PDVD img debug

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imaging crushing issue

```
[21:32:11.342] D [  img   ] <GridTiling:tiling-anode5-face0> anode=5 face=0 slice=1621, time=3.242 ms no activity
[21:32:11.342] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-entry call=1621] VmSize=2818264 kB, VmRSS=1358096 kB, VmHWM=1620520 kB
[21:32:11.342] D [  img   ] <GridTiling:tiling-anode5-face1> anode=5 face=1 slice=1622, time=3.244 ms no activity
[21:32:11.342] D [  img   ] <GridTiling:tiling-anode5-face0> anode=5 face=0 slice=1622, time=3.244 ms no activity
[21:32:11.342] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-entry call=1622] VmSize=2818264 kB, VmRSS=1358096 kB, VmHWM=1620520 kB
[21:32:11.342] D [  img   ] <GridTiling:tiling-anode5-face1> anode=5 face=1 slice=1623, time=3.246 ms no activity
[21:32:11.342] D [  img   ] <GridTiling:tiling-anode5-face0> anode=5 face=0 slice=1623, time=3.246 ms no activity
[21:32:11.343] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-entry call=1623] VmSize=2818264 kB, VmRSS=1358096 kB, VmHWM=1620520 kB
[21:32:11.343] D [  img   ] <GridTiling:tiling-anode5-face1> anode=5 face=1 slice=1624, time=3.248 ms no activity
[21:32:11.343] D [  img   ] <GridTiling:tiling-anode5-face0> anode=5 face=0 slice=1624, time=3.248 ms no activity
[21:32:11.343] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-entry call=1624] VmSize=2818264 kB, VmRSS=1358096 kB, VmHWM=1620520 kB
[21:32:11.343] D [  glue  ] <FrameFanout:sn_mag_fout_0_0> call=1: see EOS
[21:32:11.343] D [  glue  ] <FrameFanout:sn_mag_fout_1_0> call=1: see EOS
[21:32:11.343] D [  glue  ] <ChannelSelector:chsel5> see EOS at call=0
[21:32:11.343] D [sigproc ] <OmnibusNoiseFilter:nf5> EOS at call=1
[21:32:11.343] D [sigproc ] <OmnibusSigProc:anode5sigproc5> EOS at call=1 anode=5
[21:32:11.343] D [  img   ] <CMMModifier:cmm-mod-anode5> see EOS at call=1
[21:32:11.343] D [  img   ] <FrameMasking:frame-masking-anode5> see EOS
[21:32:11.343] D [  img   ] <ChargeErrorFrameEstimator:cefe-anode5> see EOS
[21:32:11.343] D [  img   ] <MaskSlice:slicing-anode5> EOS
[21:32:11.343] D [  glue  ] <SliceFanout:slicefanout-anode5> sending out 2 EOSes
no slice
[21:32:11.343] D [  img   ] <GridTiling:tiling-anode5-face1> EOS
no slice
[21:32:11.343] D [  img   ] <GridTiling:tiling-anode5-face0> EOS
[21:32:11.343] D [  glue  ] <BlobSetSync:blobsetsync-anode5> EOS
[21:32:11.343] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-entry call=1625] VmSize=2818264 kB, VmRSS=1358100 kB, VmHWM=1620520 kB
[21:32:11.343] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [flush-begin call=1625] VmSize=2818264 kB, VmRSS=1358100 kB, VmHWM=1620520 kB
[21:32:11.346] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [flush-loop bscount=50/1625 nblobs=2 V=428 E=1162] VmSize=2818264 kB, VmRSS=1358156 kB, VmHWM=1620520 kB
[21:32:11.348] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [flush-loop bscount=100/1625 nblobs=2 V=806 E=2209] VmSize=2818264 kB, VmRSS=1358156 kB, VmHWM=1620520 kB
[21:32:11.350] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [flush-loop bscount=150/1625 nblobs=1 V=1166 E=3191] VmSize=2818264 kB, VmRSS=1358156 kB, VmHWM=1620520 kB
[21:32:11.351] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [flush-loop bscount=200/1625 nblobs=1 V=1438 E=3791] VmSize=2818264 kB, VmRSS=1358156 kB, VmHWM=1620520 kB
./processdata_loop_img_2.sh: line 54:  3714 Killed                  lar -n 1 --nskip 1 -c standard_reco_pdvdimg_offline.fcl $filename
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ free -m
               total        used        free      shared  buff/cache   available
Mem:           31564         522       30308           3         733       30603
Swap:           4095         333        3762
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ ulimit -a
core file size          (blocks, -c) unlimited
data seg size           (kbytes, -d) unlimited
scheduling priority             (-e) 0
file size               (blocks, -f) unlimited
pending signals                 (-i) 125997
max locked memory       (kbytes, -l) 8192
max memory size         (kbytes, -m) unlimited
open files                      (-n) 1024
pipe size            (512 bytes, -p) 8
POSIX message queues     (bytes, -q) 819200
real-time priority              (-r) 0
stack size              (kbytes, -s) 8192
cpu time               (seconds, -t) unlimited
max user processes              (-u) 125997
virtual memory          (kbytes, -v) unlimited
file locks                      (-x) unlimited
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ cat /proc/self/cgroup 2>/dev/null || echo "no cgroup"
0::/user.slice/user-12918.slice/session-4373.scope
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ cat /proc/self/oom_score_adj
0
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ systemctl --user status 2>/dev/null | head -5
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ cat /sys/fs/cgroup/user.slice/user-$(id -u).slice/memory.max 2>/dev/null || cat /sys/fs/cgroup/memory/user.slice/user-$(id -u).s
lice/memory.limit_in_bytes 2>/dev/null || echo "no cgroup memory limit found"
max
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ dmesg | grep -i "killed process" | tail -10
[2007776.383408] Out of memory: Killed process 30975 (python) total-vm:13570536kB, anon-rss:9664864kB, file-rss:0kB, shmem-rss:0kB, UID:57766 pgtables:23276kB oom_score_adj:0
[2379910.060269] Out of memory: Killed process 1473411 (lar) total-vm:44167192kB, anon-rss:31480352kB, file-rss:512kB, shmem-rss:0kB, UID:12918 pgtables:71832kB oom_score_adj:0
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$
```

```
RC overlap: recursing to layer=3 newproj.size=203 nblobs=1
RC overlap: layer=3 strip=[446641312,0) tol=1 lbound=446641311 hbound=1 proj.size=203
RC overlap: layer=3 selected 0 blobs
RC associate: overlap returned 0 matches
[23:17:47.509] D [geom_clustering] geom_clustering EXIT associate pair=2 edges_this=1
[23:17:47.509] D [geom_clustering] MEM geom_clustering done pairs=2 edges_total=2 VmRSS=1356576 kB
[23:17:47.509] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [after-geom_clust bscount=228/1625 nblobs=1 V=1597 E=
[23:17:47.509] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [after-add_blobs bscount=229/1625 nblobs=1 V=1600 E=4
[23:17:47.509] D [geom_clustering] geom_clustering ENTER associate pair=1 rel_diff=1 nblobs1=2 nblobs2=1 tol=2
RC associate: one[0]: L0=[0,1) L1=[0,1) L2=[13,16) L3=[201,203) L4=[40,42)
RC associate: one[1]: L0=[266,267)
RC associate: two[0]: L0=[0,1) L1=[0,1) L2=[14,16) L3=[201,203) L4=[40,42)
RC associate: proj.size()=42
RC associate: calling overlap for blob 0/2
RC overlap: layer=4 strip=[40,42) tol=2 lbound=38 hbound=42 proj.size=42
RC overlap: layer=4 selected 1 blobs
RC overlap: recursing to layer=3 newproj.size=203 nblobs=1
RC overlap: layer=3 strip=[201,203) tol=2 lbound=199 hbound=203 proj.size=203
RC overlap: layer=3 selected 1 blobs
RC overlap: recursing to layer=2 newproj.size=16 nblobs=1
RC overlap: layer=2 strip=[13,16) tol=2 lbound=11 hbound=16 proj.size=16
RC overlap: layer=2 selected 1 blobs
RC associate: overlap returned 1 matches
RC associate: calling overlap for blob 1/2
RC overlap: layer=4 strip=[0,743) tol=2 lbound=0 hbound=42 proj.size=42
RC overlap: layer=4 selected 1 blobs
RC overlap: recursing to layer=3 newproj.size=203 nblobs=1
RC overlap: layer=3 strip=[421585216,0) tol=2 lbound=421585214 hbound=2 proj.size=203
RC overlap: layer=3 selected 0 blobs
RC associate: overlap returned 0 matches
[23:17:47.509] D [geom_clustering] geom_clustering EXIT associate pair=1 edges_this=1
[23:17:47.509] D [geom_clustering] geom_clustering ENTER associate pair=2 rel_diff=2 nblobs1=1 nblobs2=1 tol=1
RC associate: one[0]: L0=[0,1) L1=[0,1) L2=[13,15) L3=[201,203) L4=[40,42)
RC associate: two[0]: L0=[0,1) L1=[0,1) L2=[14,16) L3=[201,203) L4=[40,42)
RC associate: proj.size()=42
RC associate: calling overlap for blob 0/1
RC overlap: layer=4 strip=[40,42) tol=1 lbound=39 hbound=42 proj.size=42
RC overlap: layer=4 selected 1 blobs
RC overlap: recursing to layer=3 newproj.size=203 nblobs=1
RC overlap: layer=3 strip=[201,203) tol=1 lbound=200 hbound=203 proj.size=203
RC overlap: layer=3 selected 1 blobs
RC overlap: recursing to layer=2 newproj.size=16 nblobs=1
RC overlap: layer=2 strip=[13,15) tol=1 lbound=12 hbound=16 proj.size=16
RC overlap: layer=2 selected 1 blobs
RC associate: overlap returned 1 matches
[23:17:47.509] D [geom_clustering] geom_clustering EXIT associate pair=2 edges_this=1
[23:17:47.509] D [geom_clustering] MEM geom_clustering done pairs=2 edges_total=2 VmRSS=1356576 kB
[23:17:47.509] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [after-geom_clust bscount=229/1625 nblobs=1 V=1601 E=
[23:17:47.509] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [after-add_blobs bscount=230/1625 nblobs=2 V=1606 E=4
[23:17:47.509] D [geom_clustering] geom_clustering ENTER associate pair=1 rel_diff=1 nblobs1=1 nblobs2=2 tol=2
RC associate: one[0]: L0=[0,1) L1=[0,1) L2=[13,15) L3=[201,203) L4=[40,42)
RC associate: two[0]: L0=[0,1) L1=[0,1) L2=[13,16) L3=[201,203) L4=[40,42)
RC associate: two[1]: L0=[266,267)
RC associate: proj.size()=919
RC associate: calling overlap for blob 0/1
RC overlap: layer=4 strip=[40,42) tol=2 lbound=38 hbound=44 proj.size=919
RC overlap: layer=4 selected 2 blobs
^Z^Z
[2]+  Stopped                 ./processdata_loop_img_2.sh
xning@dunebuild02:/exp/dune/data/users/xning/proto-dune-vd/test2$ Timeout, server dunebuild02.fnal.gov not responding.
```

The bug accidentally work

Then same issue cause crush

```
94  void WireCell::RayGrid::associate(const blobs_t& one, const blobs_t& two, associator_t func, overlap_t ol)
95  {
96      if (one.empty() or two.empty()) {
97          return;
98      }
99      const size_t nlayers = two[0].strips().size();
100     const size_t ilayer = nlayers - 1;
101     const auto proj = projection(references(two), ilayer);
102     for (blobref_t blob = one.begin(); blob != one.end(); ++blob) {
103         auto assoc = ol(blob, proj, ilayer);  // recursive call
104         for (blobref_t other : assoc) {
105             func(blob, other);
106         }
107     }
108 }
109
```

RayClustering.cxx

https://github.com/WireCell/wire-cell-toolkit/blob/master/util/src/RayClustering.cxx#L103

RayTiling.cxx

```
117     class Blob {
118       public:
119         // Add a strip to this blob, updating corners.
120         // A nudge will effectively enlarge strips for the purpose of the inclusion
121         // tests by this fraction of the pitch.
122         void add(const Coordinates& coords, const Strip& strip,
123                  double nudge = 0);
124
125         const strips_t& strips() const { return m_strips; }
126         strips_t& strips() { return m_strips; }
127
128         // Blob corners are pair-wise ray crossing points which
129         // are contained by all strips.
130         const crossings_t& corners() const;
131
132         bool valid() const
133         {
134             size_t nstrips = m_strips.size();
135             if (nstrips == 0) {
136                 return false;
137             }  // empty
138             for (const auto& strip : m_strips) {
139                 if (strip.bounds.second == strip.bounds.first) {
140                     return false; // strip has no width
141                 }
142             }
143             if (nstrips == 1) {
144                 return true;
145             }  // no corners expected with 1 strip
146             // A blob must have some area
147             return corners().size() >= 3;
148         }
149
```

https://github.com/WireCell/wire-cell-toolkit/blob/master/util/inc/WireCellUtil/RayTiling.h#L143

```
446  blobs_t WireCell::RayGrid::make_blobs(const Coordinates& coords,
447                                        const activities_t& activities,
448                                        double nudge)
449  {
450      Tiling rc(coords, nudge);
451      blobs_t blobs;
452
453      for (const auto& activity : activities) {
454          if (blobs.empty()) {
455              blobs = rc(activity);
456          }
457          else {
458              blobs = rc(blobs, activity);
459              if (blobs.empty()) {
460                  spdlog::trace("RayGrid::make_blobs: lost blobs with {}", activity);
461                  return blobs_t{};
462              }
463          }
464          drop_invalid(blobs);
465      }
466      prune(coords, blobs, nudge);
467      drop_invalid(blobs);
468
469      return blobs;
470  }
```

if add some debug info here:

```
[02:25:19.705] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-
[02:25:19.705] D [  img   ] <GridTiling:tiling-anode5-face1> nactivities = 9
[02:25:19.705] D [  img   ] <GridTiling:tiling-anode5-face0> nactivities = 9
[02:25:19.706] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face1> nactivities = 7
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face0> nactivities = 7
[02:25:19.706] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face1> nactivities = 8
make_blobs: MALFORMED blob[0] nstrips=1 expected=5 L4=[266,267)
[02:25:19.706] W [  img   ] <GridTiling:tiling-anode5-face1> anode=5 face=1 slice=
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face0> nactivities = 8
[02:25:19.706] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face1> nactivities = 8
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face0> nactivities = 8
[02:25:19.706] D [  img   ] <BlobClustering:blobclustering-anode5> MEM [operator()-
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face1> nactivities = 10
[02:25:19.706] D [  img   ] <GridTiling:tiling-anode5-face0> nactivities = 10
```