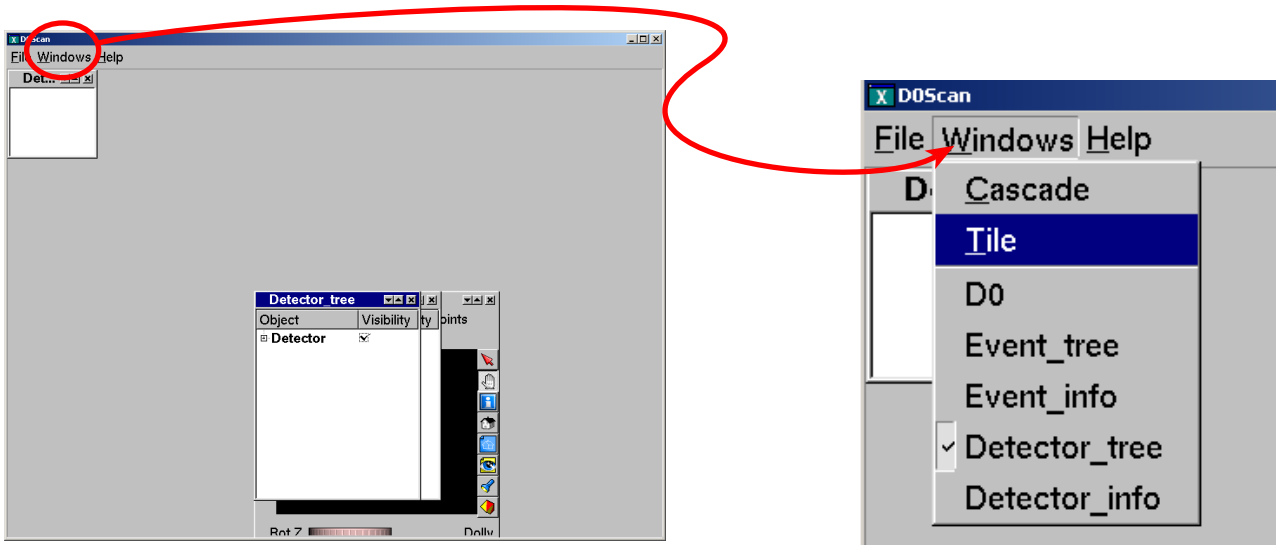
DØScan Through Pictures

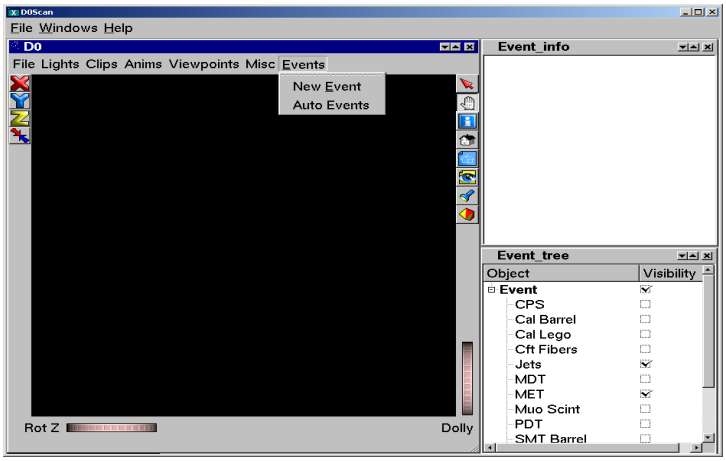
You should probably start by using the pre-built version of d0scan_qt. Start it as a standard framework package:

```
> setup D0Run t01.my.favorite
> d0setwa
> d0scan_qt_x -rcp \
$SRT_PUBLIC_CONTEXT/d0scan_qt/rcp/d0scan_qt_test.rcp\
 -input_file your_file_here
```



This would bring up a framework containing status and control windows and an event viewer, in most cases without a visible event.

Arrange the windows to suit yourself and/or use the Windows menu to help. A rational layout might resemble this...



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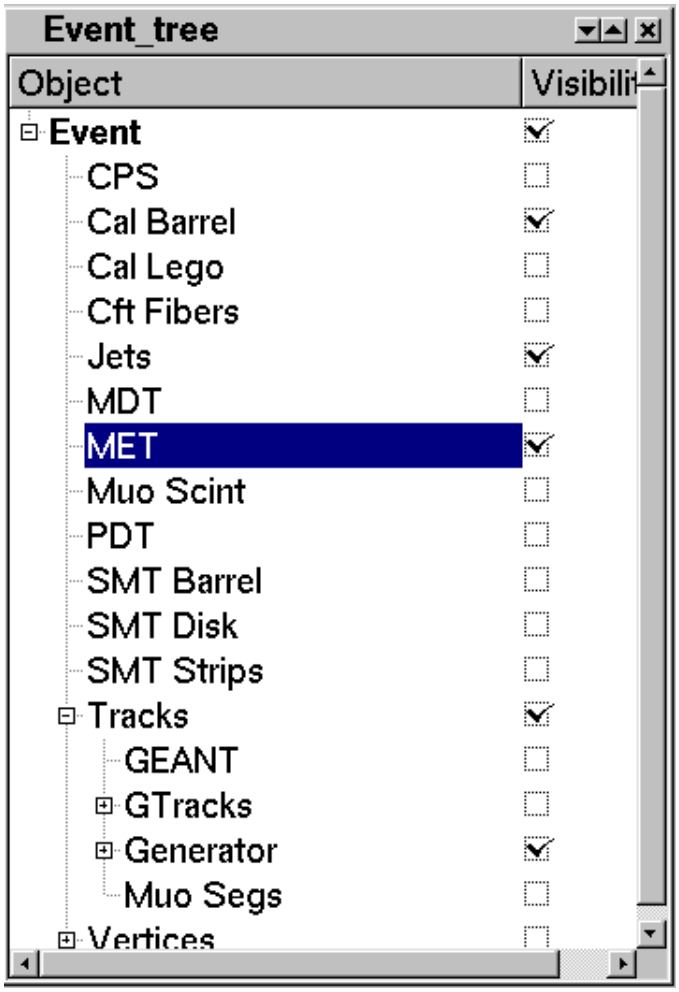
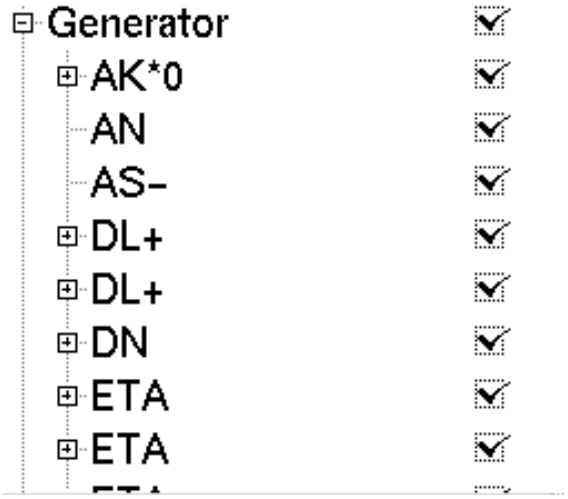
Selecting What is Displayed

You'll mostly be interested in which pieces of the event get included in the view. There is one controller for the event itself and one for the physical detector, but they both operate the same way, as a nested list of nodes. Normally, only the very ends of each branch represent potentially visible objects; every node in the chain must be set on for an object to be rendered.



In the window at left, the Event has been expanded (as shown by the '-' in the box next to its label) and selected. Of the tracks composing the event, only the Generator level tracks have been selected. The Generator may also be expanded (by clicking on the '+') to reveal which tracks will be shown.



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Event Selection

Events can only be viewed as they occur in the input stream (although that stream is subject to the standard ReadEvent stiyle rcp flags). New events are requested using either of the two items

under the Events pull-down menu: New Event and Auto Events. When Auto Events is selected, each event is rotated about all three axes and then discarded. New Event just gets a new event. It does have a keyboard accelerator, as does the Events menu itself. Use (on a Windows-style box) right Alt ‘e’ followed by e to get a new event.

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Manipulating the Scene

We manipulate the scene using the mouse, the icons on the right side of the viewer, and the thumbwheels.

The Right-side Icons.

Mouse down in the window selects the clicked object.

Mouse down + drag in the window changes the viewpoint.

Help (starts a web browser).

Return to the home (starting) view.

Set the home view to the current viewpoint.

View all objects (pan out).

Set clicked object at center and zoom in.

Toggle between perspective and orthographic views (the icon will change to a cube in orthographic view).

Using the Mouse.

If the icon for the hand is selected, clicking and dragging in the main window will shift your viewpoint as if you were rotating a crystal ball holding the scene.

If you hold the control key down while dragging, it translates the scene in the direction of the drag. (This will change the position of the center of the co-ordinate system to match! You can use the view menu or the home view button to return to the original position.)

Selecting an object (by clicking on the target icon and then clicking on the object in the scene) will reset the center of the scene.

Note that mouse button use may depend on the system and the mouse.

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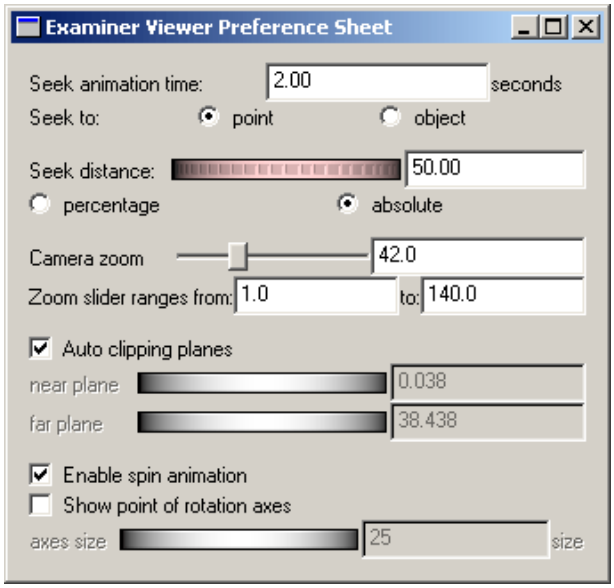
The Left-side Icons

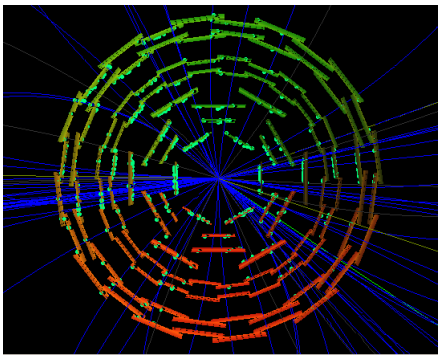
Align along the (X,Y,Z) axis

Reflect through the origin (e.g., x→ -x)

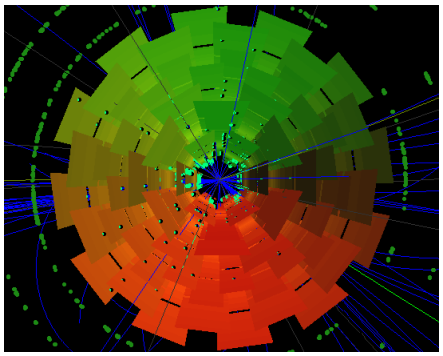
Zoom and Dolly

When the camera mode is set to orthographic projection, the thumbwheel on the lower right side of the frame controls the size of the viewing region and is labeled ZOOM. When the mode is set to perspective, the wheel is labeled DOLLY and controls the position of the virtual camera. To change the angular coverage of the camera in perspective mode, use the Properties Sheet (accessible by right clicking in the viewing region). The scale is in degrees.





Zoom = 1

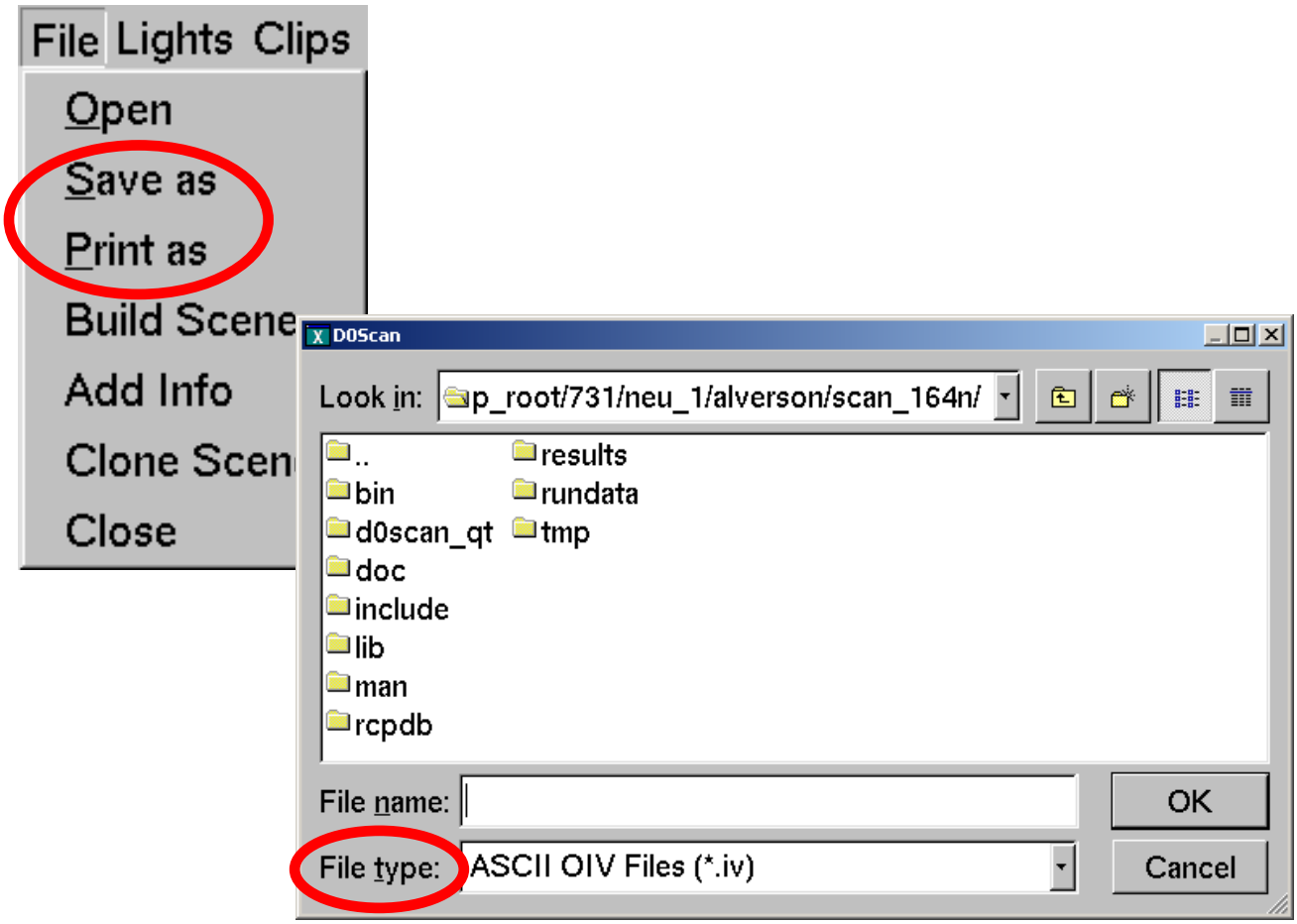


Zoom = 25

Printing and Saving Images

OpenInventor scenes are constructed by ray tracing from all the light sources, reflecting off the various reflective surfaces and passing through all the transparent surfaces. This results in an image which is not appropriate for reduction to vector graphics (i.e., PostScript or SVG) except as a wrapped bitmap. Partially because of this difficulty, you can either save an image in the native OpenInventor format (iv) or you can "print" it as a bitmap of some sort. Although encapsulated PostScript is available, we've gotten better results using JPEG or TIFF. Both options are located under the File menu of the viewer and open a standard file browser window with available file formats in a pull down window.

Rendering can be quite slow as the process involves taking multiple passes through the scene and averaging them to produce an anti-aliased view.



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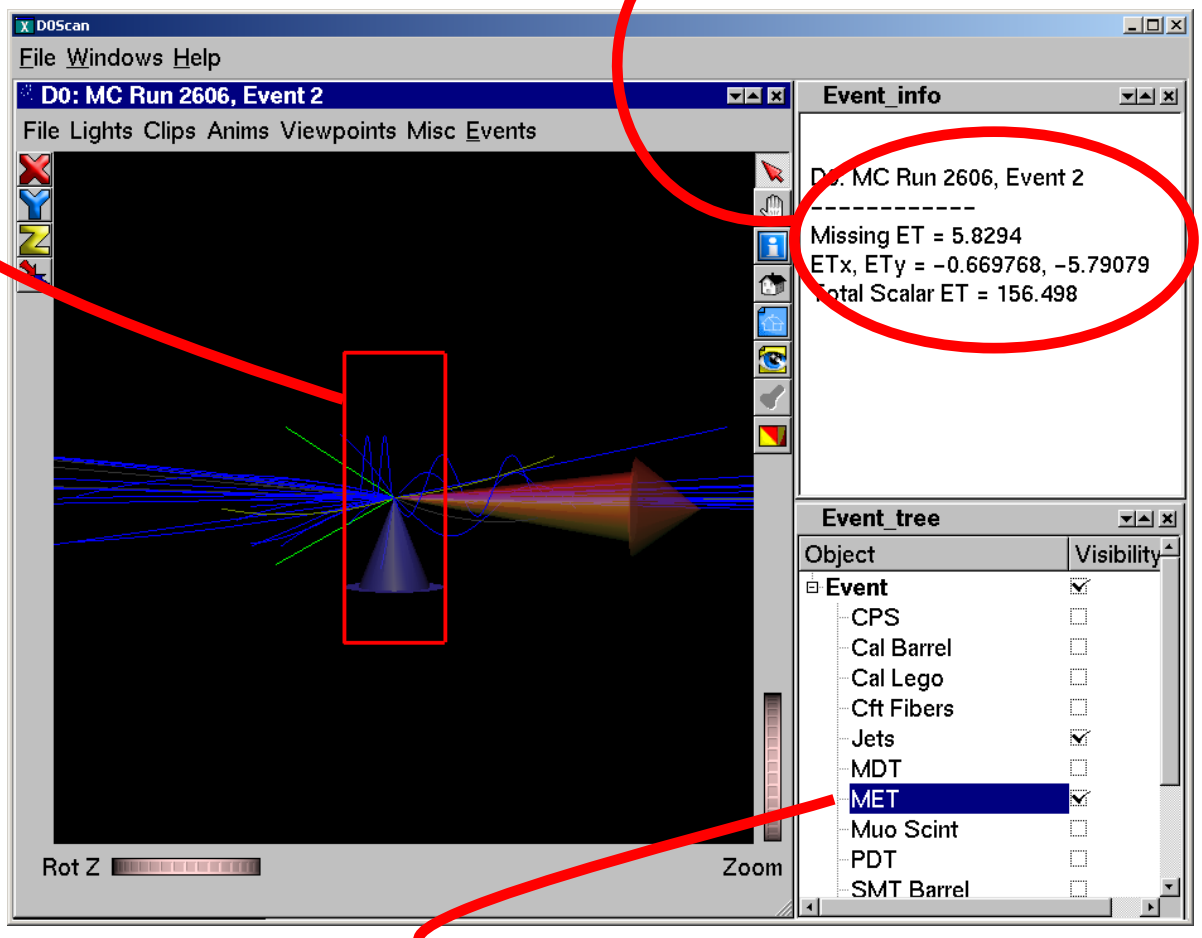
Picking to Get Information from the Event

To select an object in the scene (pick), change the cursor mode from manipulate to pick and click on the object. This automatically causes any information available about it to be piped a scrolling information panel. This is implemented using a very simple-minded algorithm that in most cases just uses the << method of the underlying object. A few of the current objects need additional work.

Picked Missing Et jet is highlighted with a red box. Highlights are outlined in some versions.

Textual information appears in the info box



The name is highlighted in the control widget

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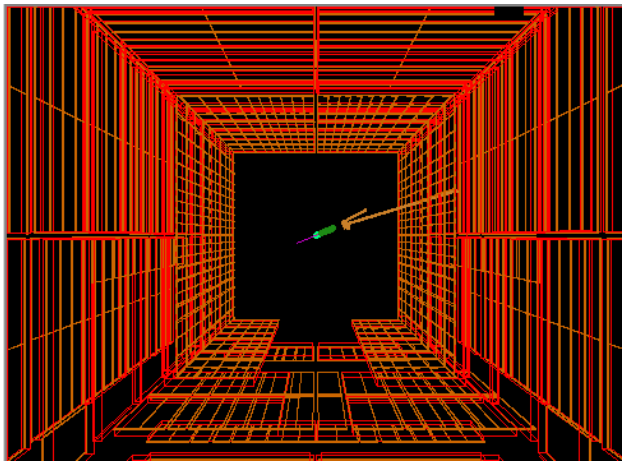
Additional Controls

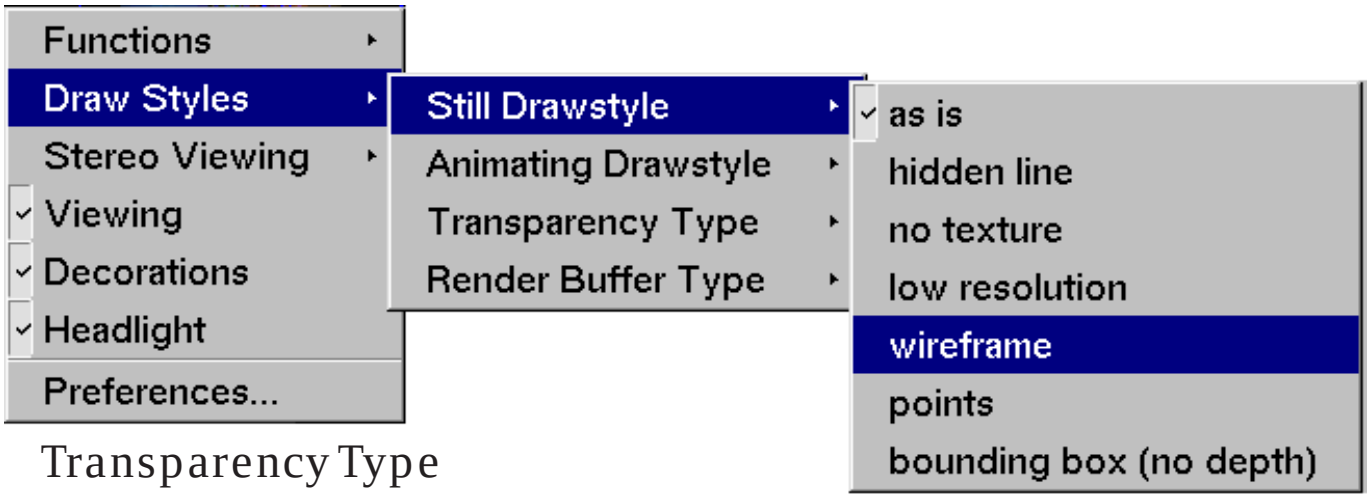
Right clicking in the viewer window will bring up additional menus. Three of them give more control over how you view the scene.

Wireframe



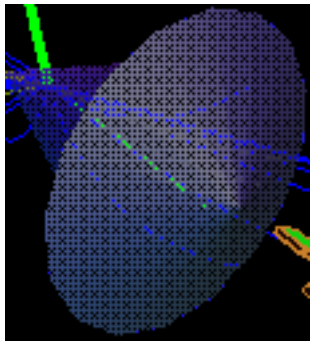
The Draw Style panel lets you view the scene in wireframe. It also lets you choose different styles depending on whether the scene is moving or static.

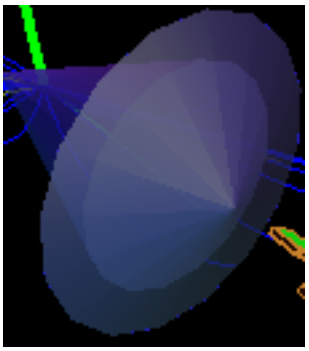
Note that this is not true wireframe: the lines are generated from the edges of the tesselation shapes that form the surfaces.

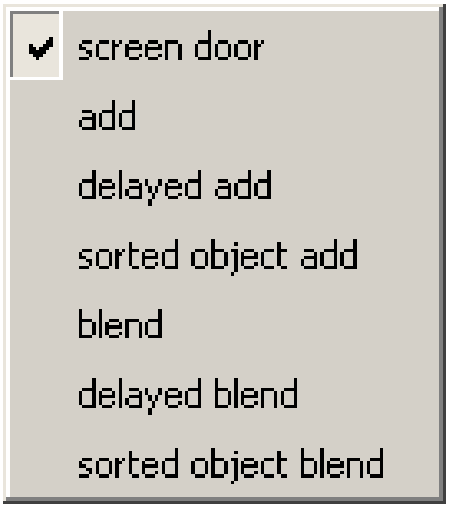


Transparency Type

The default is screendoor. A better looking result is obtained using any of the other options but requires increased rendering power.







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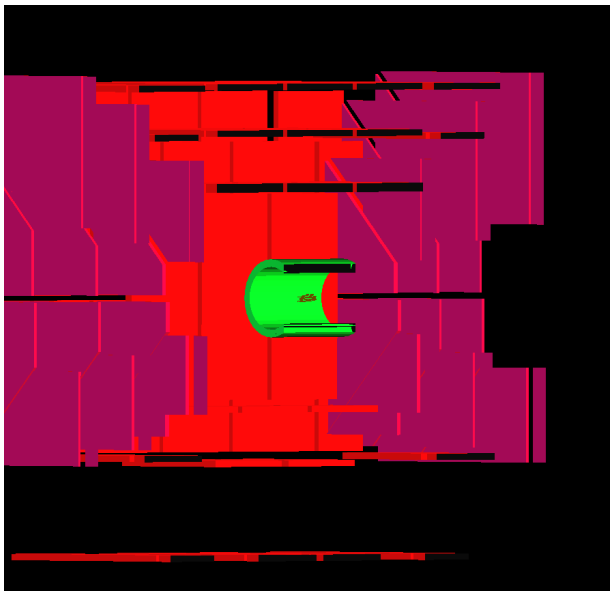
Clipping & Slicing

The clipping & slicing controls allow for the removal of various parts of a scene. Clip planes are available through the clip pull-down menu and slicing along the x, y, and z-axes is located under the miscellaneous pull-down.

At right is a clipped version of the D0 detector.



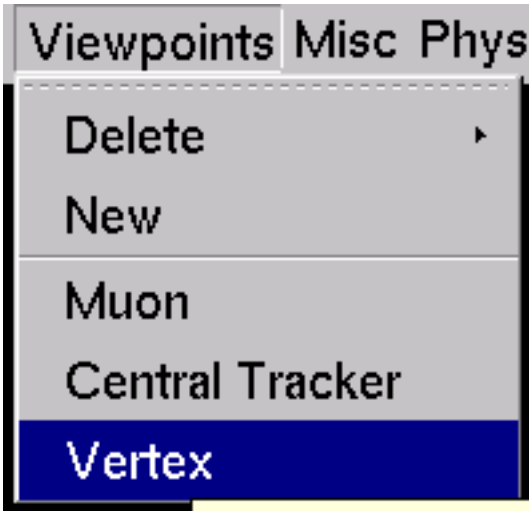
Lighting Control

There are a number of pre-defined white and colored lights in the scene. These may be turned on or off from the Lights pull-down menu. Additional (white only) lights of various sources may also be created and positioned.

With the default lights, a grey sphere is rendered as shown at left.

Viewpoints

A scene always has a home viewing position. Additional viewpoints may be created and controlled using the Viewpoints menu.



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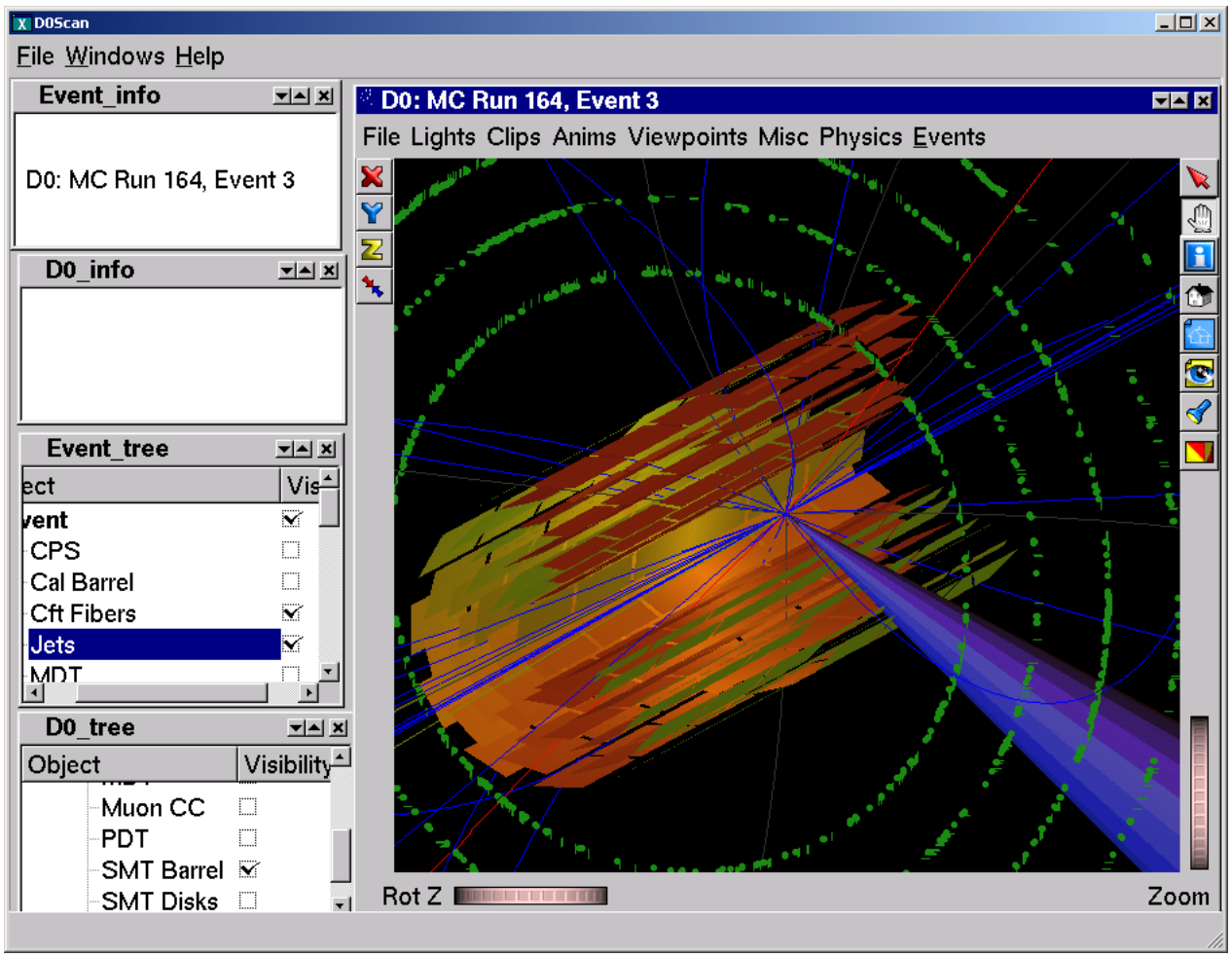
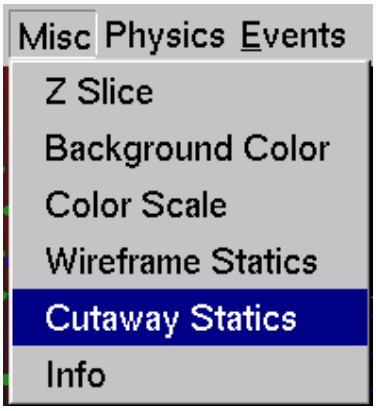
Cut-aways

To see both the event and the detector in the same view, you can use a cut-away. It will cut out the upper-right sector of the detector, leaving the event untouched.



The control for cutaways is located on the Misc menu.



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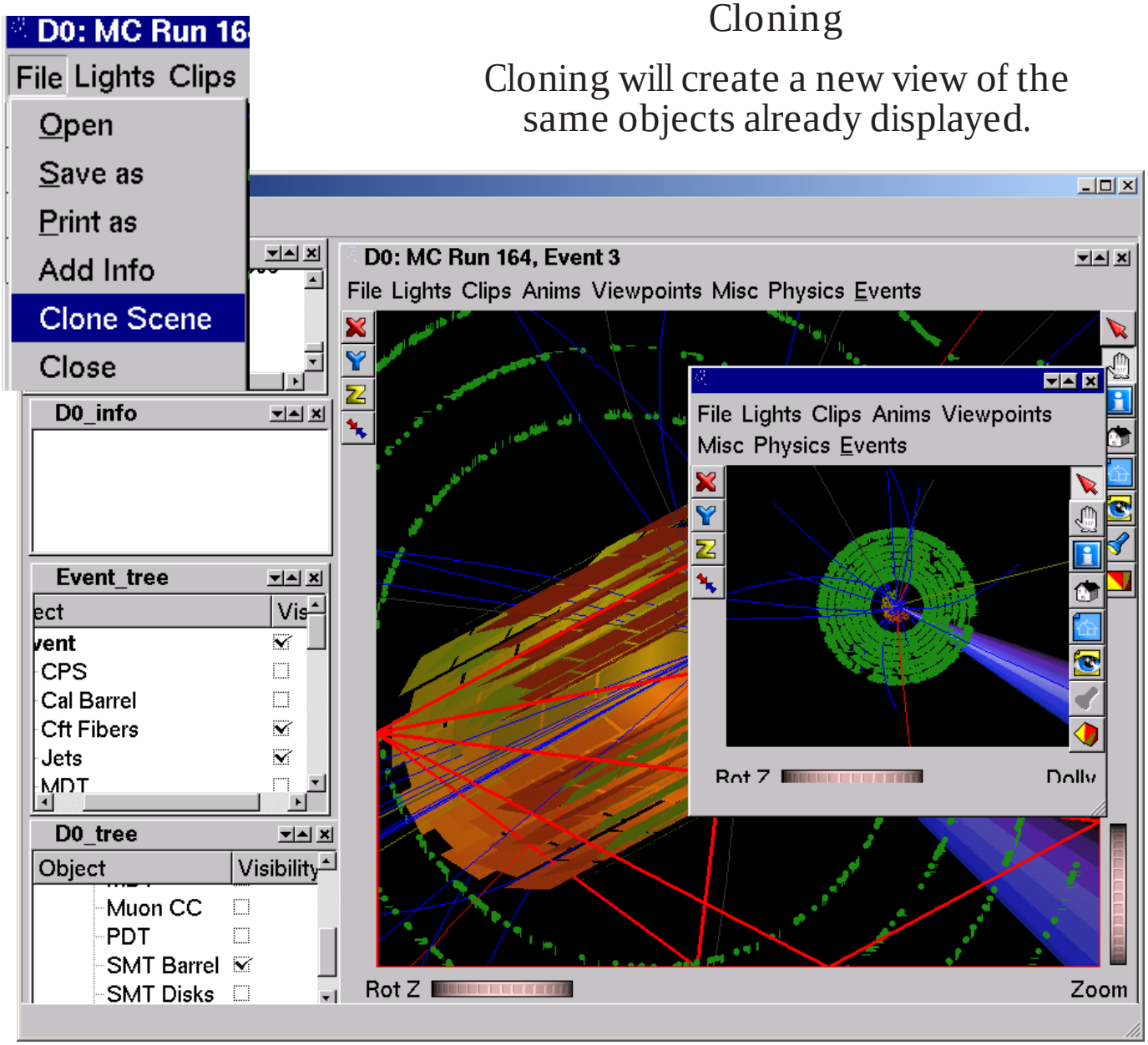
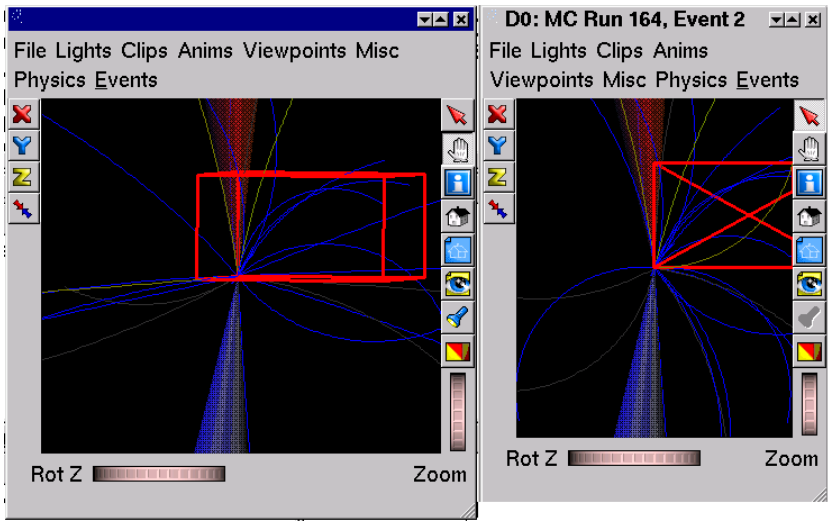
Cloning

Cloning will create a new view of the same objects already displayed.





Picking an object in either of two cloned views will highlight it in both

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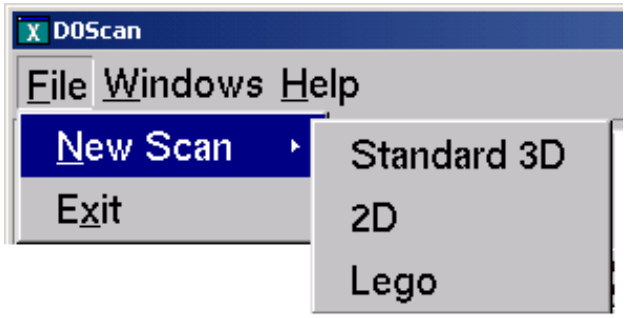
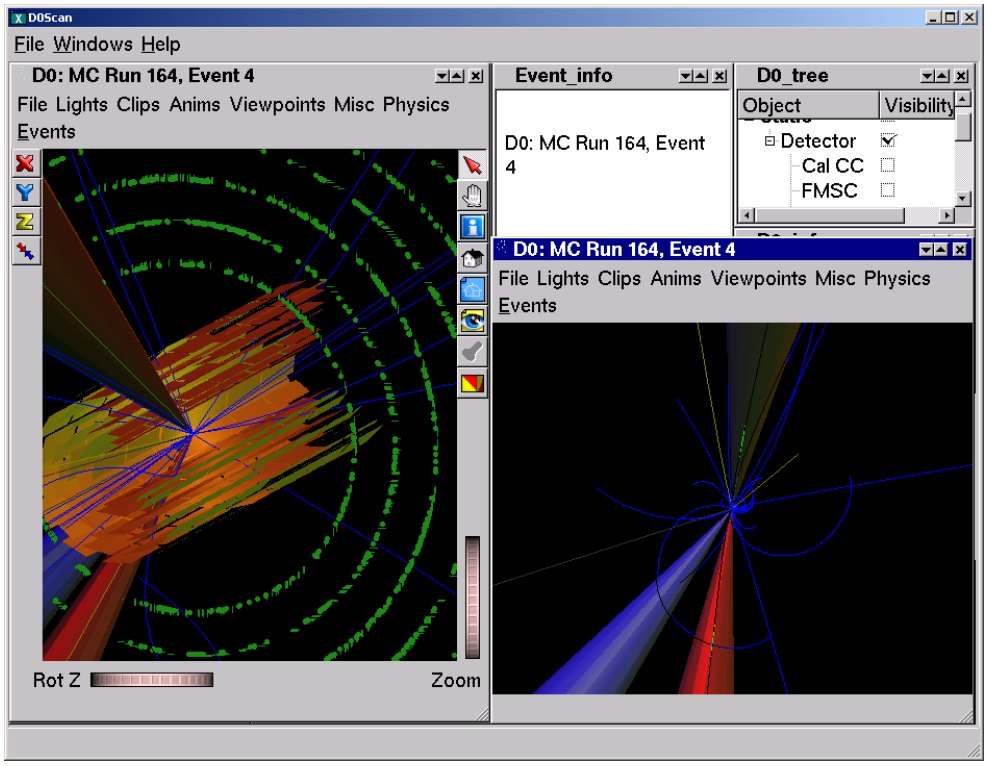


Additional Viewers

You can create additional viewers, with events synched together, using the scan menu item. Selecting a new event in any window will cycle them all.

Each view can be individually manipulated, turing portions on and off at will. (Note that sometimes you'll need to tile all windows in order to get the new viewer to become visible. We're looking into this.)



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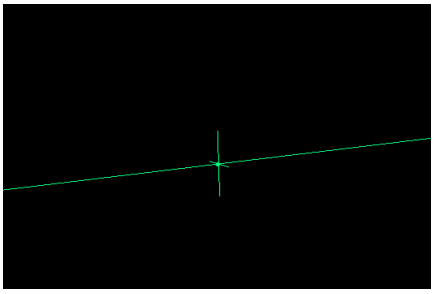
Information About Non-Obvious Shapes

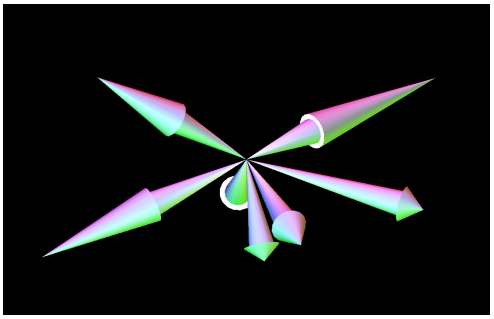
Most shapes used to represent physical objects are clear as to their meaning: a trajectory is represented by a curved line, a physical chamber is represented by a box. More abstract concepts may lead to trouble, however. In many cases, we've gone to HEPVis to find an appropriate shape that we coulduse without too much labor. Here are some pointers in their interpretation.

3D Errors



You may not notice the error bars on SMT hits since they are so small (we hope!) in terms of the spacing between wafers. If you zoom in close enough you'll begin to see them, however.

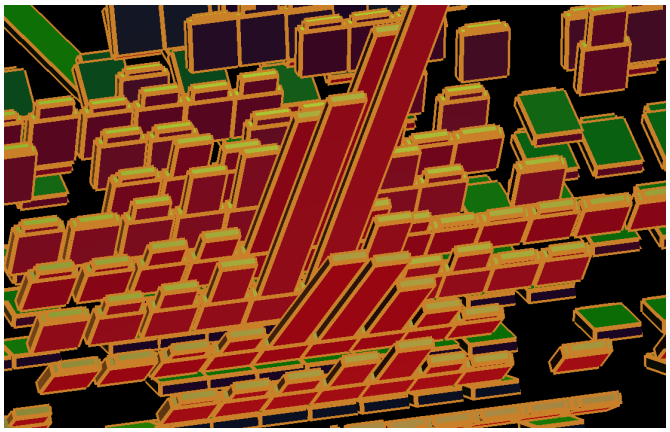
Jets



The SoJet shape encodes the direction, energy, and thrust of the jet. The fatter the jet shape, the lower the thrust.

Calorimeter Hits

Calorimeter hits show the physical shape of the calorimeter cell and then extrude a copy outward in the radial direction which is proportional to the energy deposition. It is slightly shrunk in the transverse direction so you can see the break. Since D0 has focusing towers, but not focusing cells, this results in a somewhat ragged appearance. The first cell in each tower is used as a representation for the tower.



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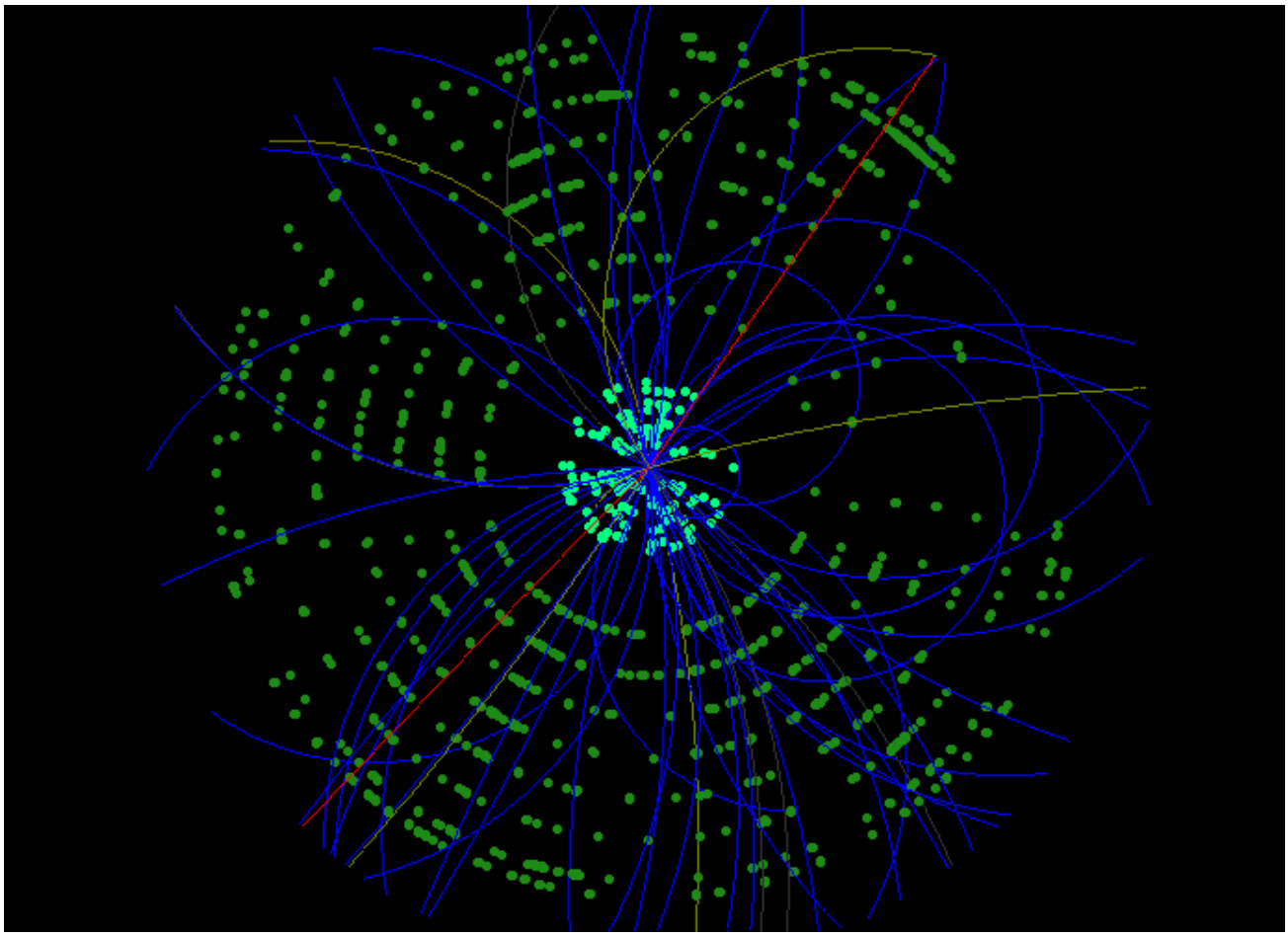
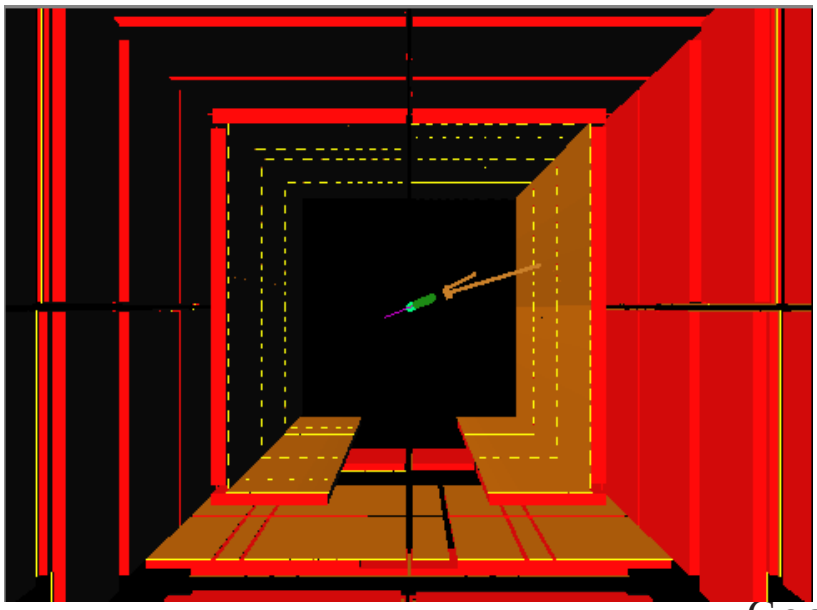
What is Currently Available?



This displays the view down the axis with reconstructed SMT hits (cyan), axial CFT fibers (green) and Monte Carlo (idealized) tracks (default colors: muons, red; electrons, green; generic hadrons, blue; protons, gold).



Perspective view of the muon detector (PDT chambers and scintillators) with a single electron event in the tracking and calorimetry.

The disparity of scales in D0 makes the ability to zoom in and out a necessity.

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