

Elliptical Reflector Tutorial



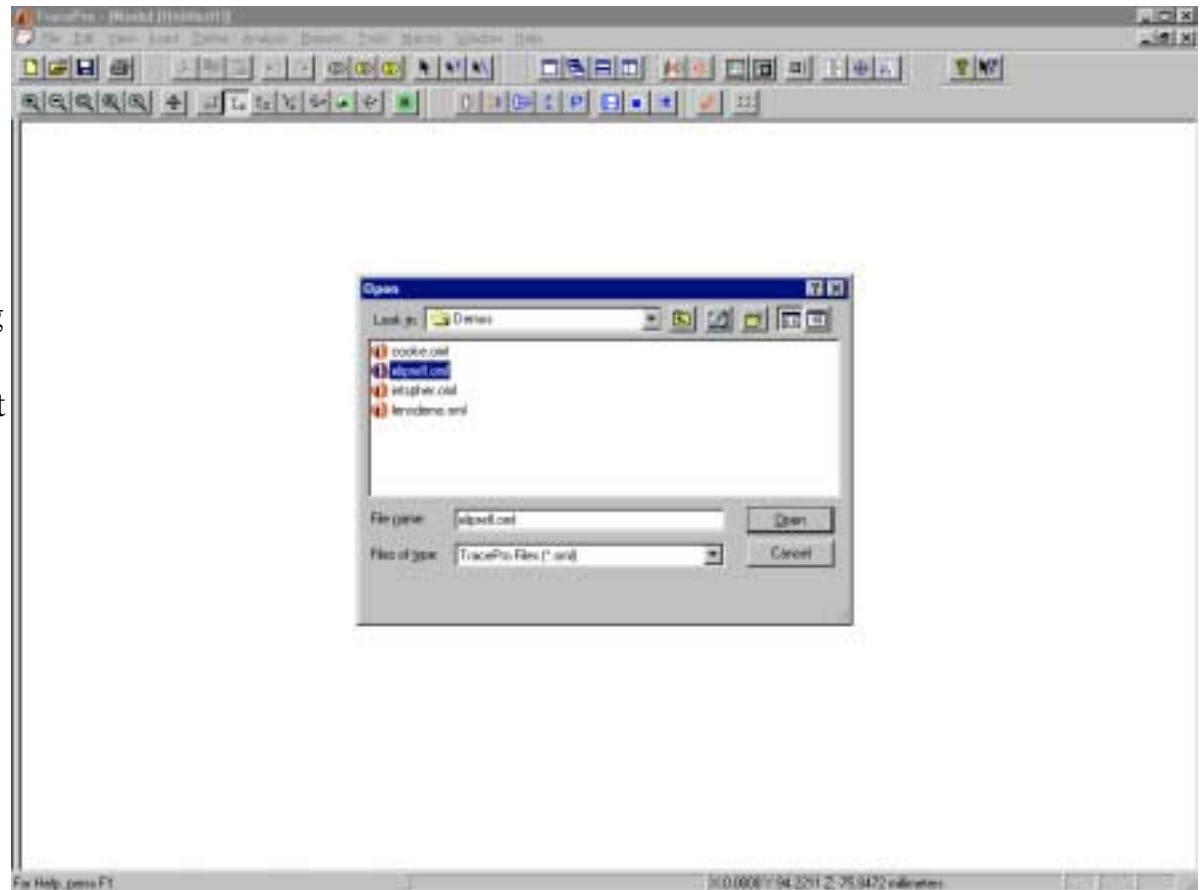
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- Opening the Elliptical Reflector File

- Open the **File** Menu and select the **Open** option. A Open file dialog box will appear.

- Find the Demo Subdirectory under the Example Subdirectory where you created the TracePro folder. After the Open file Dialog box appears double click on the file **eliprefl** filename with the left mouse button to open the file. The file should highlight in blue background when clicked on as shown in the figure to the right.

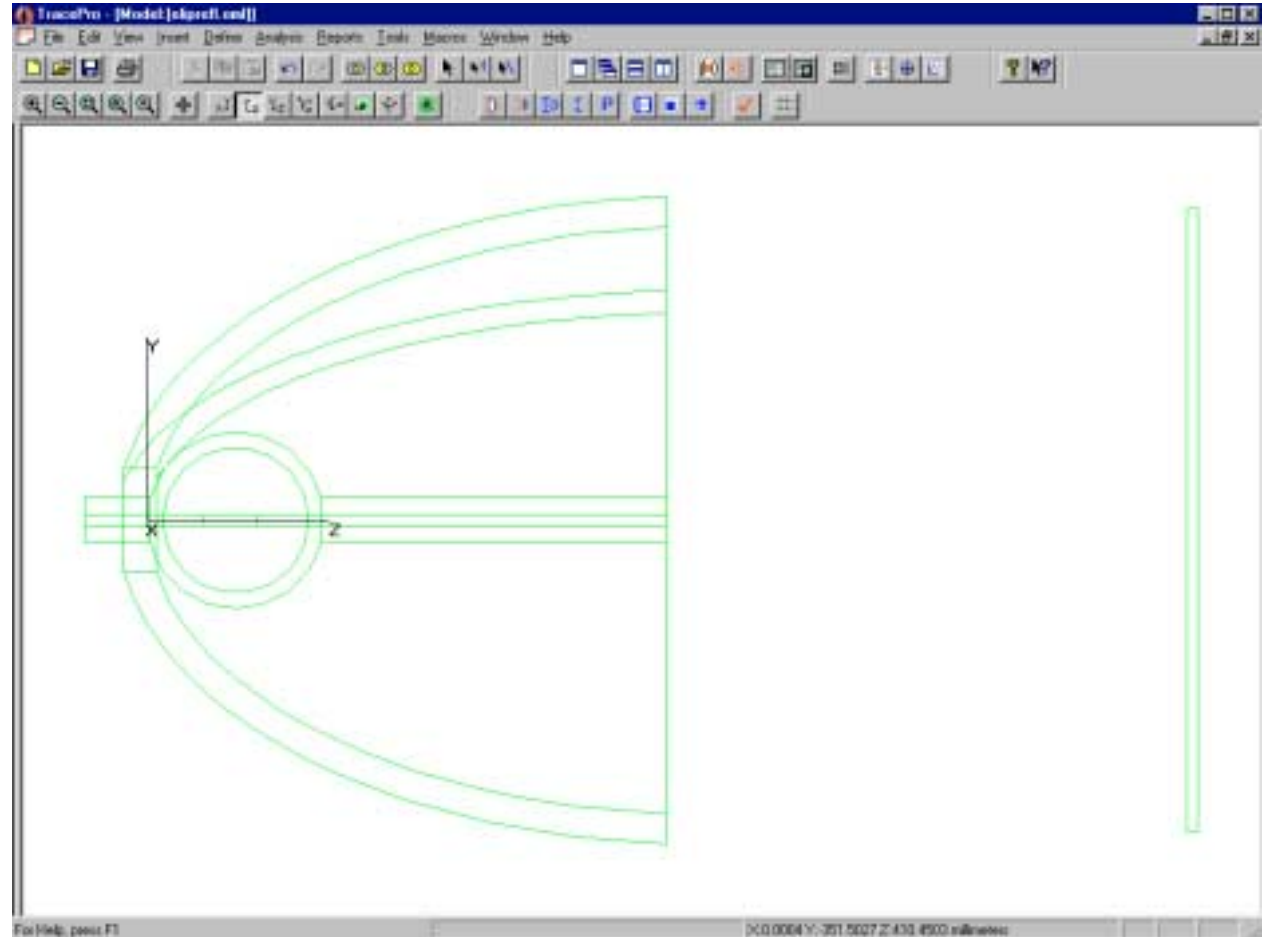
- The extension of all TracePro files is OML. The OML file is based on the SAT format which is the ACIS standard file format. This gives the user import and export capability with over 170 different programs.




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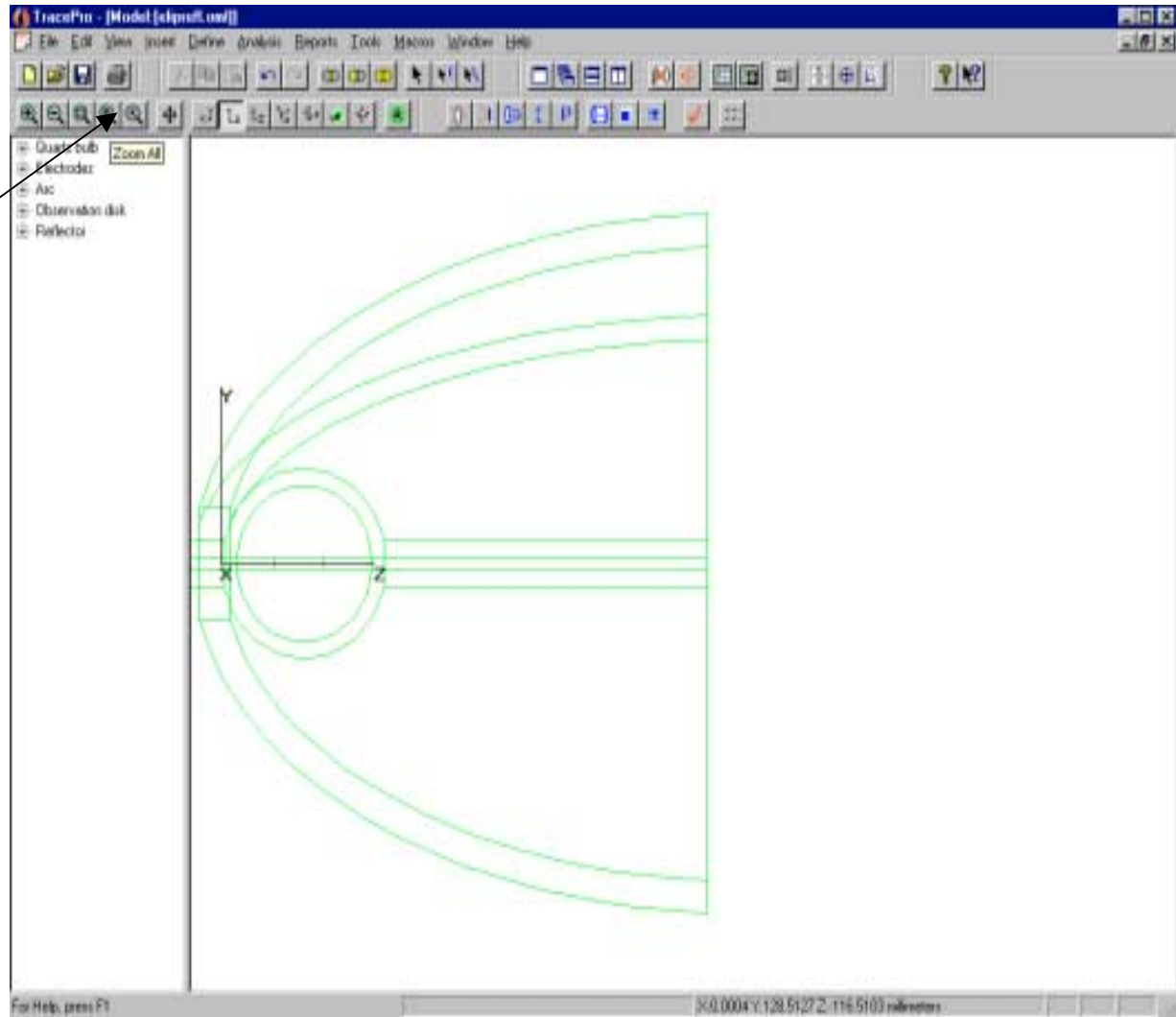
- The elliptical reflector and metal halide bulb will appear as shown to the left.
- Open the **System Tree**
- To do this move the cursor to the left double bar and wait until the cursor changes to a double bar, hold the left mouse button down and pull the cursor to the right. The System Tree will then appear
- You can also open the System Tree by using the **Window** menu and using the **Split** option



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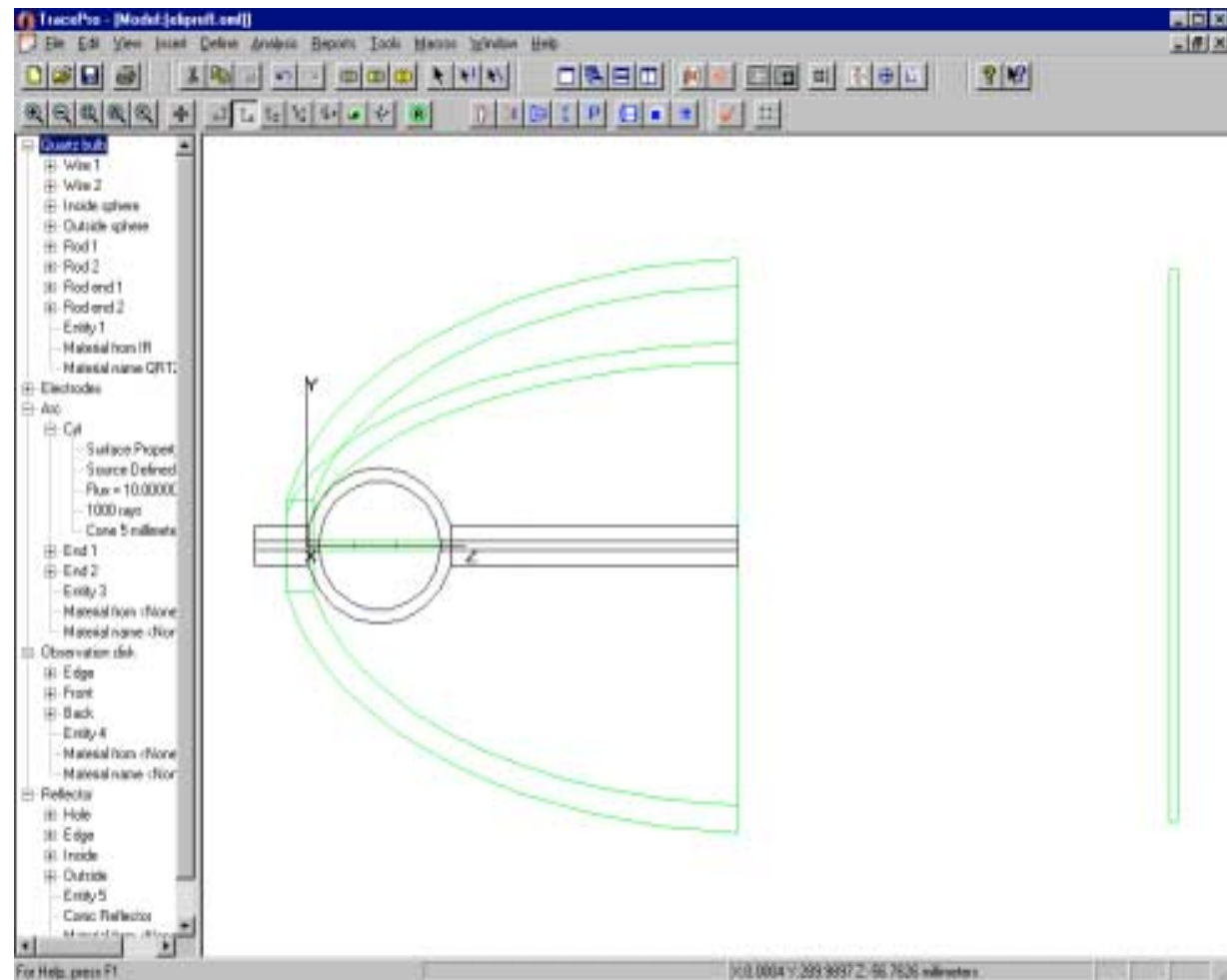
- When you first open the System Tree the system will not fit the screen, it will overfill it. To zoom it to the size of the screen, click on the **zoom all** icon 

- The program will then size the full system to fit the screen. The system will now look as shown to the right.






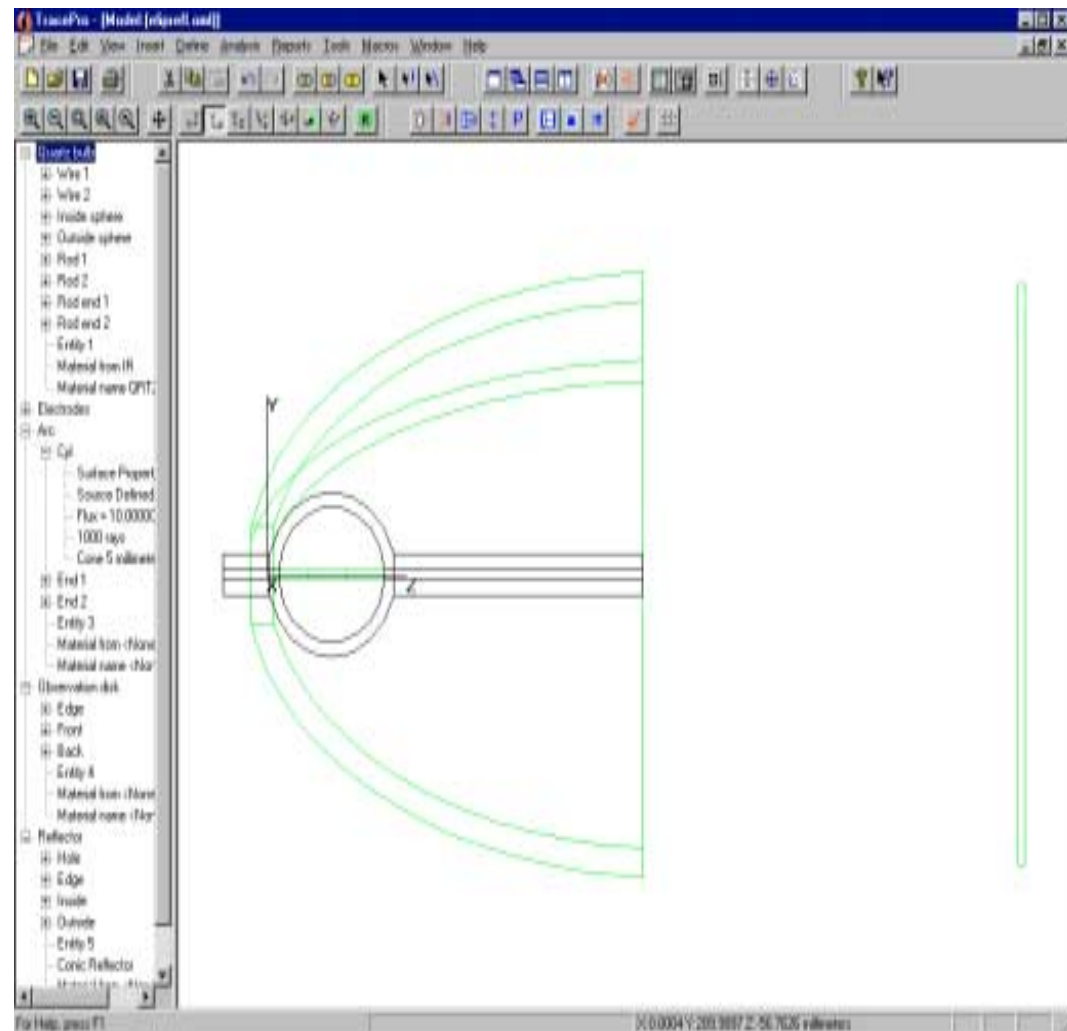
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- The system tree contains all the information about the objects and surfaces contained in the system model.
- Left Clicking the mouse button on any \oplus sign before an object or surface opens up information on that object or surface. Clicking on the \ominus sign closes this information. This information consists of the surface properties, type of surface and material properties of an object. Further information may show if it is a source, exit surface or any other applied property.



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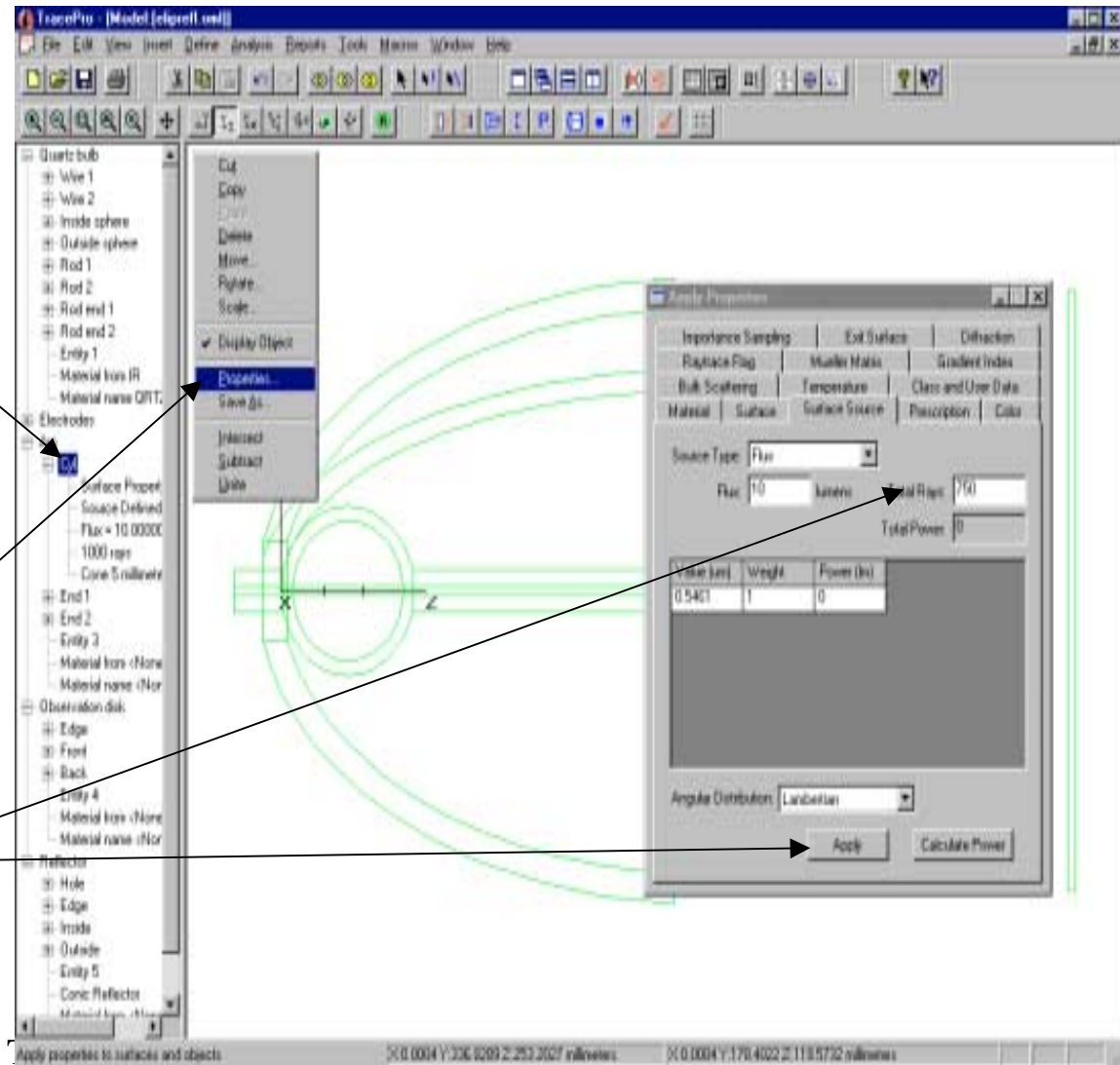
- There are two methods for selecting an object or surface. You can use the main viewing window or the system tree.
- To use the main viewing window left mouse click on the select object icon  to select objects or left click on the select surface icon  to select surfaces. After clicking on the icon it will look pushed in.  If the icons are grayed out first click on the main viewing screen to activate these icons.
- You can now select objects or surfaces by positioning the cursor on top of the object or surface to be selected and left mouse click. The object will be highlighted in black on the main viewing window and background highlighted in blue in the system tree as shown to the right.




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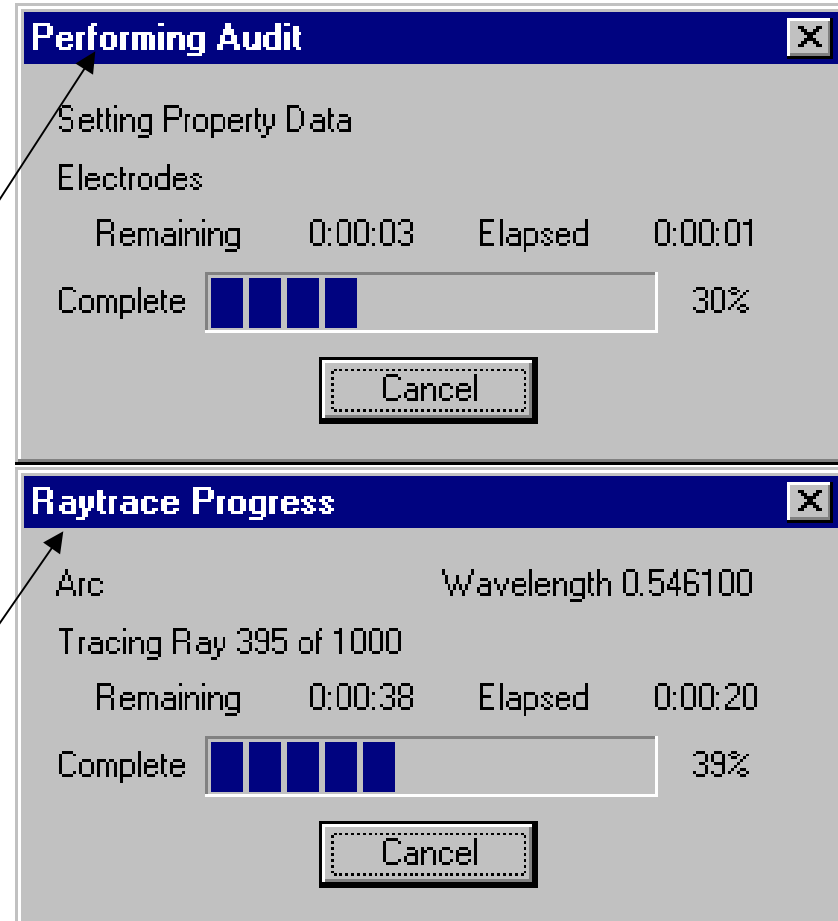
- This model uses a surface source. This source is defined on one of the surfaces that define the Arc lamp system geometry. Open the Arc object definition by left mouse clicking on the Cyl surface. This will open the Cyl surface definition.
- We can now change this Cyl surface in the **System Tree** by right mouse clicking inside the main viewing window. A dialog box will appear. Left mouse click on the **Properties** option. An **Apply Properties** Dialog Box will appear as shown to the right.
- Change the number of rays from 1000 to 750 and left mouse click on the **Apply Button**. The information for the source definition will change in the **System Tree**.

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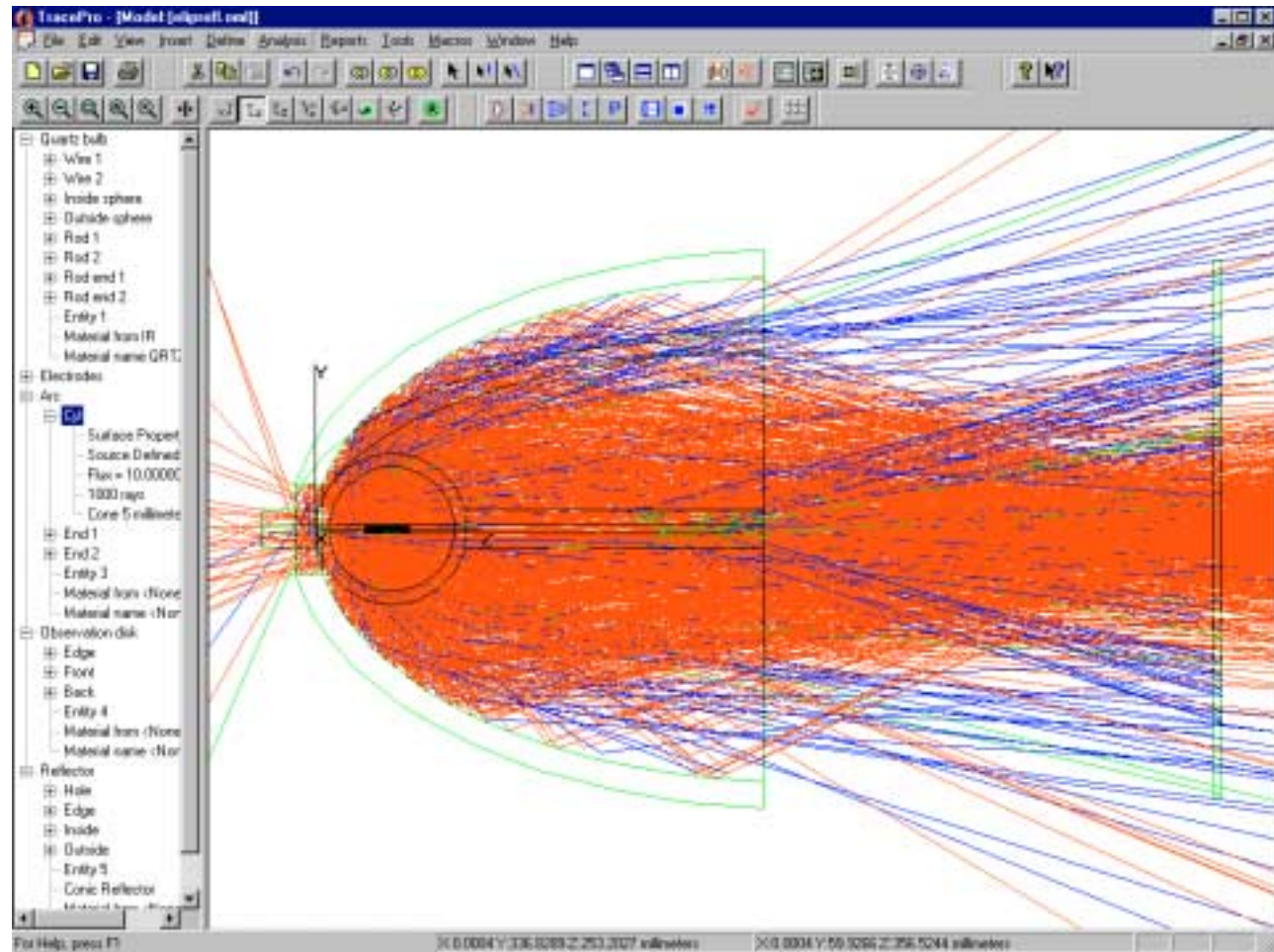
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- To trace rays from the surface source click on the  **Source Trace** icon in the main TracePro screen.
- The program will first perform an audit function first. The Audit function tests the system geometry for accuracy, overlapping objects, defective objects, and then applies the properties and materials to each object and surface. Finally, the audit function creates a set of 3D blocks that fill the entire 3D space with 3D building blocks called voxels. A list of every surface in each voxel is then written so that the program can determine each surface intersection when it enters a voxel.
- After the Audit function is completed the program will trace all 750 rays. A Raytrace Progress report is displayed. The Progress report displays the number or rays currently traced and an estimation of how long the ray trace will take. It will also show you the wavelength for each source.



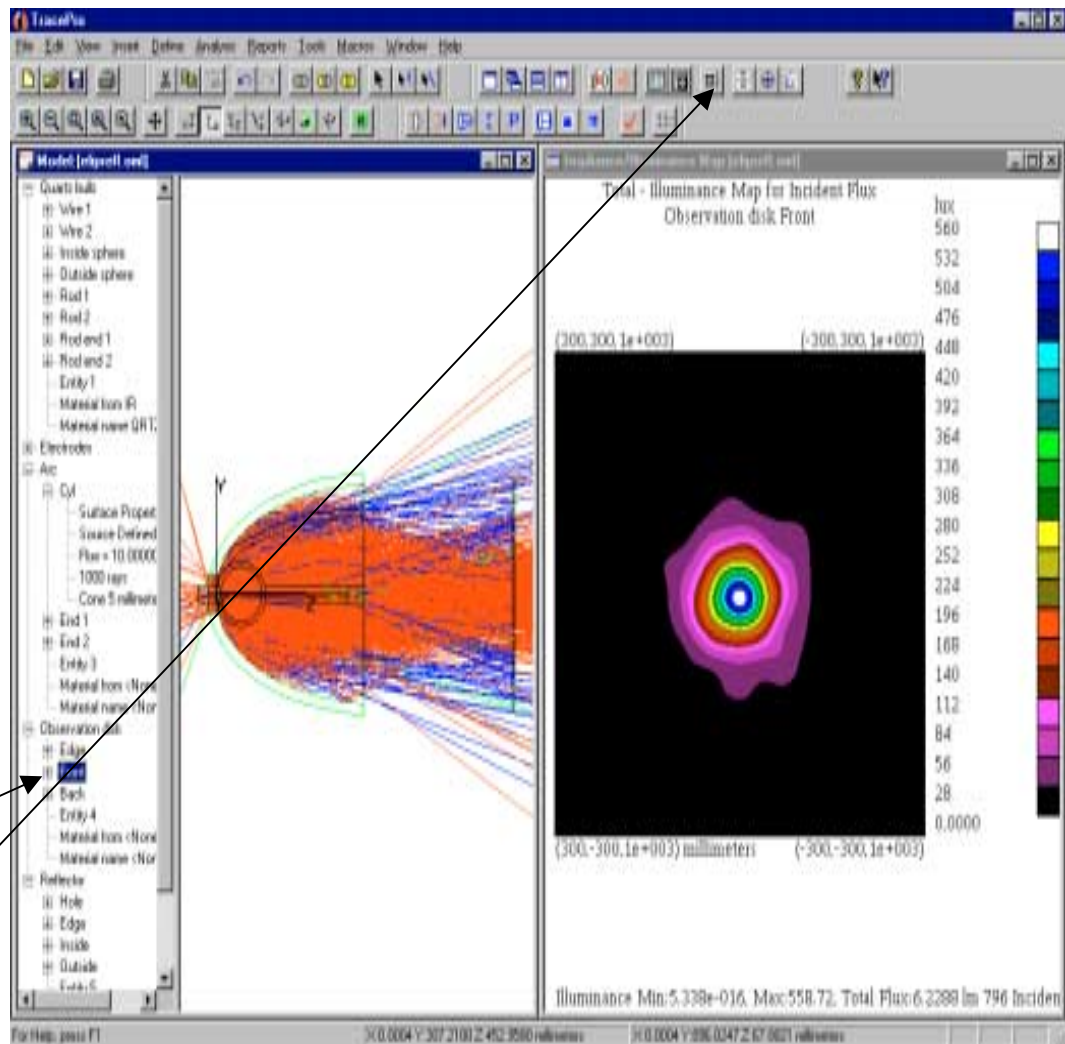
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- On completion of the ray trace all rays are displayed on the main viewing window. If this does not occur check to make sure the **Display Rays** option in the **Analysis Menu** is checked.
- The colors of each ray indicate the flux of each ray traced. Red rays have flux from 100 to 66 percent of their beginning ray flux. Green rays are between 66 and 33 percent and Blue rays are between 33 and 0 percent.



Bulb and Reflector

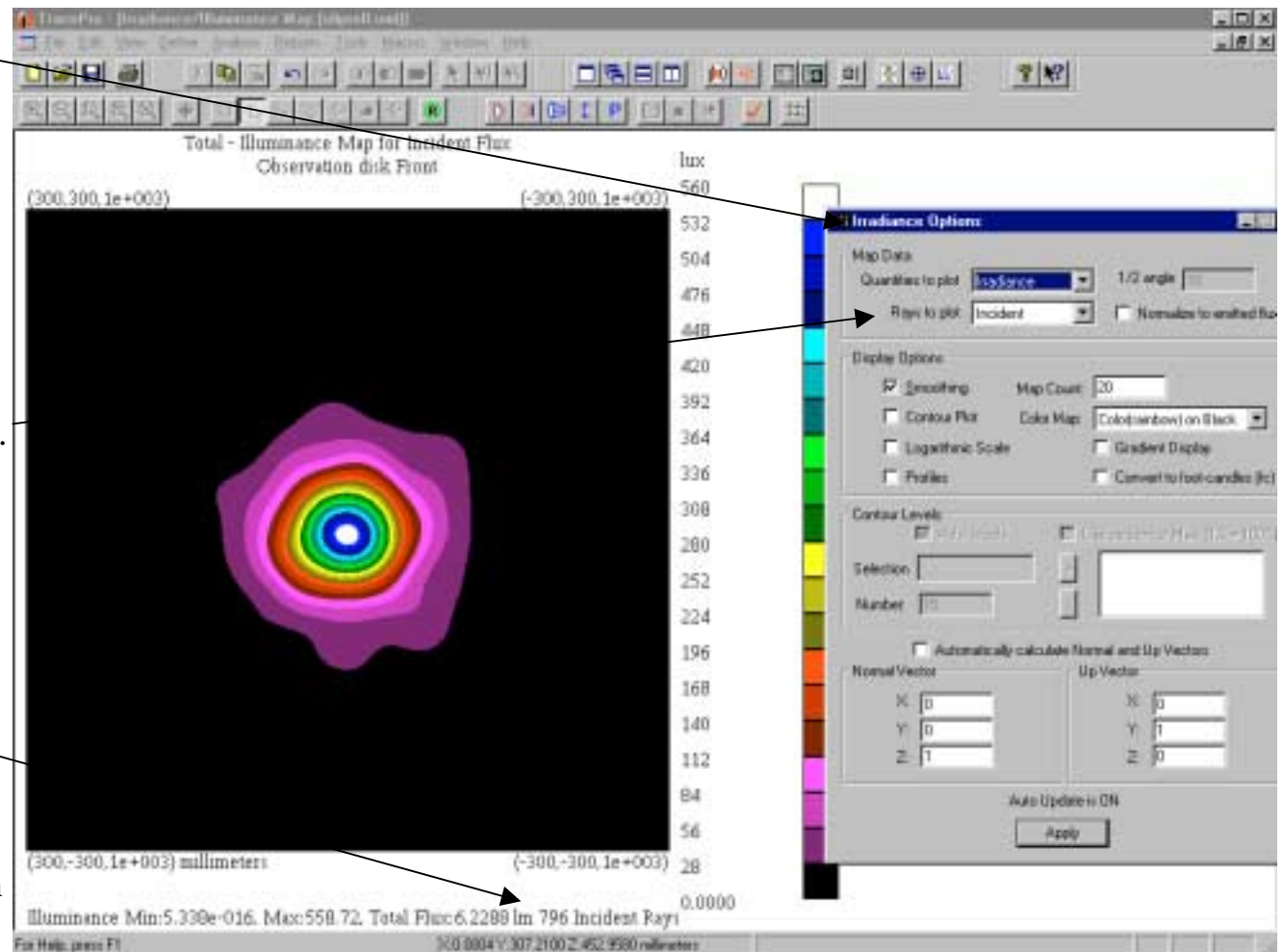
- There are two modes to analyze systems in TracePro. Analysis and Simulation mode. Analysis mode lets the user look at Position and Angular result plots on any surface. Simulation mode lets the user look at only one surface that must be defined before a ray trace takes place. Simulation mode uses much less virtual memory due to the smaller amount of information saved and usually traces faster.
- By default Analysis mode is on. We will now look at several irradiance maps for this system.
- First, select the Observation Plane object and the Front surface. Now click on the irradiance map icon to see the plot shown at right.



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- Notice the default **Irradiance/Illuminance Options** menu shown at right. This menu is available from the **Analysis Menu** and is used to set all the parameters for the output map.
- The default map type is usually set to absorbed rays. If you do not see rays on a surface click this option to incident and a irradiance/illuminance map should appear. This system is set to Photometric units so that all output units are shown in lux and lumens.
- To set radiometric units the user must set this option in the **Analysis Menu** option **Raytrace Options**.



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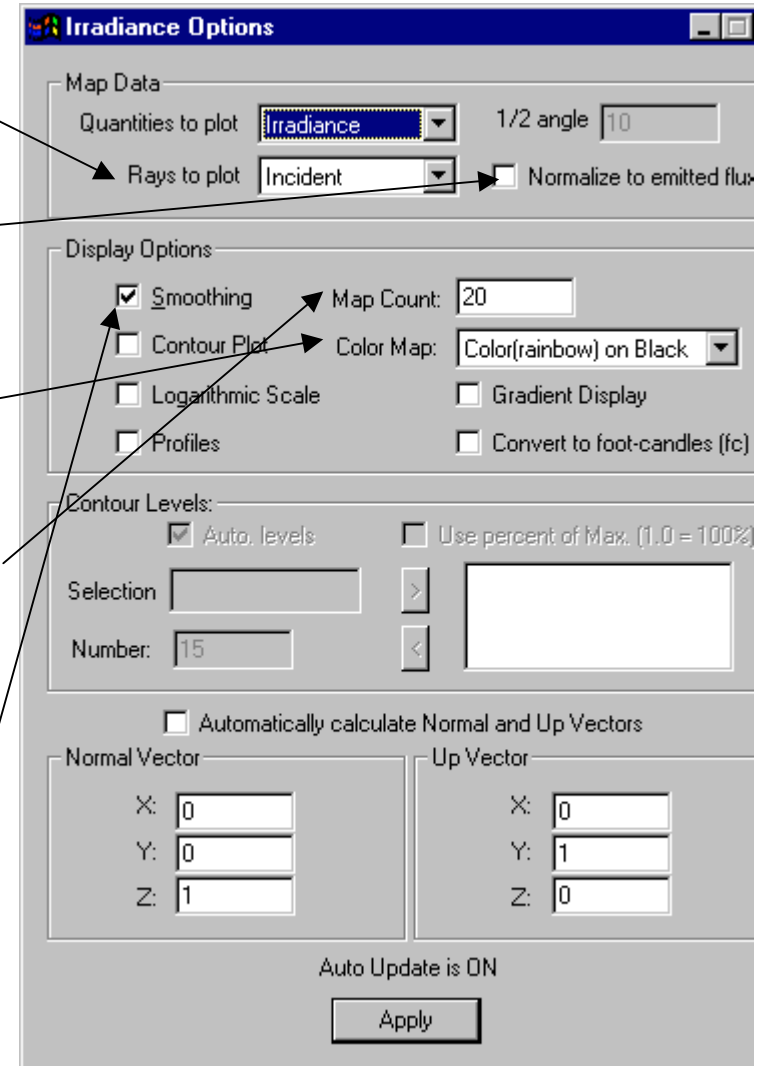
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- The **Rays to plot** options set the map to either incident or absorbed rays being display when the reach the selected surface.
- If the **Normalize to emitted flux** box is checked all rays will be normalized to 1. This is a good way to figure out the efficiency of a light pipe when you have many sources.
- The foreground and background colors of the map are set using the **Color Map** option. Black&White and greyscale maps are good for sending maps over faxes or Black and White printers. Color is best for pseudo-color display.
- The **Count** option determines the number of pixels used by the map to collect rays. A count set to 20 divides the detector into a 20x20 grid of pixels and counts the rays striking each section of the grid and then totals the energy of these rays together. Larger counts show more rays and provide a more accurate view of what is happening on the map if small detail is needed. Smaller counts let the user trace less rays and get a better idea of what they system looks like from a macro perspective.
- The **Smoothing** option applies a Gaussian smoothing across the detector pixels to smooth out choppy or non-contiguous data. This is a method to trace less rays and let the Gaussian smoothing function fill-in the missing data.

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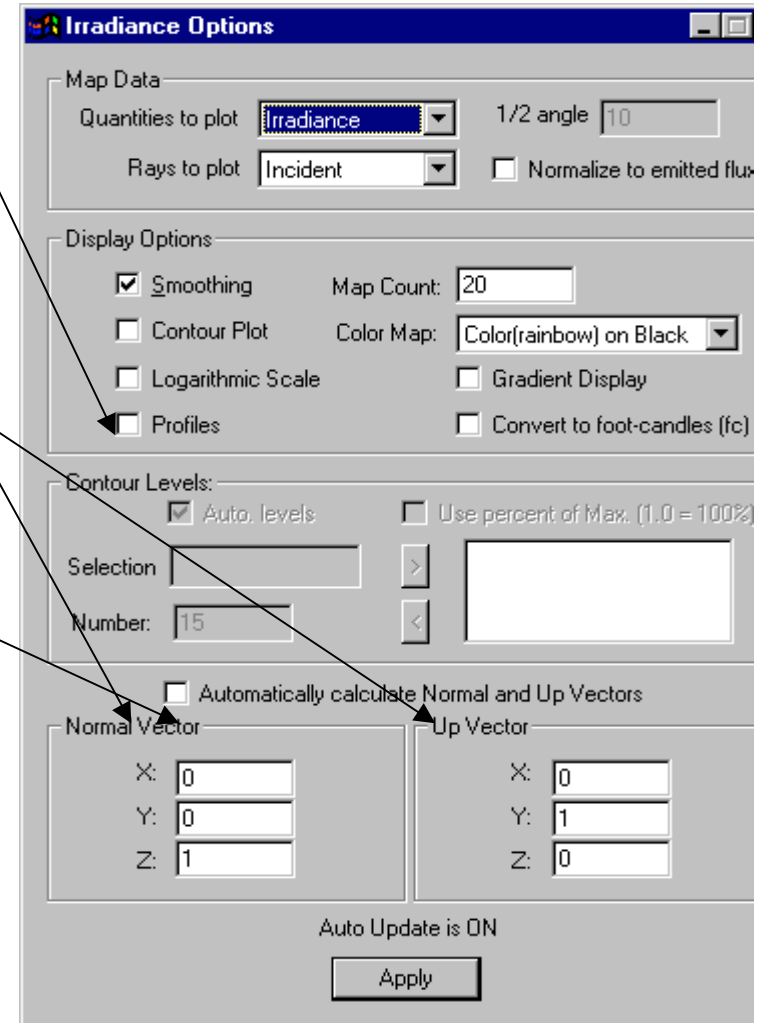
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- The **Profiles** option creates the two-cross sectional plots of the map after selecting this option and pressing the **Apply button**. This will activate two boxes below and to the left of the map. Left mouse clicking anywhere on the map will now show a cross section in both profiles of a horizontal and vertical cut through the map.
- The Normal and Up Vector selection is one of the most critical options. This sets the projection plane that all rays will be collected on. If you have a doubt what the collection plane is, the program can automatically calculate the Normal and Up vector for you. Just click on the **Automatically calculate Normal and Up Vector** box. Remember you must click **Apply** before any option is applied to the map.
- The normal vector is the vector that is perpendicular to the collection plane.
- The Up vector is parallel to the vertical side of the plane.
- If the Normal and Up vector box is entered with the wrong vectors the map may look incorrect. This incorrect map may look like a slice if the selected plane is perpendicular to the correct plane or may show no results



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- Illuminance map of the observation plane with the wrong Normal and Up vector selected and the Profiles option turned on.

