



DEEP UNDERGROUND  
NEUTRINO EXPERIMENT



The  
University  
Of  
Sheffield.

# Event display improvements, Fix to photon detector flash width

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# Adding Flashes to event display

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- ❖ Can already see Flash information on 2D wire plane view of event display, but not on Ortho3D.
  - ❖ Clear benefit of being able to see location of flashes in Y, Z planes.
- ❖ Added a function to RecoBaseDrawer.cxx - OpFlashOrtho
  - ❖ Takes `art::event`, `eve::OrthoProj_t` and `evdb::View2D` as arguments.
  - ❖ Accesses OpFlash information ( Centres and widths of flashes in Y and Z ) and adds them to the Ortho3D event display if `DrawOpFlash == 1`.

# Ortho3D w MC, Track, OpFlash

Mac OS X11 Applications Edit Window Help Tue 10:36

Drawing Services

Raw Reco Color Simulation

DrawClusters	
DrawCosmicTags	0
DrawEvents	0
DrawHits	1
DrawOpFlashes	1
DrawPFParticles	0
DrawProngs	0
DrawSeeds	0
DrawShowers	0
DrawSkeleton3DHitsOnly	false
DrawSpacePoints	0
DrawTrackSpacePoints	1
DrawTrackTrajectoryPoints	0
DrawTracks	1
DrawVertices	0
EndPoint2DModuleLabels	
EventModuleLabels	
HitModuleLabels	[linecluster]
OpFlashModuleLabels	[opflash]
PFPParticleModuleLabels	[pandora]
ProngModuleLabels	
SeedModuleLabels	[seedfinder]

File Edit

<- Previous

Zoom Inter

UnZoom In

Zoom Back

AutoZoom

Find XYZ

x,y,z

Clear Point

ShowM

Apply Cancel Done

Ortho3D

File Edit Window Help

<- Previous Next >> Reload [Run/Event]=1 702 Go Print

XZ View

Unzoom

1 Marker Size

YZ View

Unzoom

1 Marker Size

LArSoft  
Run: 1/8  
Event: 702  
UTC Thu Jul 31, 198  
17:46:39 270625952

ADC Threshold 5 Wire 180 Plane 0 Raw Reconstructed Both Grayscale MC Truth

# Ortho3D with 2 flashes

The image displays the Ortho3D software interface on a Mac. The main window, titled "Ortho3D", shows two 2D plots: the XZ View (top) and the YZ View (bottom). Both plots show a red hatched region representing a detector volume, with a blue arrow indicating a particle track. The XZ View has axes x (cm) and z (cm), while the YZ View has axes y (cm) and z (cm). A configuration window titled "Drawing Services" is open in the foreground, showing various drawing options for different detector components. The status bar at the bottom indicates "Run/Event" 1/765 and provides controls for ADC Threshold, Wire, Plane, and visualization modes.

**Drawing Services Configuration:**

Option	Value
DrawCosmicTags	0
DrawEvents	0
DrawHits	1
DrawOpFlashes	1
DrawPFParticles	0
DrawProngs	0
DrawSeeds	0
DrawShowers	0
DrawSkeleton3DHitsOnly	false
DrawSpacePoints	0
DrawTrackSpacePoints	1
DrawTrackTrajectoryPoints	0
DrawTracks	1
DrawVertices	0
EndPoint2DModuleLabels	
EventModuleLabels	
HitModuleLabels	[linecluster]
OpFlashModuleLabels	[opflash]
PFPParticleModuleLabels	[pandora]
ProngModuleLabels	
SeedModuleLabels	[seedfinder]

**Status Bar:**

ADC Threshold: 5 Wire: 180 Plane: 0 Raw  Reconstructed  Both  Grayscale  MC Truth

# Fix to width of OpFlash

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- ❖ From above can see that the width of flashes is very large.
- ❖ Gleb noticed that calculation of width is incorrect.
- ❖ Function is in larana/OpticalDetector/OpFlashAlg.cxx

```
double CalculateWidth(double const& sum, double const& sum_squared, double const& weights_sum){  
    //return std::sqrt( sum_squared*weights_sum - sum*sum )/weights_sum; // GVS bugfix  
    return std::sqrt( sum_squared*weights_sum + sum*sum )/weights_sum;  
}
```

- ❖ The '+' should be '-' as per RMS calculation.

# Ortho3D with fixed width

The image displays the Ortho3D software interface on a Mac OS X system. The main window, titled "Ortho3D", contains two 2D plots: an XZ View and a YZ View. Both plots show a red line representing a track, with a blue line and green markers overlaid. A hatched rectangular region is visible in both plots, indicating a specific area of interest. The XZ View has axes labeled x (cm) and z (cm), with x ranging from 0 to 200 and z from 0 to 140. The YZ View has axes labeled y (cm) and z (cm), with y ranging from -80 to 100 and z from 0 to 140. A "Marker Size" control is set to 1 in both views.

Overlaid on the Ortho3D window is a "Drawing Services" configuration window. It features a list of drawing options with checkboxes and input fields. The "Raw" tab is selected. The configuration window includes buttons for "Apply", "Cancel", and "Done".

At the bottom of the Ortho3D window, there is a status bar with the following controls: "ADC Threshold" set to 5, "Wire" set to 180, "Plane" set to 0, and radio buttons for "Raw", "Reconstructed", and "Both". There are also checkboxes for "Grayscale" and "MC Truth".

The Mac OS X menu bar at the top shows the application name "X11", menu items "Applications", "Edit", "Window", and "Help", and system status icons including network, battery, and time (Tue 11:12).

# Ortho 3D, fixed width, 2 flashes

The screenshot displays the Ortho3D software interface on a Mac OS X desktop. The main window, titled "Ortho3D", shows two orthogonal views: XZ View and YZ View. The XZ View plots x (cm) on the y-axis (0 to 200) against z (cm) on the x-axis (0 to 140). It features a vertical red hatched region between z ≈ 35 and z ≈ 65, and a blue line at z ≈ 50. The YZ View plots y (cm) on the y-axis (-80 to 100) against z (cm) on the x-axis (0 to 140). It features a blue hatched region between z ≈ 35 and z ≈ 65, and a blue line at z ≈ 50. A settings panel on the left lists various drawing options, including "DrawOpFlashes" (set to 1) and "DrawTracks" (set to 1). The status bar at the bottom shows "ADC Threshold" set to 5, "Wire" set to 180, and "Plane" set to 0. The status bar also includes checkboxes for "Raw", "Reconstructed", "Both", "Grayscale", and "MC Truth".

Option	Value
Draw2DSlopeEndPoints	0
DrawBestPCAAxisOnly	true
DrawBezierTracks	0
DrawClusters	1
DrawCosmicTags	0
DrawEvents	0
DrawHits	1
DrawOpFlashes	1
DrawPFParticles	0
DrawProngs	0
DrawSeeds	0
DrawShowers	0
DrawSkeleton3DHitsOnly	false
DrawSpacePoints	0
DrawTrackSpacePoints	1
DrawTrackTrajectoryPoints	0
DrawTracks	1
DrawVertices	0
EndPoint2DModuleLabels	0
EventModuleLabels	0
HitModuleLabels	[linecluster]
OpFlashModuleLabels	[opflash]

ADC Threshold: 5 Wire: 180 Plane: 0 Raw Reconstructed Both Grayscale MC Truth

# Permission to push changes

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- ❖ Currently both are just on my local areas in;
  - ❖ lareventdisplay - Event Display addition
  - ❖ larana - OpFlash correction
- ❖ Can I push them straight to head? Or should I make a feature branch for each? Neither are breaking changes.