Update Guide
Release 2024.3

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INTRODUCTION

This document serves as a guide for new features, changes, and updates in TracePro 2024.3. This release has several new features to make TracePro more convenient to use and expand its capabilities. This release also fixes several problems reported by TracePro users.

WHAT'S NEW IN TRACEPRO 2024.3?

Changes in TracePro 2024.3 consist of the new Sequence Editor as well as fixes to issues reported by our customers and found by our staff. New features include:

- New Sequence Editor
  - Lens-element-oriented entry and editing of optical design data
  - Sequential ray tracing
  - Analysis functions including beam footprints, wavefront, PSF, and spot diagram

For more details on fixes to specific problems, please refer to the Revision History on the Current Release page in the TracePro Support section at www.lambdares.com.

SEQUENCE EDITOR

The Sequence Editor enables you to edit the sequence of optical elements in an optical design, do sequential ray-traces, and analyze performance metrics such as PSF, Spot Diagram, and Footprints. The following sections describe the features in the Sequence Editor.

To open the Sequence Editor, select **Tools|Sequence Editor**. You must have a TracePro model open before opening the Sequence Editor.

The windows in the Sequence Editor are movable and dockable. By default, they are docked, and you can drag the splitter bars to resize them. You can click and drag the title bar of a window to undock it, and use the pop-up Windows dock control to redock, or leave it undocked. Once undocked, you can drag the window outside the Sequence Editor window.

Sequence Ribbon

The Sequence Ribbon is the main ribbon for editing the sequence and performing analysis. The following option groups are available for entering design data, performing analysis, exchanging data with the TracePro Model, and controlling the Lens View.

- **Edit** - undo and redo previous operations.
- **Lens** - add elements to the sequence.
- **Recipes** - example designs to aid in learning the Sequence Editor.
- **Analysis** - open a new window with analysis plots.
- **Ray Trace** - control the display of rays.
- **TracePro** - add, update or remove the sequence from the TracePro Model.
- **Camera** - control the rendered view of the optical design in the Lens View window.

Figure 1. The Sequence Ribbon in the Sequence Editor.

Lens Group

Use the Lens group to add new Lens Elements to the sequence. Using the Lens group you can create a Singlet, Doublet, Stop, or Reference Surface (normally an Image).

Analysis Group

Use the Analysis Group to view Beam Footprints, Spot Diagram, PSF/Wavefront, and Wavefront. These analyses require rays to be traced as specified in the Ray Trace Group and Ray Trace Settings. Example plots are shown in Figure 2 through Figure 5.

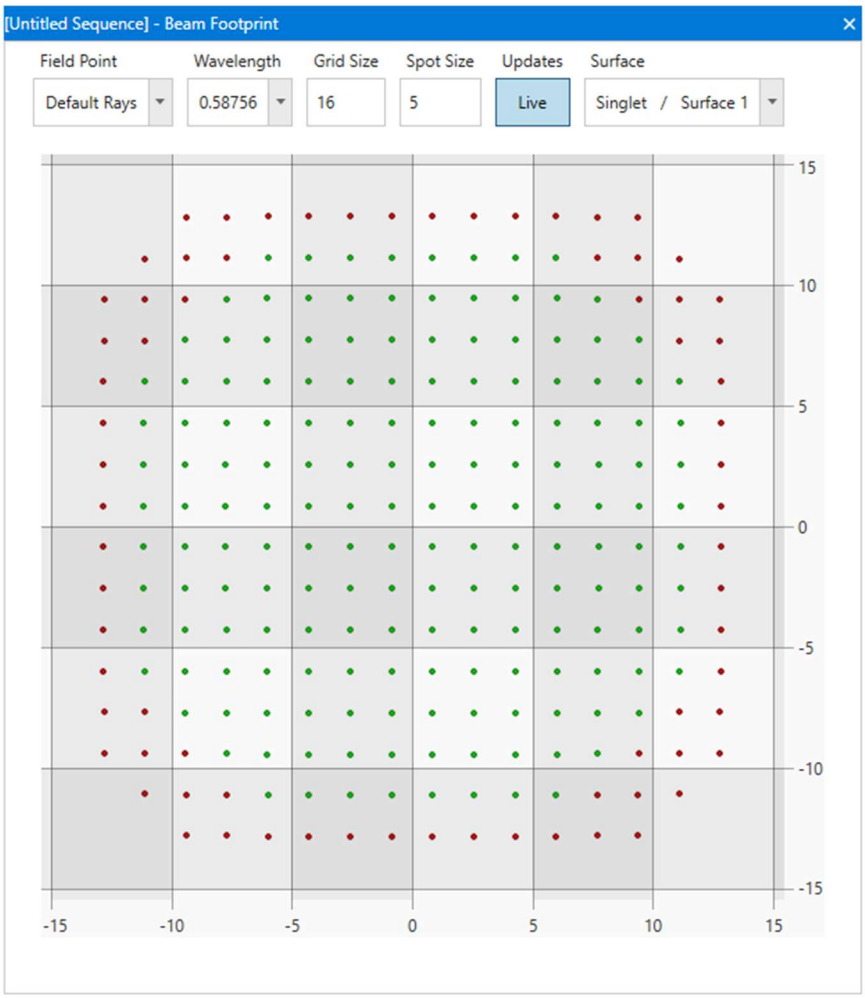

Figure 2. Example beam footprint.

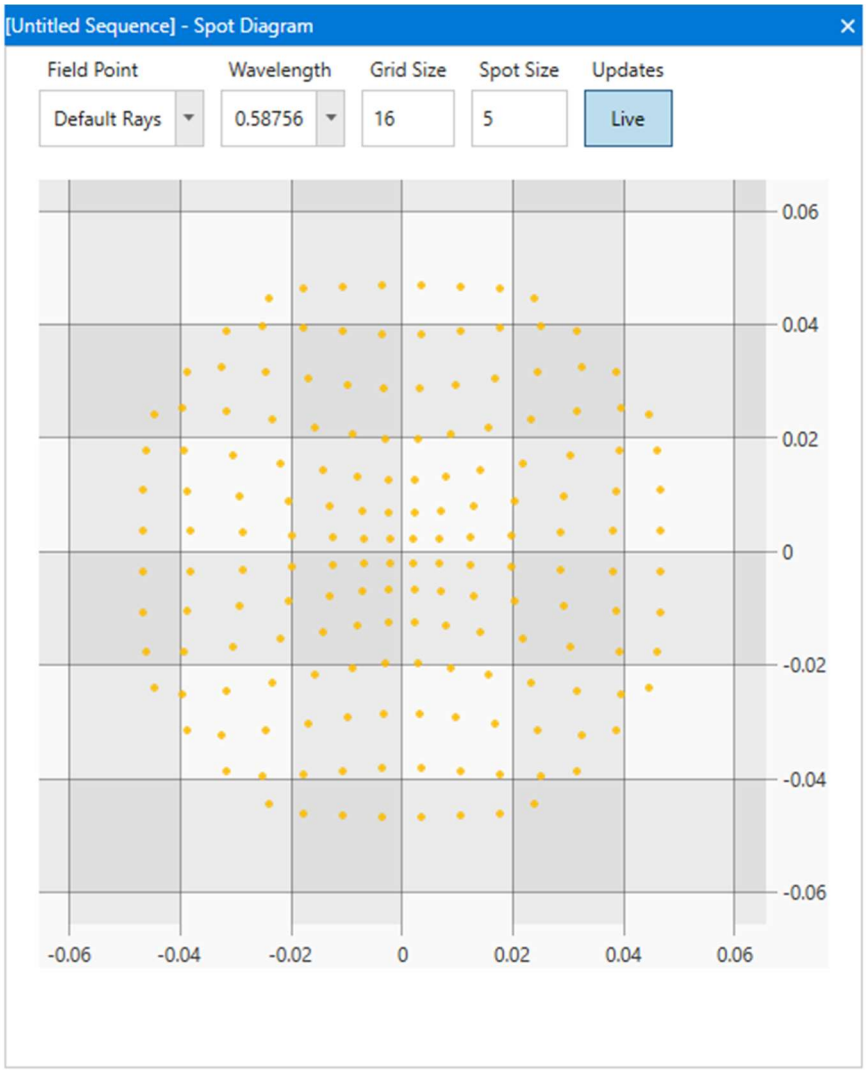

Figure 3. Example Spot Diagram.

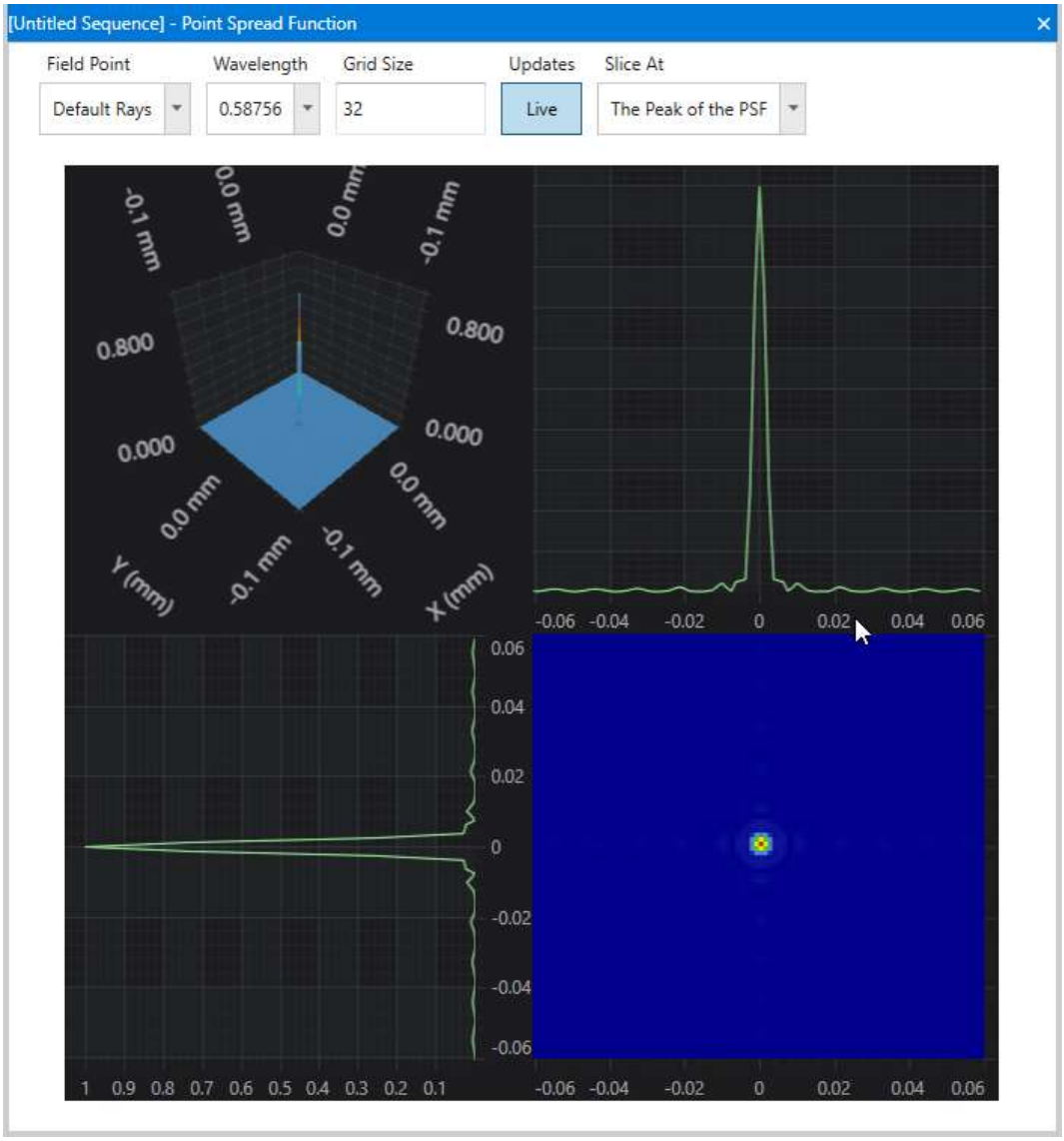

Figure 4. Example PSF.

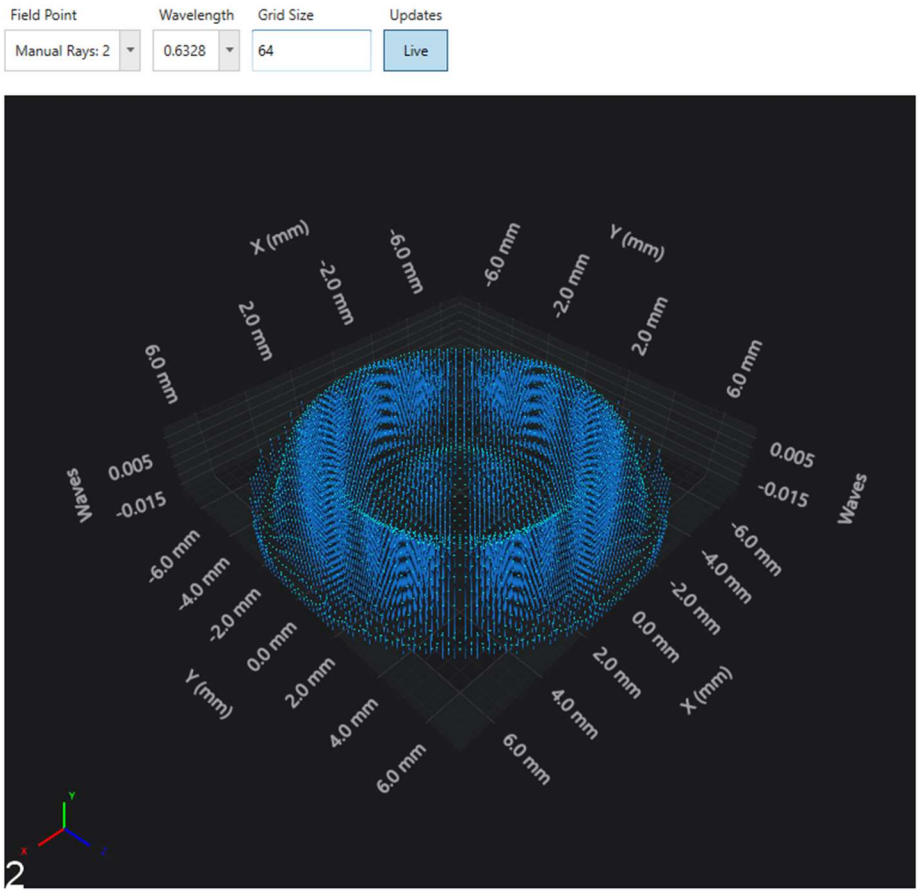

Figure 5. Example Wavefront plot.

General Settings Ribbon

Use the General Settings ribbon to set the units to be used for the sequence, and whether you enter Radius or Curvature to control surface shape. Settings that you can control are:

- **Temperature** - choose Kelvins, degrees Celsius, or degrees Fahrenheit.
- **Wavelength** - choose micrometers, nanometers, or millimeters.
- **Angle** - choose Radians or Degrees.
- **Curvature** - choose Radius or Curvature (i.e. inverse of Radius).
- **Distance** - choose units for all physical length parameters, e.g. Radius, semi-diameter, width, height, thickness, etc. Choices are Meter, Inch, Centimeter, Millimeter, Micrometer, or Nanometer.

Ray Trace Settings

The Ray Trace Settings window allows you to set parameters controlling rays to be traced. These ray sets are used for Analysis functions. Settings are in three groups as described in the sections below. The default location for the Ray Trace tab is at the left of the Lens Set window. Click on the tab to open the window.

Lens Set Window

The Lens Set Window consists of two panels: the Elements list on the left panel, and construction data for the selected element on the right panel.

The elements panel lists the elements in the optical design. The Sequence Editor supports four types of elements:

- Singlet - consists of two optical surfaces, thickness, material, and aperture data.
- Doublet - consists of two singlets cemented together, so that the cemented interface is described by one surface.
- Stop - the aperture stop of the design.
- Reference - normally the Image surface or some other reference surface such as exit pupil.

You can move an element up or down in the list by clicking the up or down arrow at the right-hand end of the element button.

The construction data panel has different sections depending on the type of element selected.

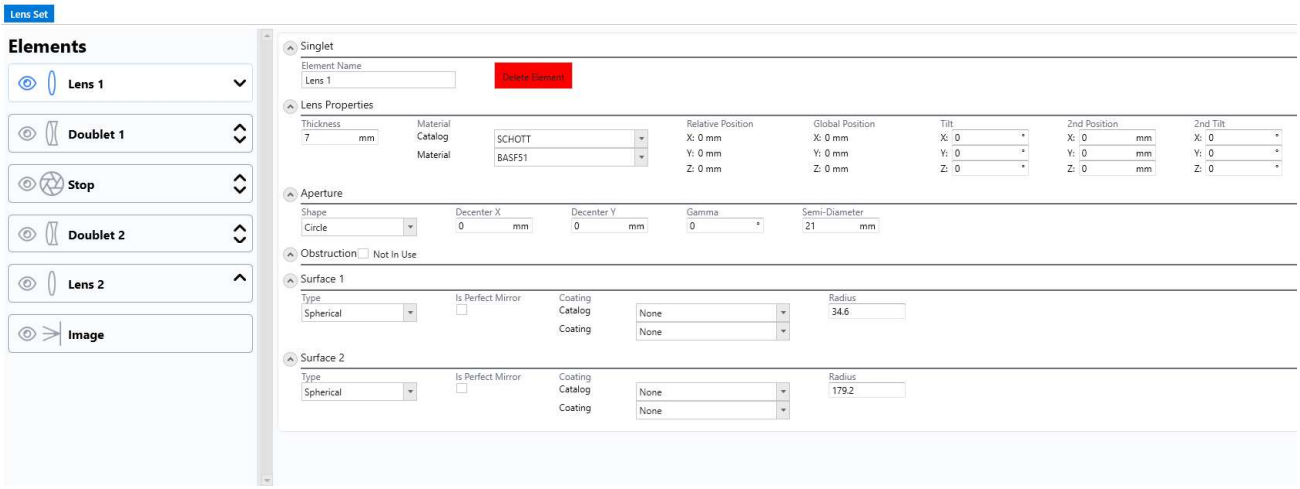

Figure 6. Lens Set Window with construction data for a singlet.

Lens View Window

The Lens View window presents a rendered view of the lens elements. It also features buttons for controlling the view. You can also control the view using the Camera controls on the Sequence ribbon.

The default rendered view has the Z axis to the right and Y axis up, with cutaway view of the lenses. An example view is shown in Figure 7.

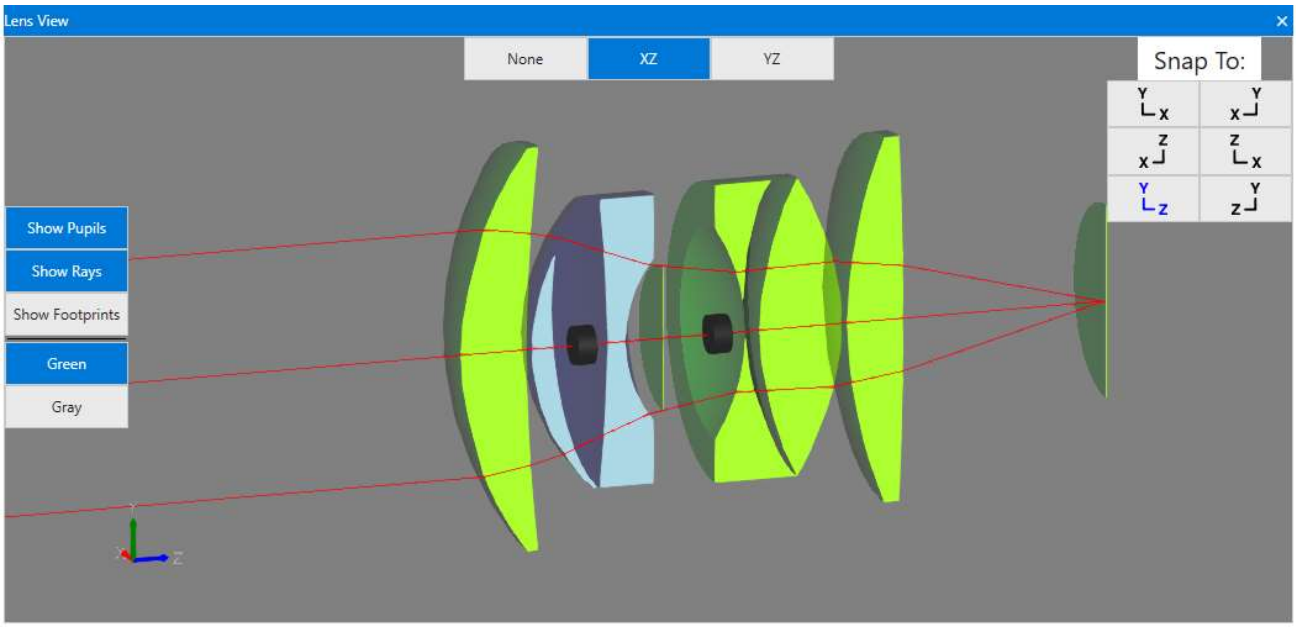

Figure 7. Lens View window with double Gauss design.

The mouse controls are generally the same as the TracePro Model Window. Specifically, you can control the view with your mouse as follows:

- **Mouse wheel** - zoom in and out.
- **Middle button (or wheel) click-and-drag** - pan the view.
- **Left-click-and-drag** - orbit the view.
- **Right-click-and-drag-up-and-down** - zoom in and out.

At the right-hand end of the Sequence ribbon, there is a group of Camera controls. Use the View selection to select one of the standard views. On the right, select Orthographic or Perspective view.

On the left of the Lens View window are buttons to show rays, footprints, and entrance and exit pupils. You can also set the color of the rendered lenses to gray or green. Note that to display footprints you first open a Beam Footprint window.

At the top center of the window, there are buttons to control the cutting plane for the rendered view. You can choose from None, XZ, or YZ.

On the right of the window are buttons to select popular orthographic views. These six buttons are a subset of the selections in the View selection in the Camera group on the Sequence ribbon.