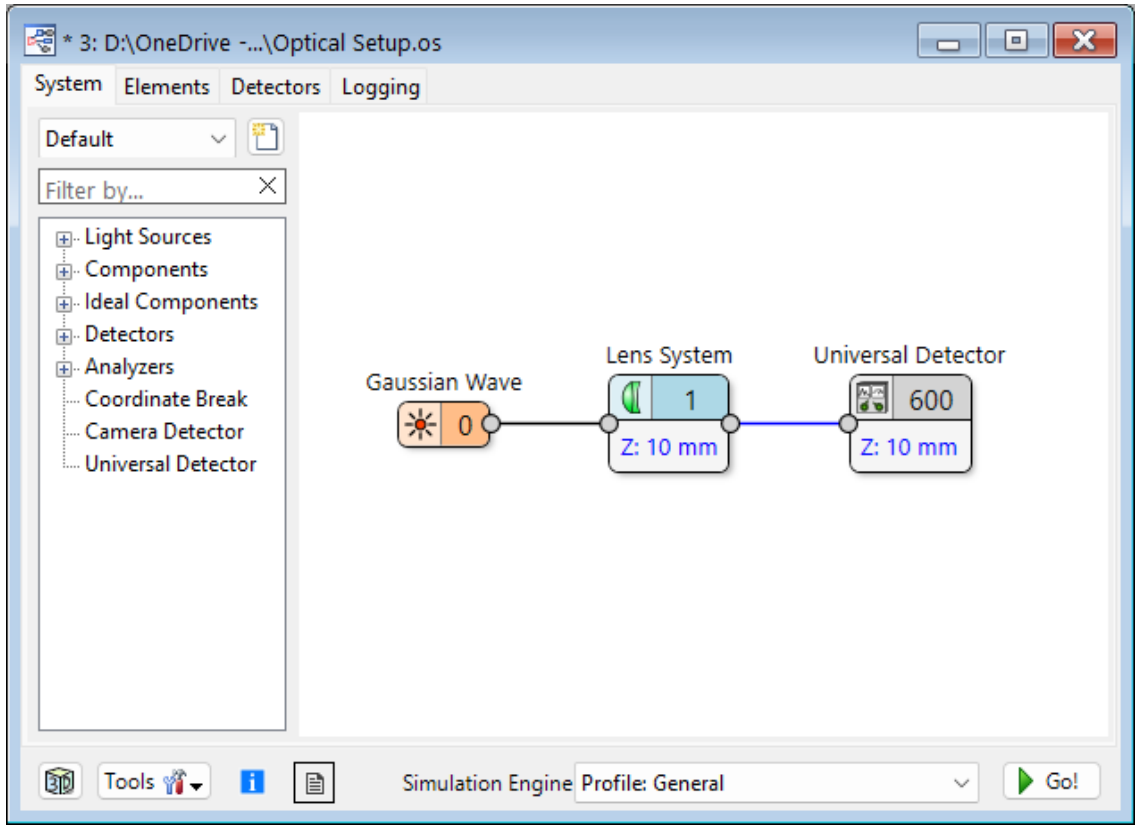
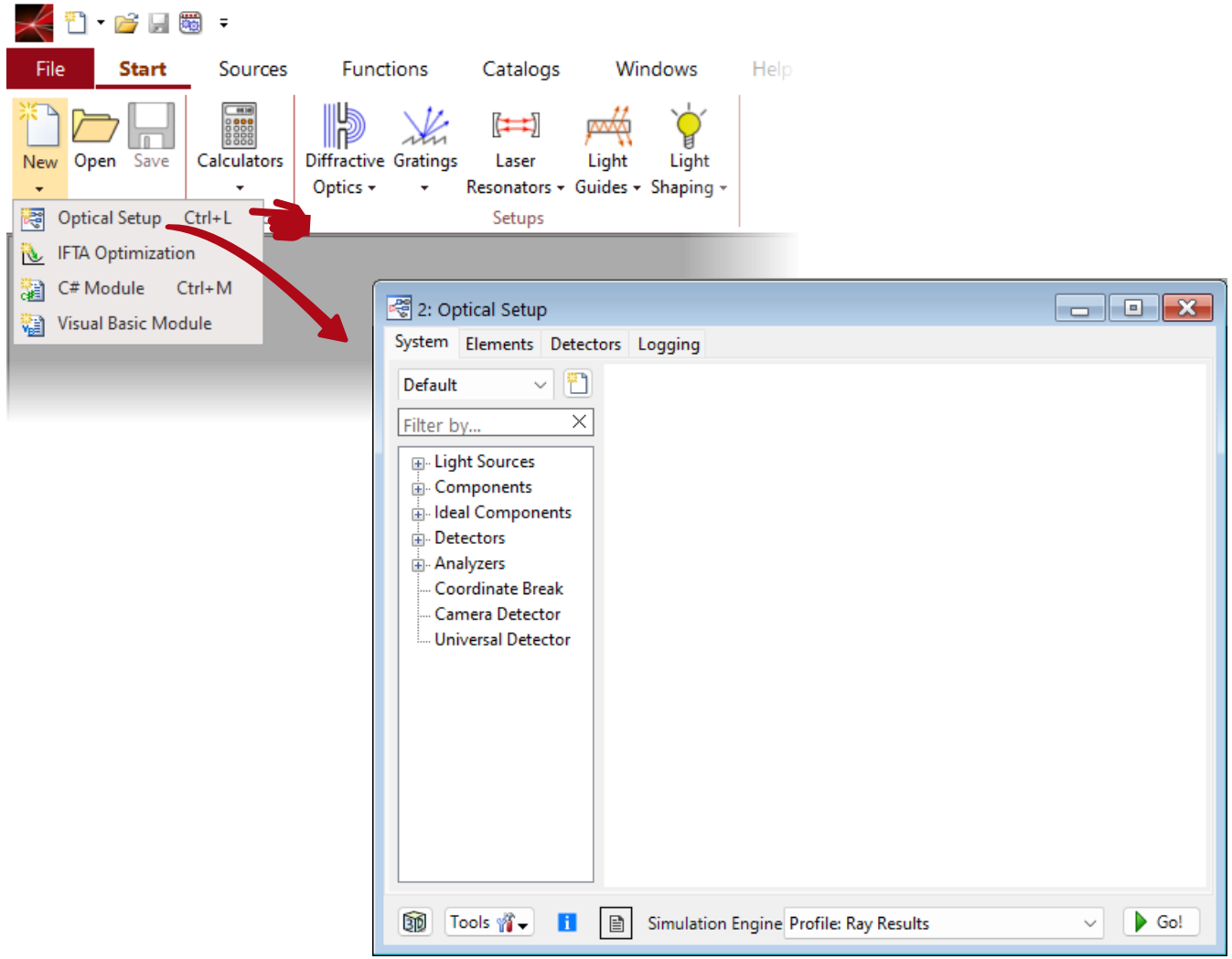
Introduction to the Optical Setup

Abstract



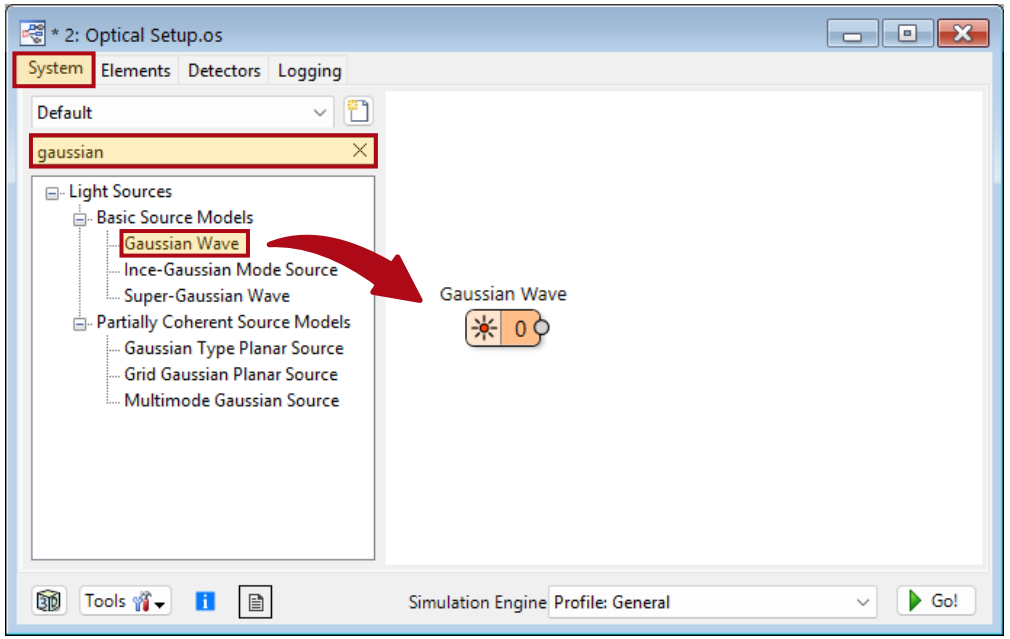
The main purpose of VirtualLab Fusion is to bring the experiments and research from the real world into a virtual one, with the Optical Setup serving as a kind of digital twin to a real-life laboratory. Here, the user can configure sources, components and detectors, control the positions and parameters of all components as well as define the materials that fill the space between them. This use case provides a general introduction to the concept.

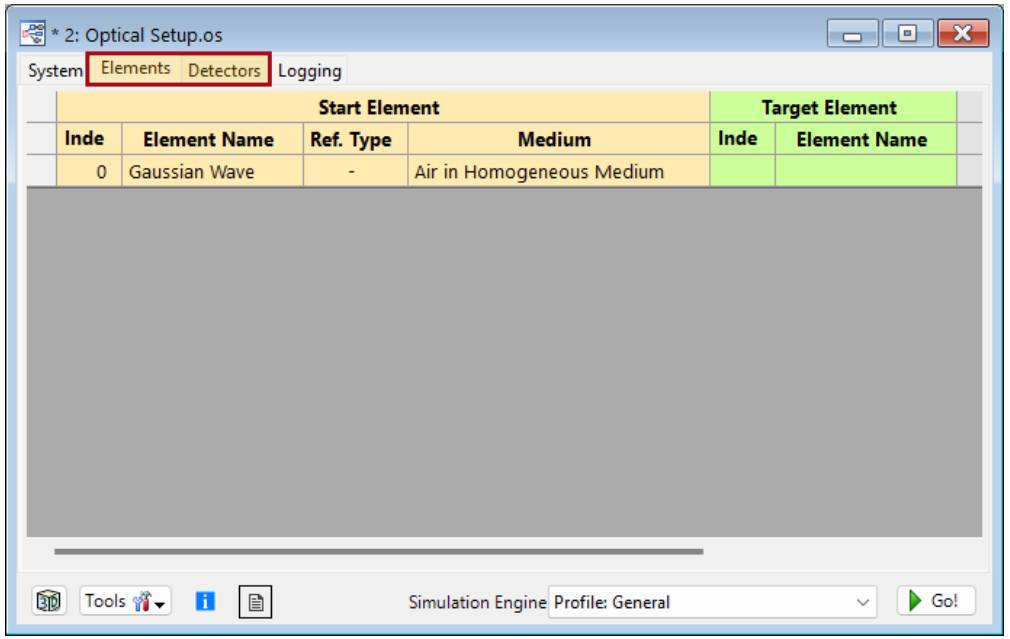
Creating a New Optical Setup



Clicking on *New* and *Optical Setup* in the Start ribbon will generate an empty document, where the overall structure and positioning of your system is visualized, and other aspects of the system, like changing the material that fills the space between two elements, for instance, can be configured.

Adding Elements to an Optical Setup

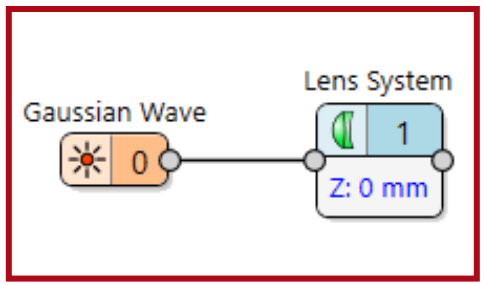




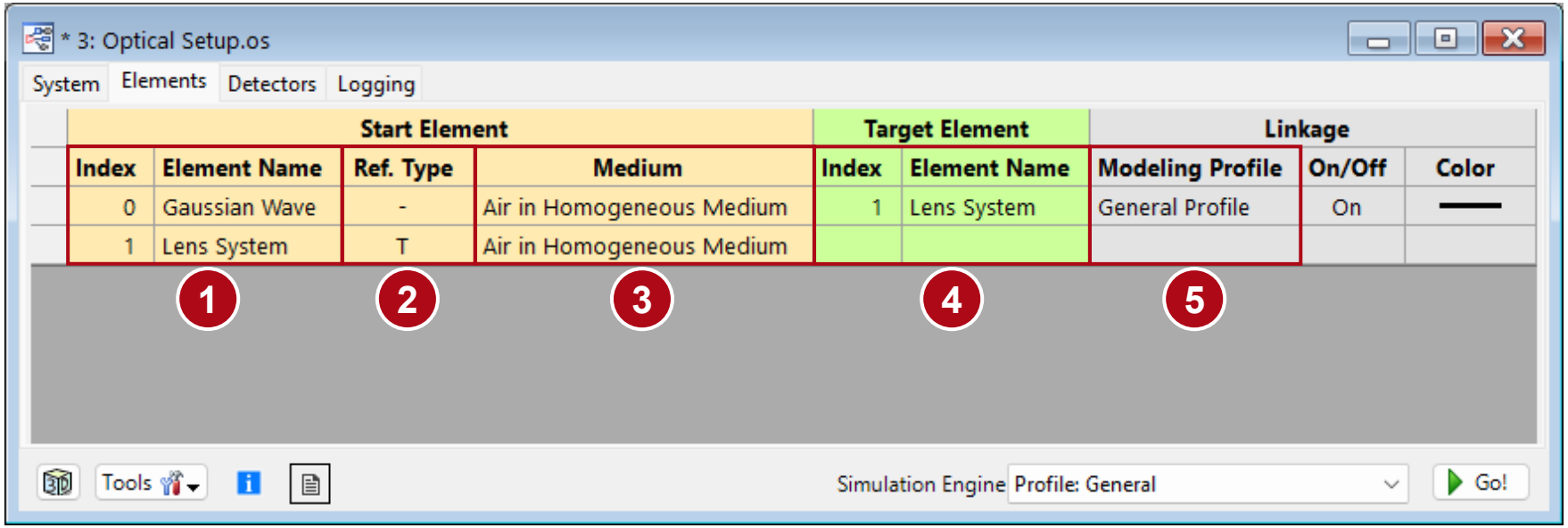
Elements (sources, components, detectors and analyzers) can be added to the *System* by dragging and dropping them from the list on the left side of the *Optical Setup* document onto the space on the right. To find a specific element either follow the three-structure or use the search function on the top-left corner.

Once an element has been dropped on the right side, it also will be automatically listed in the *Elements* or *Detectors* tab.

Connecting Elements to Each Other



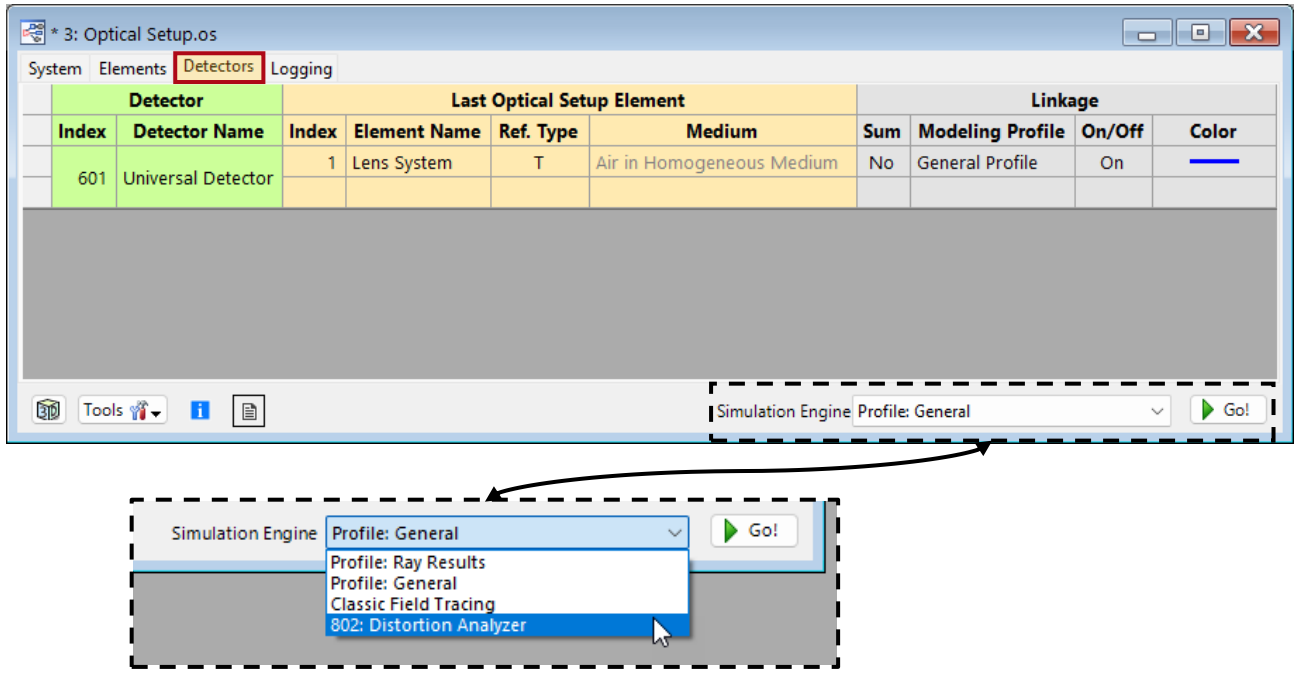
To connect an element to another, simply drag and drop a line between them.



The connection will then automatically appear in the *Elements* tab, including information about:

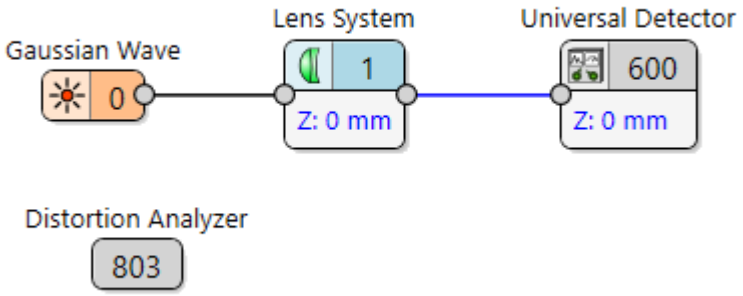
1. Name and index (automatically assigned number) of the *Start Element* for each connection.
2. The Reference Type: R stands for *Reflection*, T for *Transmission.*
3. The homogeneous medium that fills the space between the two elements.
4. Name and index of the *Target Element.*
5. The modeling profile used (see: *Configuring Your Simulation in VirtualLab Fusion*)

Detectors & Analyzers



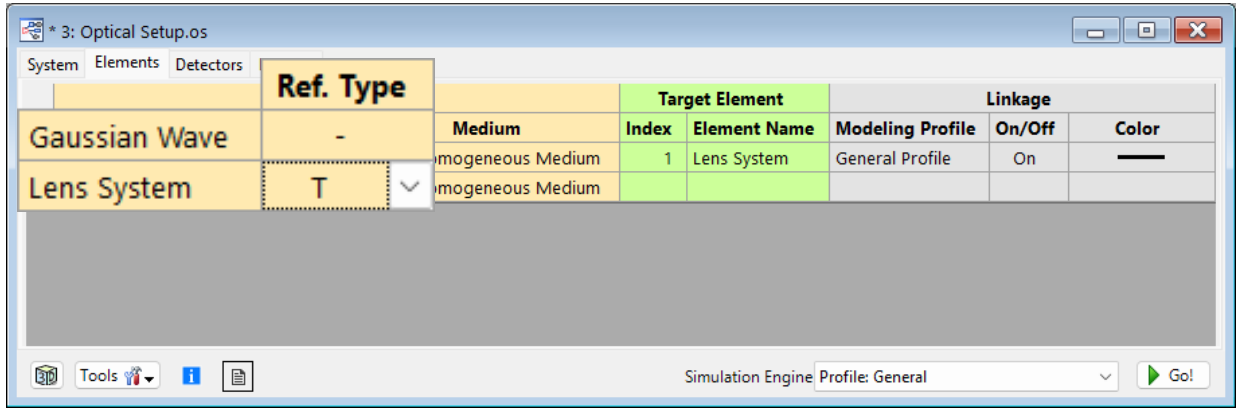
Detectors are listed under the *Detectors* tab. As *Detectors* work similarly to other components (meaning they need connections to operate), the interface looks identical to the one for sources and other components.

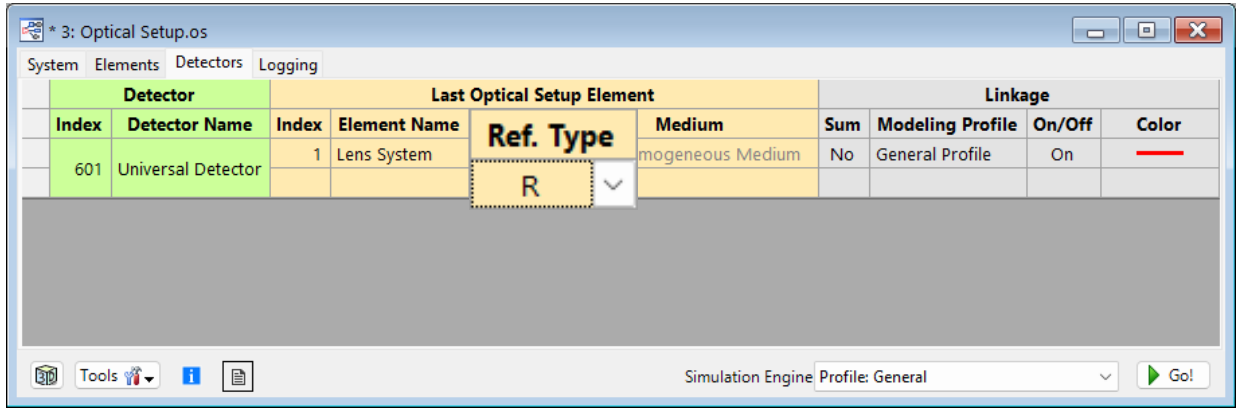
Analyzers on the other hand are not connected to the system and function more as their own simulation engine, often with a “bird’s eye” view of the entire system.



Note: Because of their special nature, analyzers need to be setup as the current Simulation Engine *to be run.*

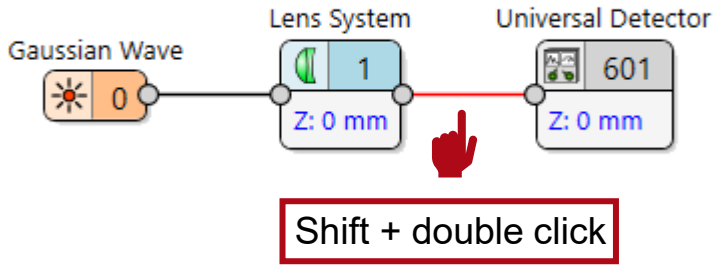
Reference Type



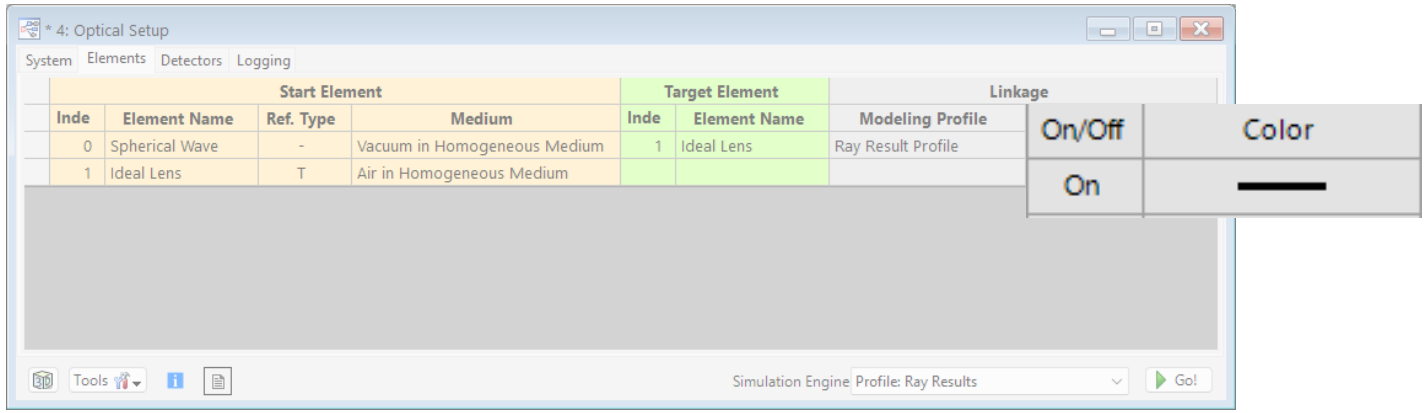


Typically, the transmission type T and the reflection type R are available as reference type. Sources have the reference type “-” only.

In addition to changing the reference type using the dropdown lists, users can also modify it by holding the Shift key and double clicking the connection between the corresponding elements.



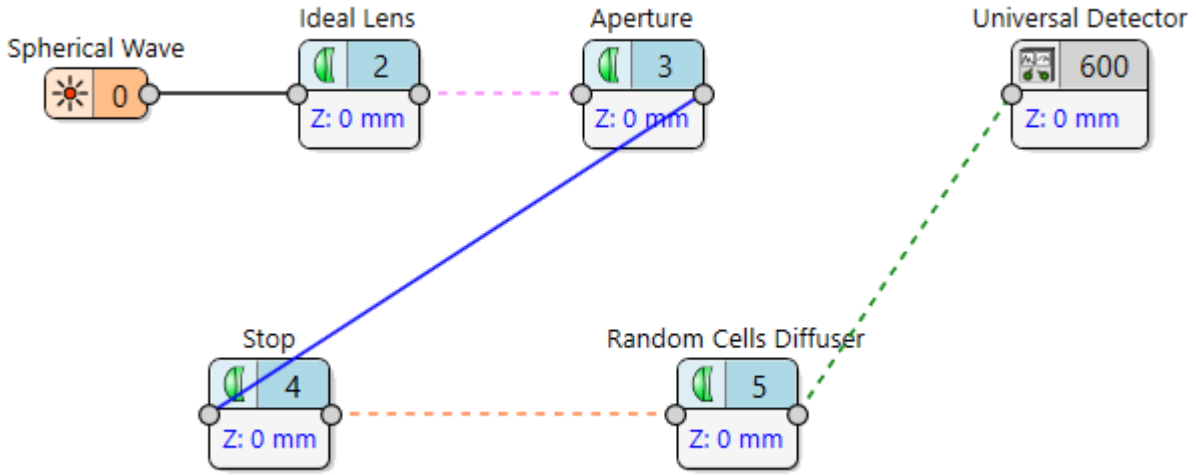
Linkages



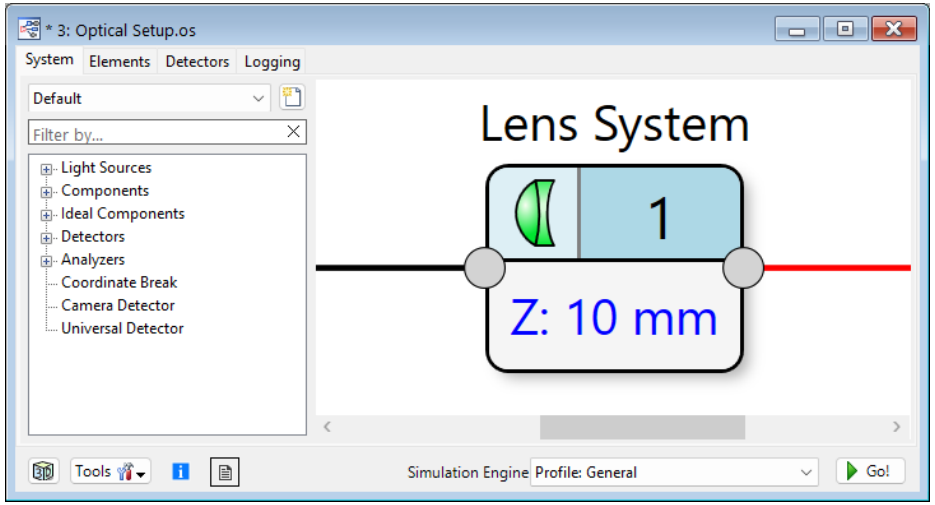
Note: Double-clicking any linkage in the Optical Setup View *will also activate or deactivate it.*

Linkages between the components can be customized in the *Elements* or *Detectors* tab. Users can quickly deactivate certain linkages (indicated in the *System* tab by dashed lines) and even customize the color of any linkage.

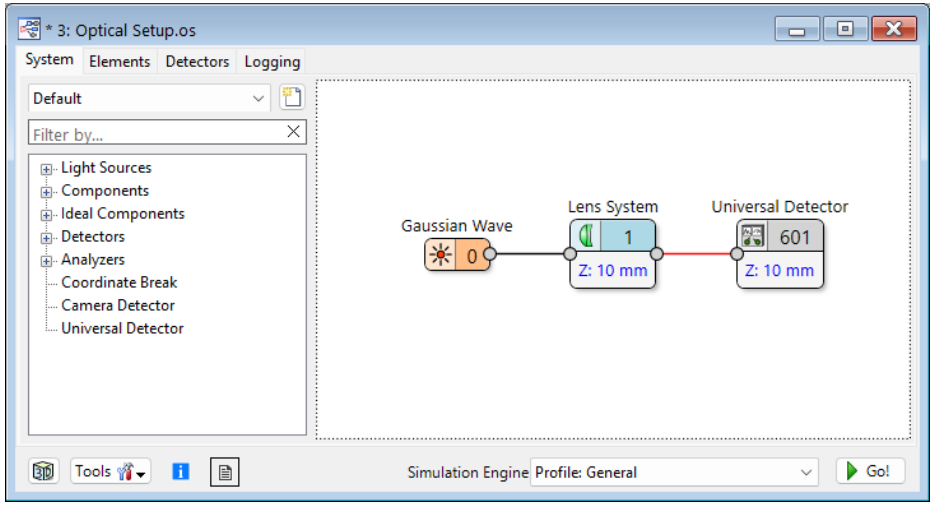
Deactivated linkages will not be considered for the simulation, but the connected components will keep their relative positions.



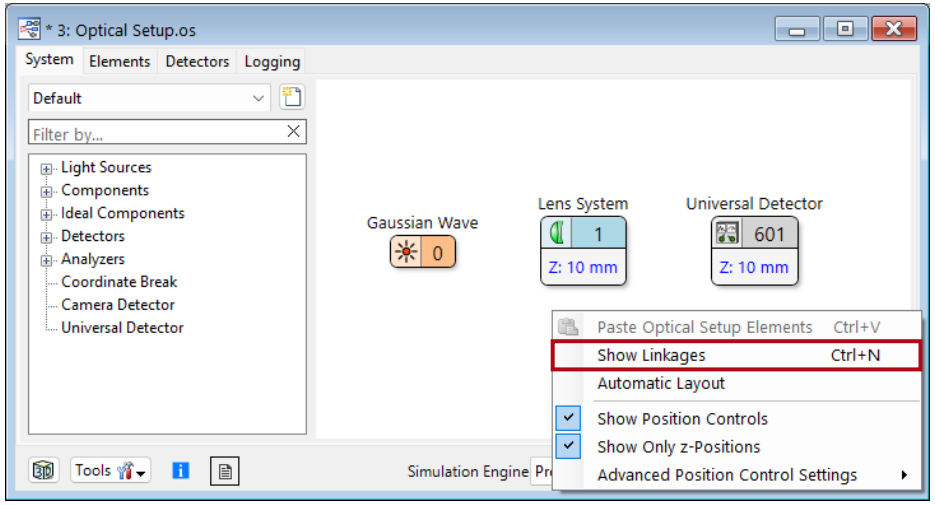
Zooming and hiding Linkages



Ctrl + 0

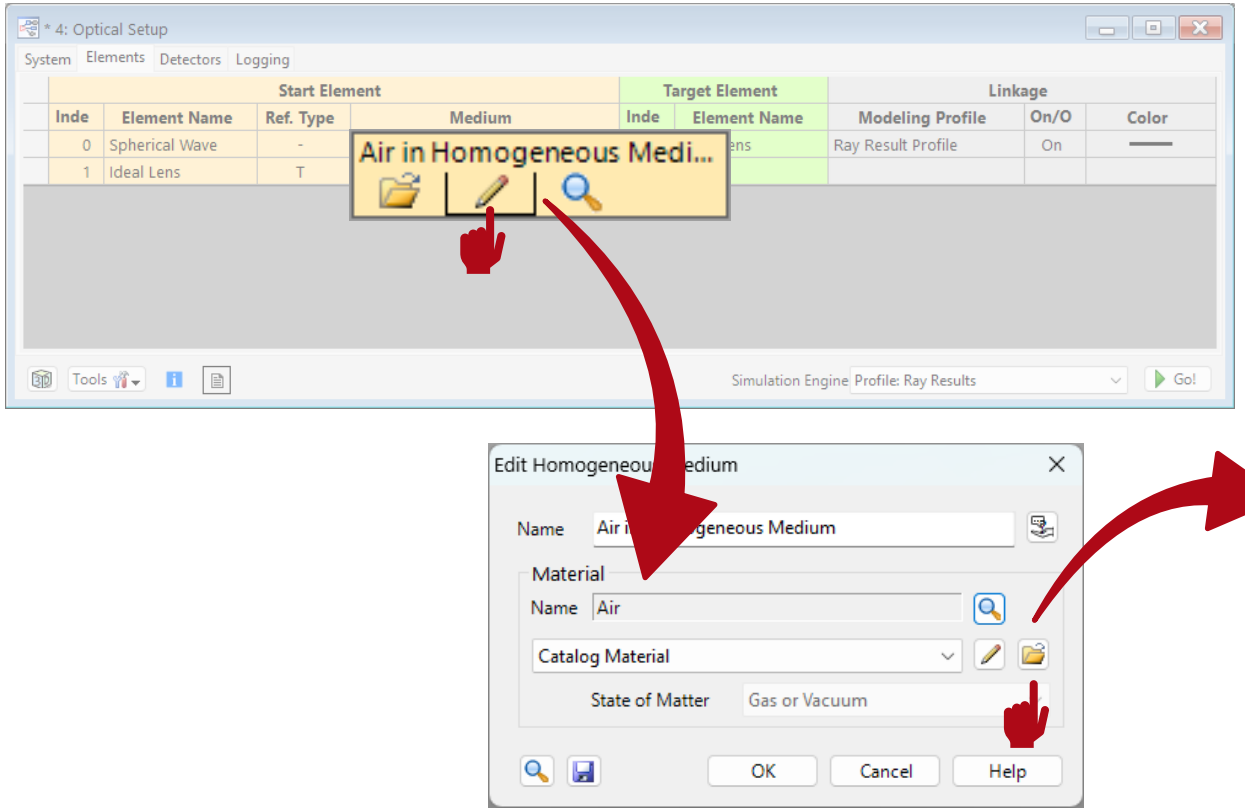


Ctrl + N

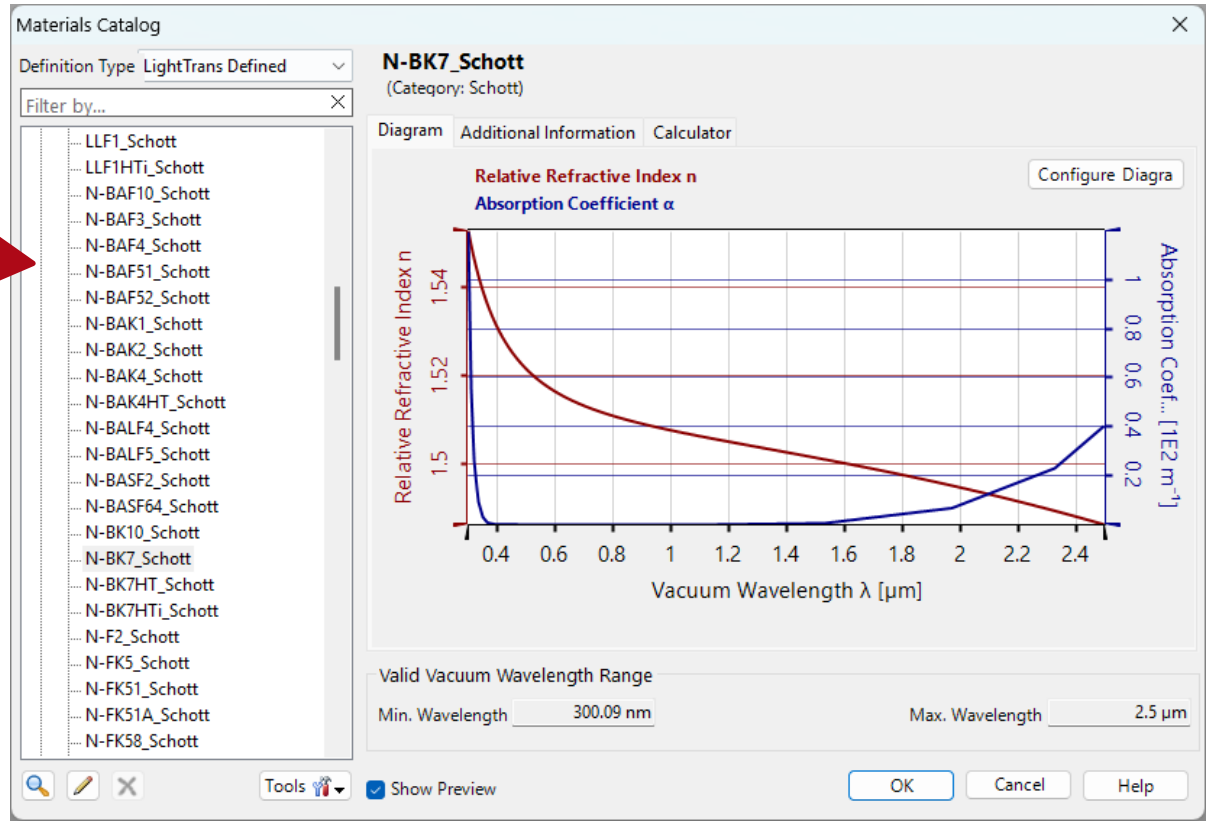


When the *System* window is zoomed in, users can press Ctrl + 0 to reset the zoom to the initial factor. Linkages can be hidden either by the context menu, or by pressing Ctrl + N.

Defining the Medium and Material between Components

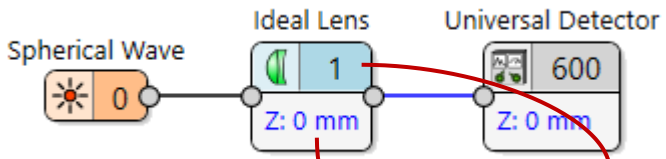


Users can define the material that fills the space between two elements in the system.

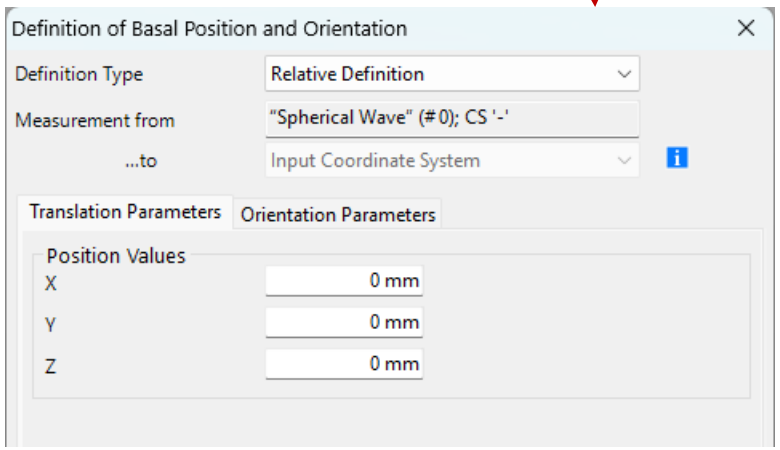


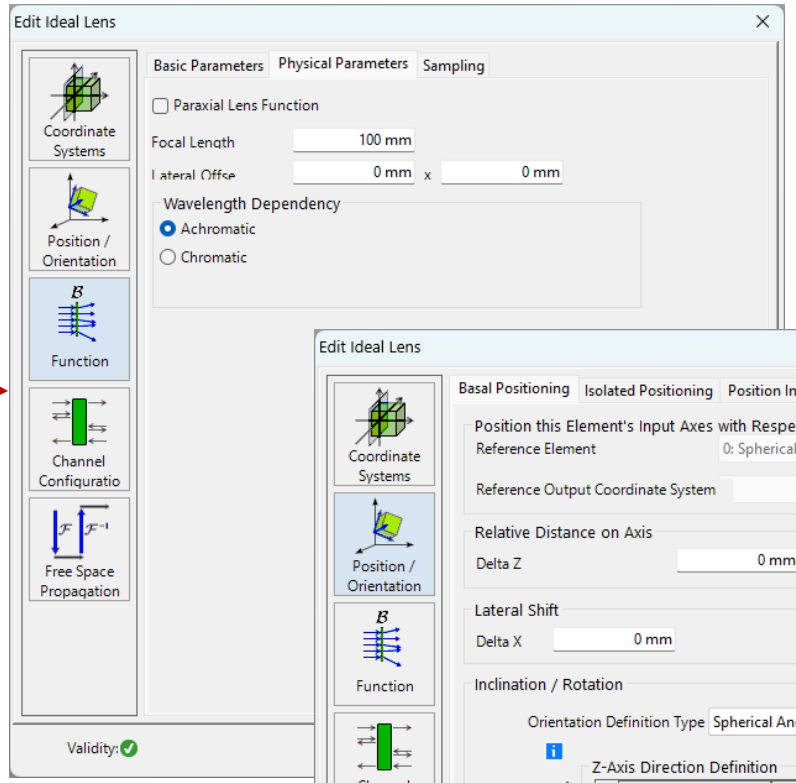
In VirtualLab Fusion, *Medium* is used to speak of the spatial dependence of the refractive index (e.g. a homogeneous medium), while *Material* refers to dispersion.

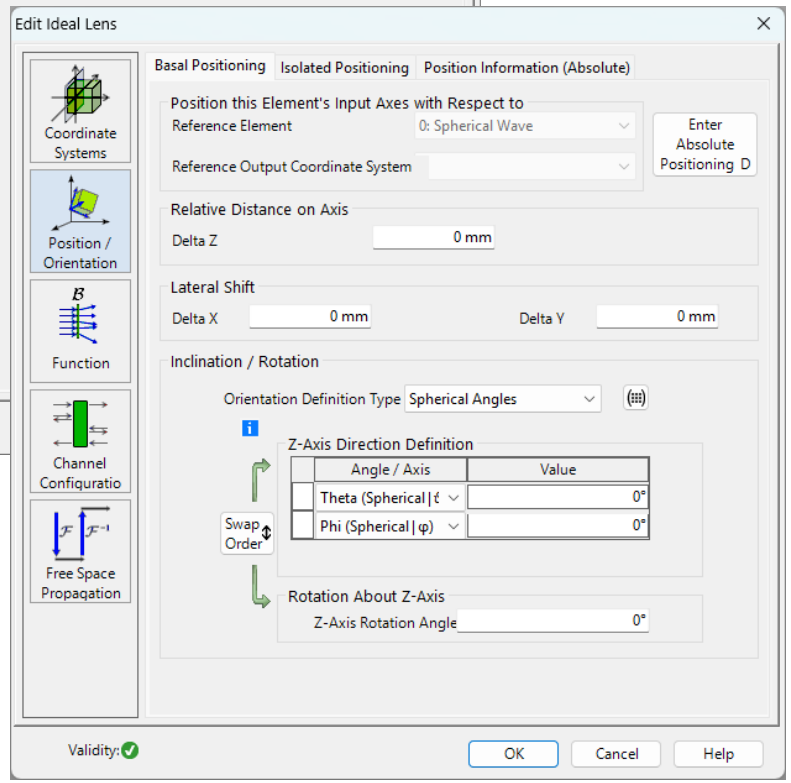
Specifying Position and Parameters of Components



Note: Double-click on the position control panel at the bottom of the component to adjust its position.

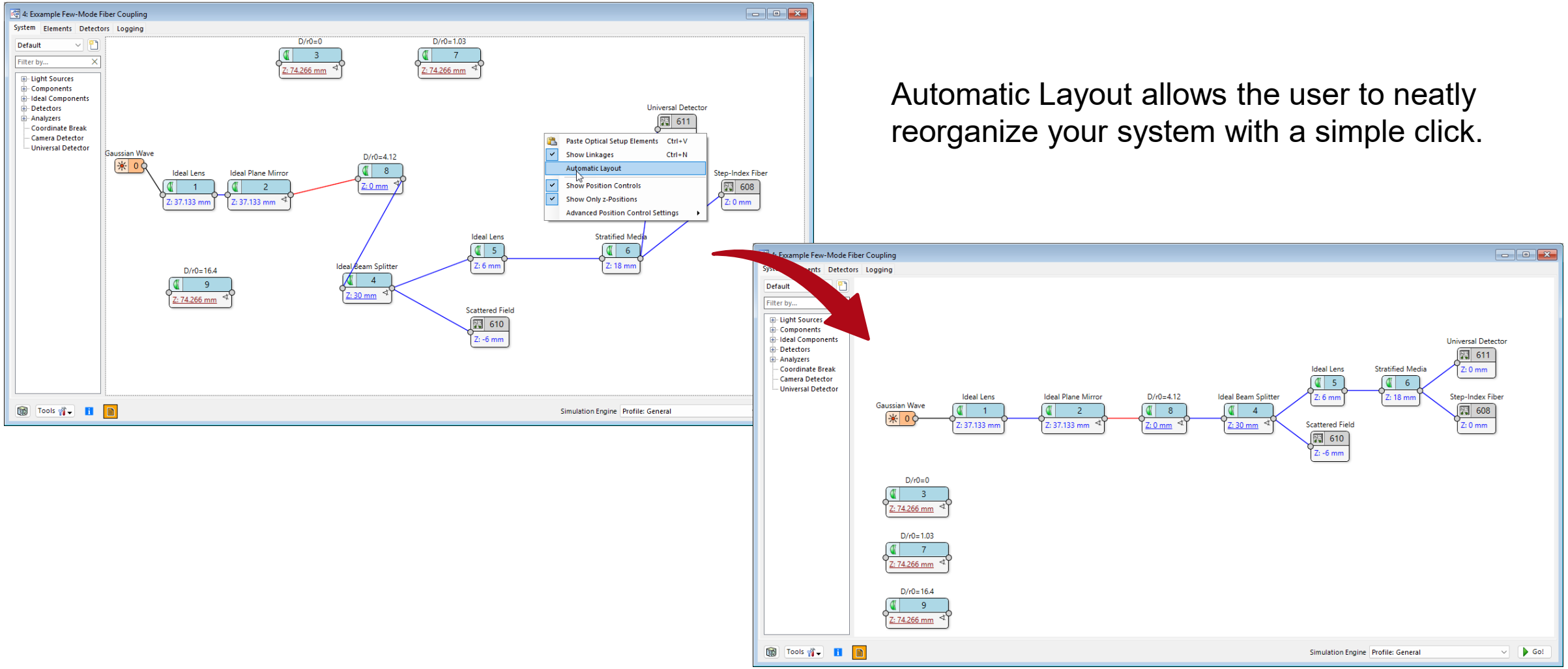






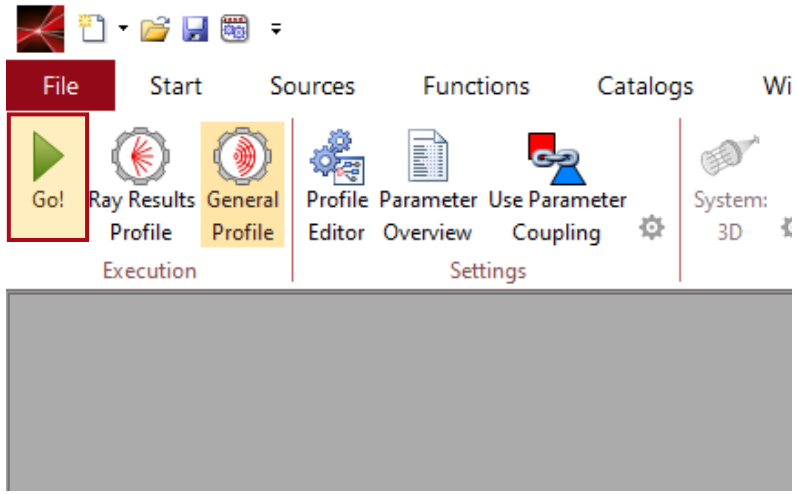
Double-clicking on an element will open its *Edit* menu, including options for positioning and its physical parameters.

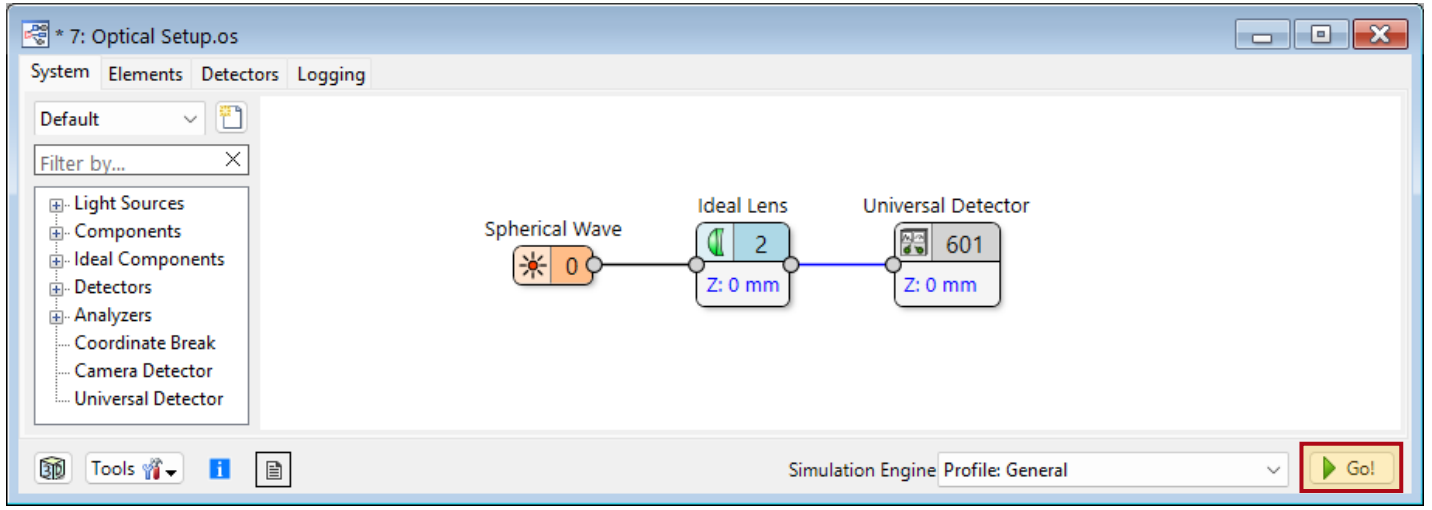
Automatic Layouts



Automatic Layout allows the user to neatly reorganize your system with a simple click.

Performing the Simulation

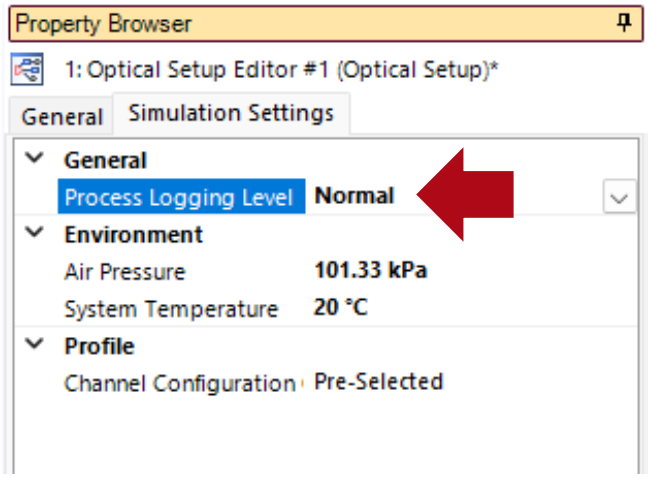




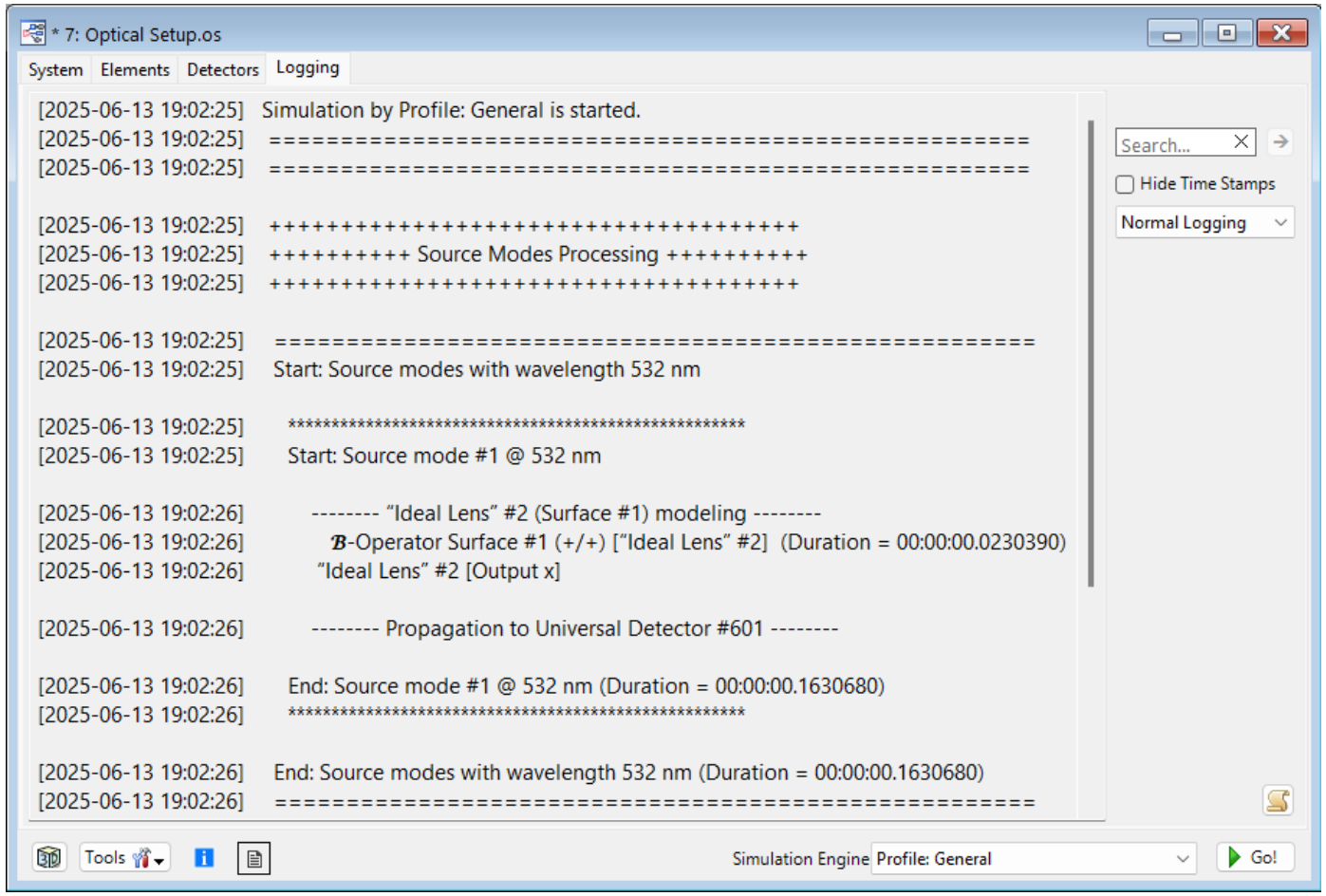
To actually perform the simulation, simply click on the *Go!* button either in the Optical Setup Window or in the *Profile Editing & Run* menu tab. VirtualLab Fusion will then automatically start the simulation using the active *Simulation Profile*. For more information on how to configure your simulation, take a look at the following documentation:

Configuring Your Simulation in VirtualLab Fusion

Logging



To see the current status of the simulation or to get more information about the internal processes (like which Fourier Transforms was used), *Logging* can be activated in the *Simulation Settings* of the *Property Browser*.



Document Information

Title	Introduction to the Optical Setup
Document code	TUT.0329
Publication date	08.07.2025
Required packages	-
Software version	2025.1 (Build 1.172)*
Category	Tutorial
Further reading	• Configuring Your Simulation in VirtualLab Fusion • Create Custom Optical Setup Tree

** The files attached to this document require the specific version or later.*