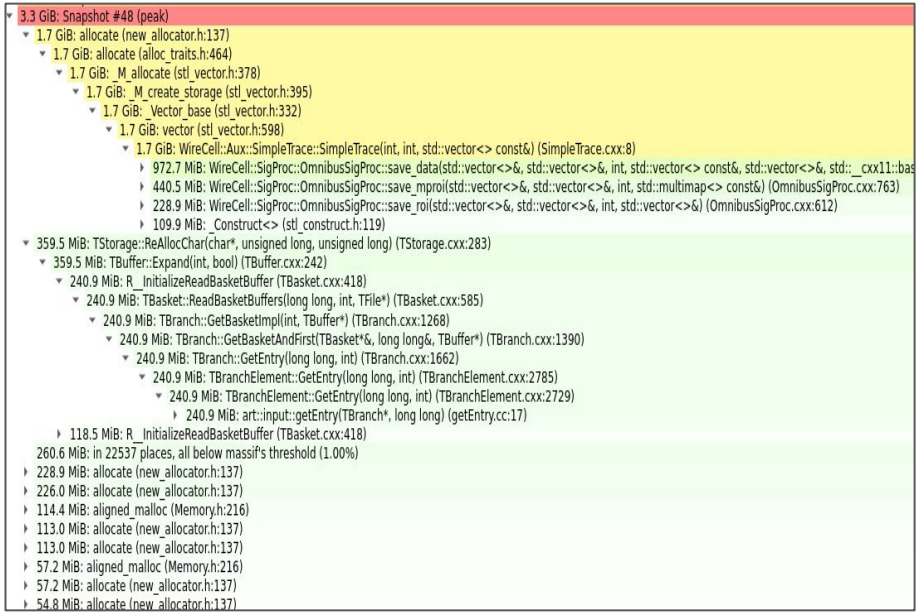
Memory Profiling - Valgrind

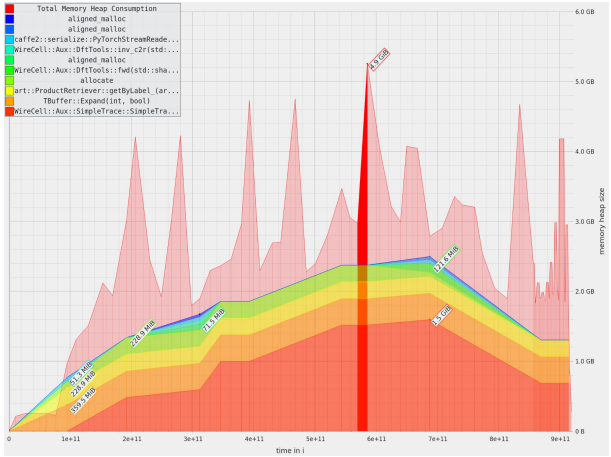




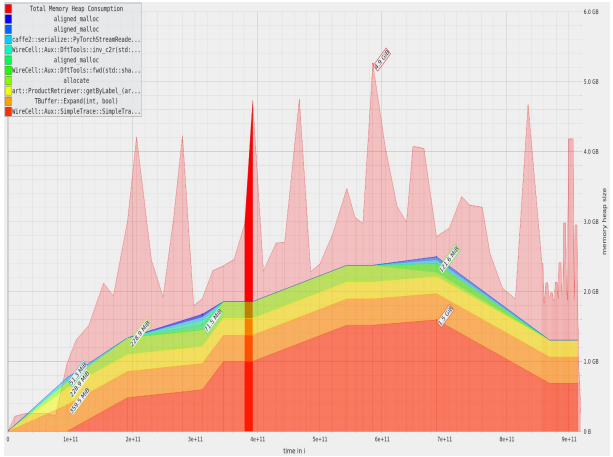
- PD-HD data, DNN SP with MobileNetV2
- The peak memory recorded is 3.3 GiB
- Almost half of the memory (~1.7 GiB) is due to:
  - WireCell::SigProc::OmnibusSigProc::save_data (972 MiB out of 1.7 GiB)
  - WireCell::SigProc::OmnibusSigProc::save_mproi (440 MiB out of 1.7 GiB)

do_not_mp_protect_tradtional is set to true

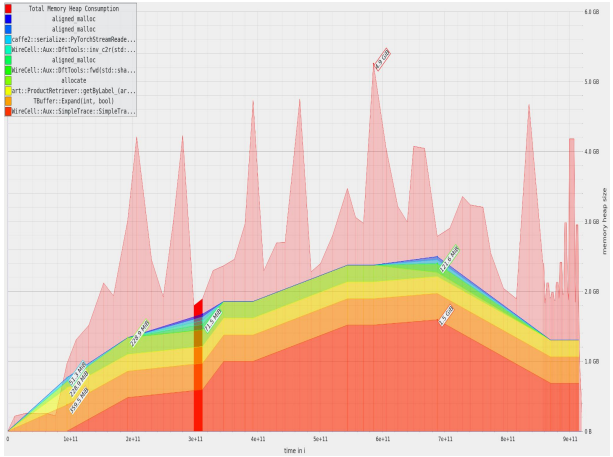
Memory Profiling - Valgrind



❏ 1st peak



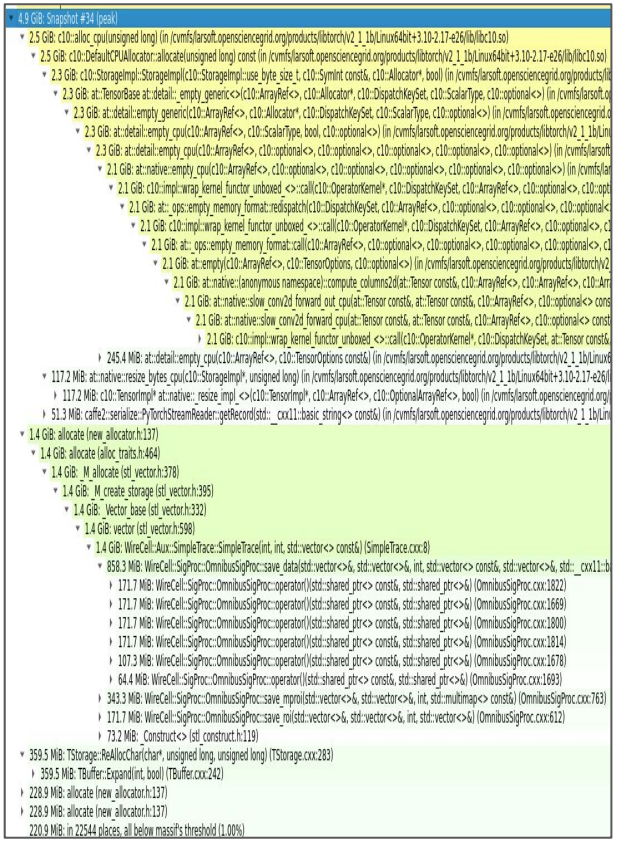
❏ 2nd peak

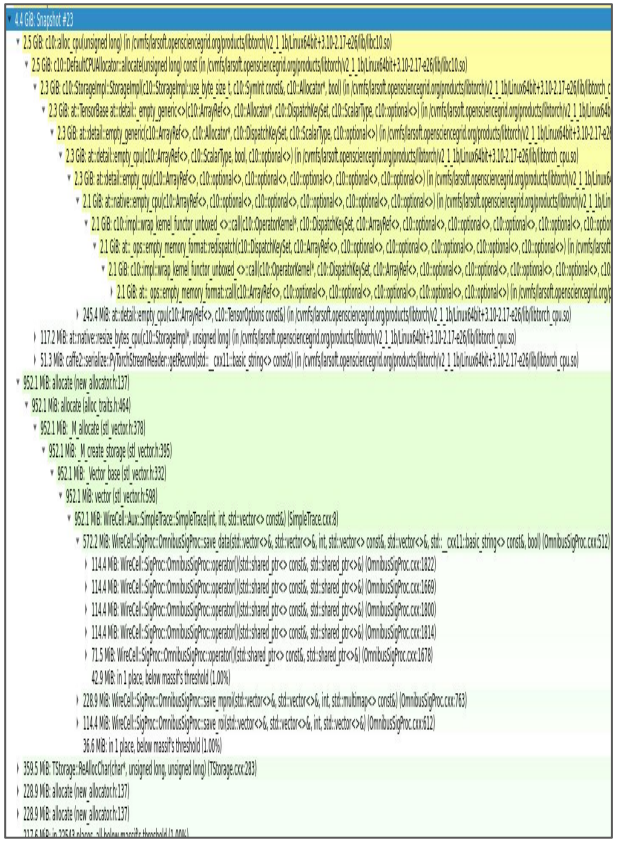


❏ low torch activity

- PD-HD data, DNN SP with UNet
- The peak memory recorded is 4.9 GiB
- Not like a MobileNet result, the total cost graph has several peaks
- Almost half of the memory (~2.5 GiB) is allocated to libtorch_cpu.so around the peak
- Another major contributions are from:
  - WireCell::SigProc::OmnibusSigProc::save_data (853 MiB out of 1.4 GiB)
  - WireCell::SigProc::OmnibusSigProc::save_mproi (343 MiB out of 1.4 GiB)

Memory Profiling - Valgrind





- ❏ 1st peak
- ❏ 2nd peak
- ❏ low torch activity

Writing LArSoft Module

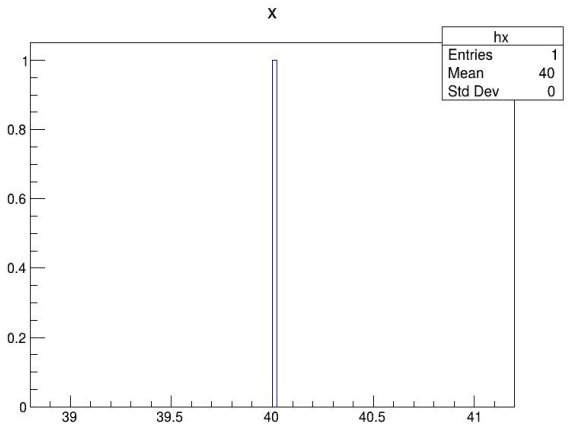
```
113  // Geometry & services
114  auto const* geom        = lar::providerFrom<geo::Geometry>();
115  auto const* wireReadout = &art::ServiceHandle<geo::WireReadout>()->Get();
116  auto const& dprop       = art::ServiceHandle<detinfo::DetectorPropertiesService>()->DataFor(e);
117
118  // Convert to geo::Point_t for TPC lookup
119  geo::Point_t mcpos(fX, fY, fZ);
120
121  // Determine TPC containing position
122  geo::TPCID tpcid = geom->FindTPCAtPosition(mcpos);
123  if (!tpcid) {
124    mf::LogWarning("ShowerAna") << "MC position outside any TPC: ("
125                                << fX << "," << fY << "," << fZ << ")";
126    return;
127  }
128
129  fTPCID = tpcid.TPC;
130
131  // Map X to tick and position to wire channel for planes 0, 1, 2
132  for (unsigned int plane = 0; plane < 3; ++plane) {
133    geo::PlaneID pid(tpcid, plane);
134    float tick = dprop.ConvertXToTicks(fX, pid.Plane, pid.TPC, pid.Cryostat);
135    int channel = std::lround(wireReadout->Plane(pid).WireCoordinate(mcpos));
136
137
138    if (plane == 0) { fTick0 = tick; fChannel0 = channel; }
139    if (plane == 1) { fTick1 = tick; fChannel1 = channel; }
140    if (plane == 2) { fTick2 = tick; fChannel2 = channel; }
141  }
142
143
144  // Fill tree
145  fTree->Fill();
```

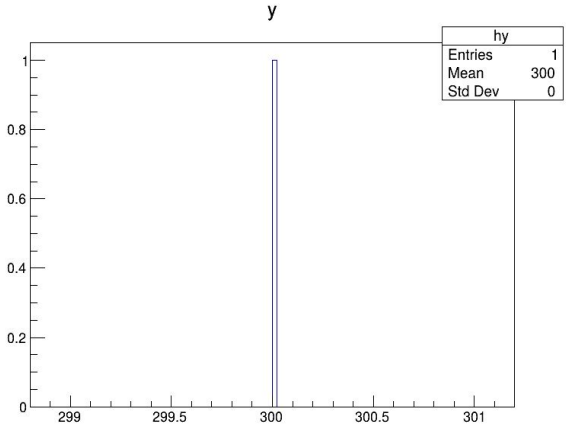
- Succeed to get x, y, z positions of primary electron generated from particle gun
- Currently under updates to include momentum, direction, TPC id, PDG id

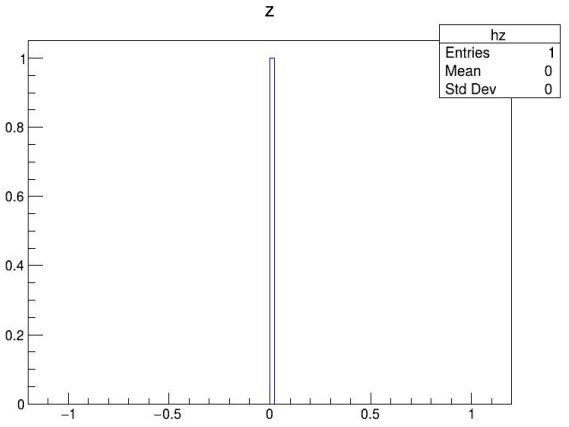
Can access under my local larsoft development environment

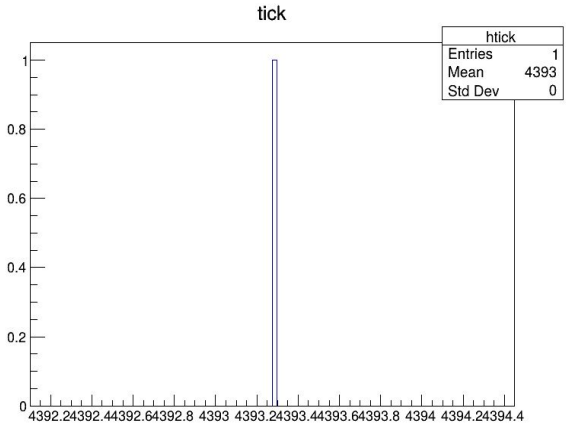
```
Apptainer> lar --print-available-modules | grep ShowerAna
402. ShowerAna                          analyzer      /exp/dune/app/users/hnam/2024tutorial/srcs/protoduneana/protoduneana/TutorialExamples/ShowerAna_module.cc
```

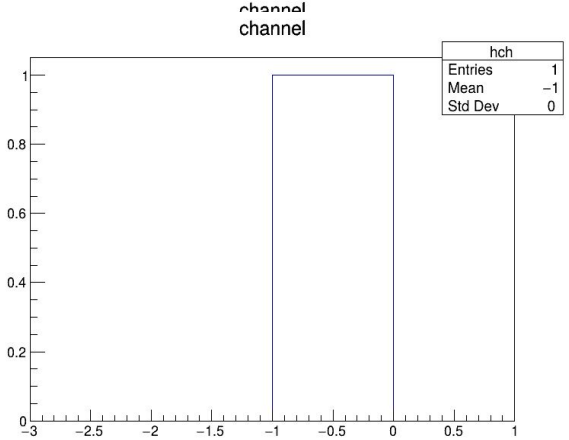
Truth Info. from MCParticle












```
# This block defines starting parameters
physics.producers.generator.PosDist: 0
physics.producers.generator.X0: [40.]
physics.producers.generator.Y0: [300.]
physics.producers.generator.Z0: [0.0]
```

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