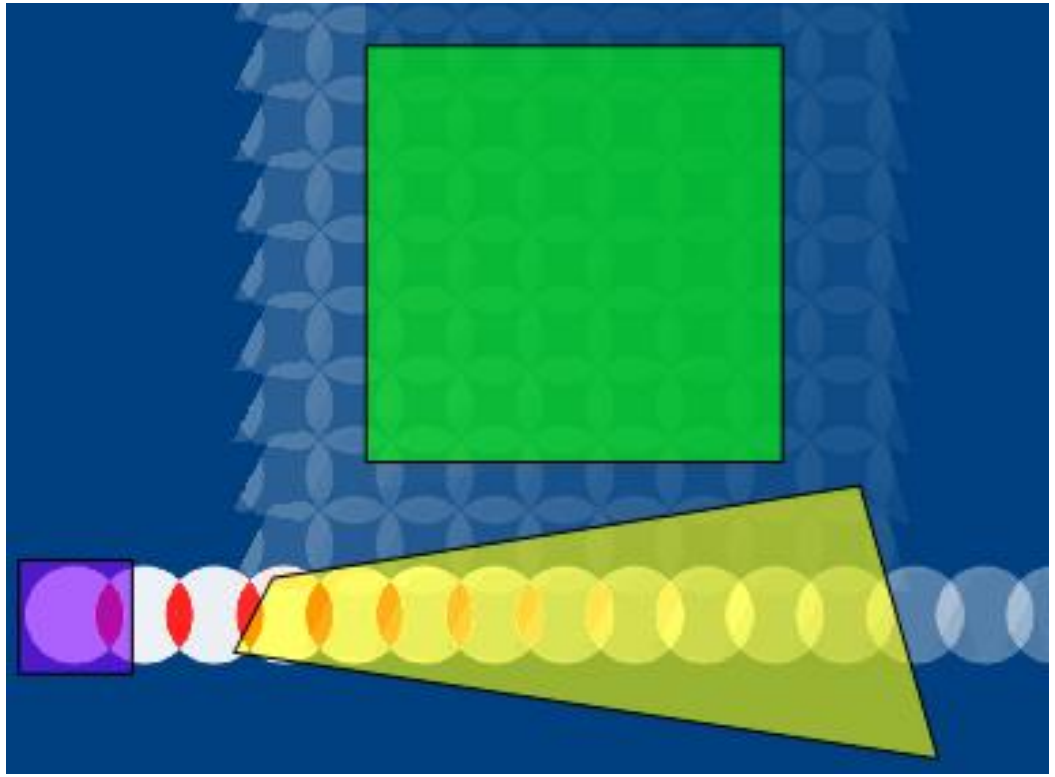
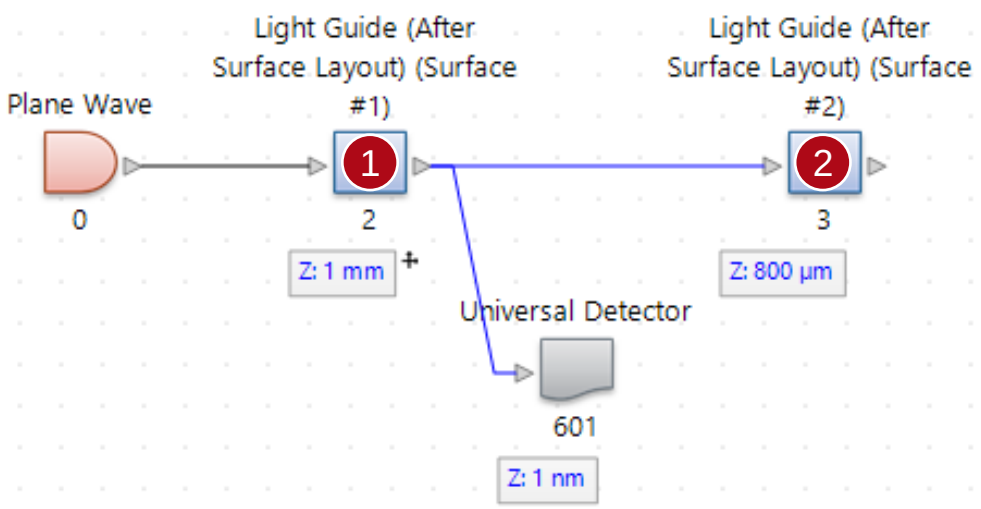
Visualize Grating Regions in Lightguide Results

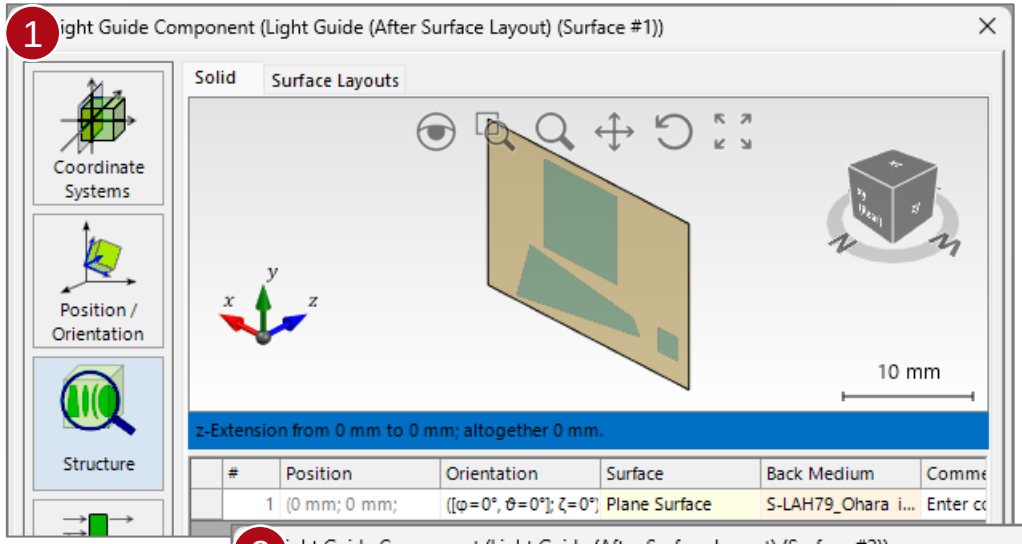
Abstract

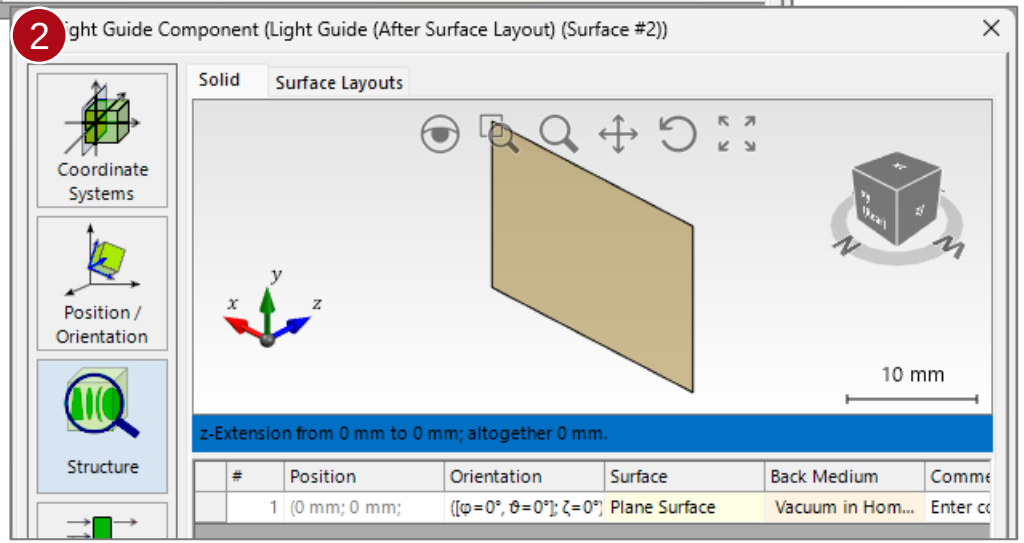


Lightguide systems based on surface relief gratings for augmented- and mixed-reality (AR/MR) applications are currently one of the hottest topics. These systems are known for their large number of free parameters as well as mixing of spectral and angular modes, making any design process challenging. To assist the optical engineer in this task, VirtualLab Fusion offers numerous analysis and visualization tools that provide deeper insight into the behavior of the system. In this use case, we present a detector add-on for the Universal Detector that allows the visualization of grating regions (such as incoupler, outcoupler, and eye-pupil expander) directly on field data.

Visualization of the Field inside a Lightguide Slab

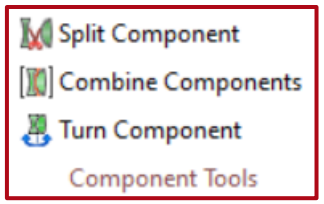




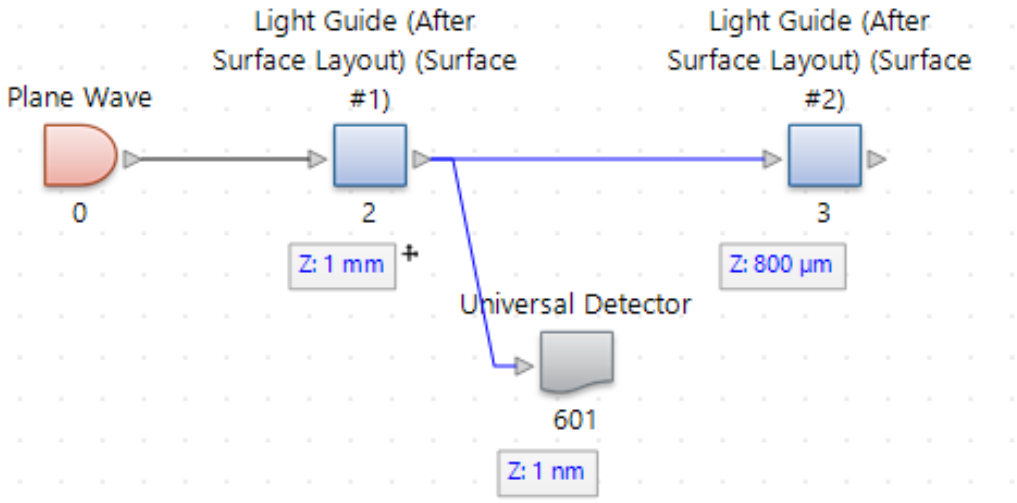


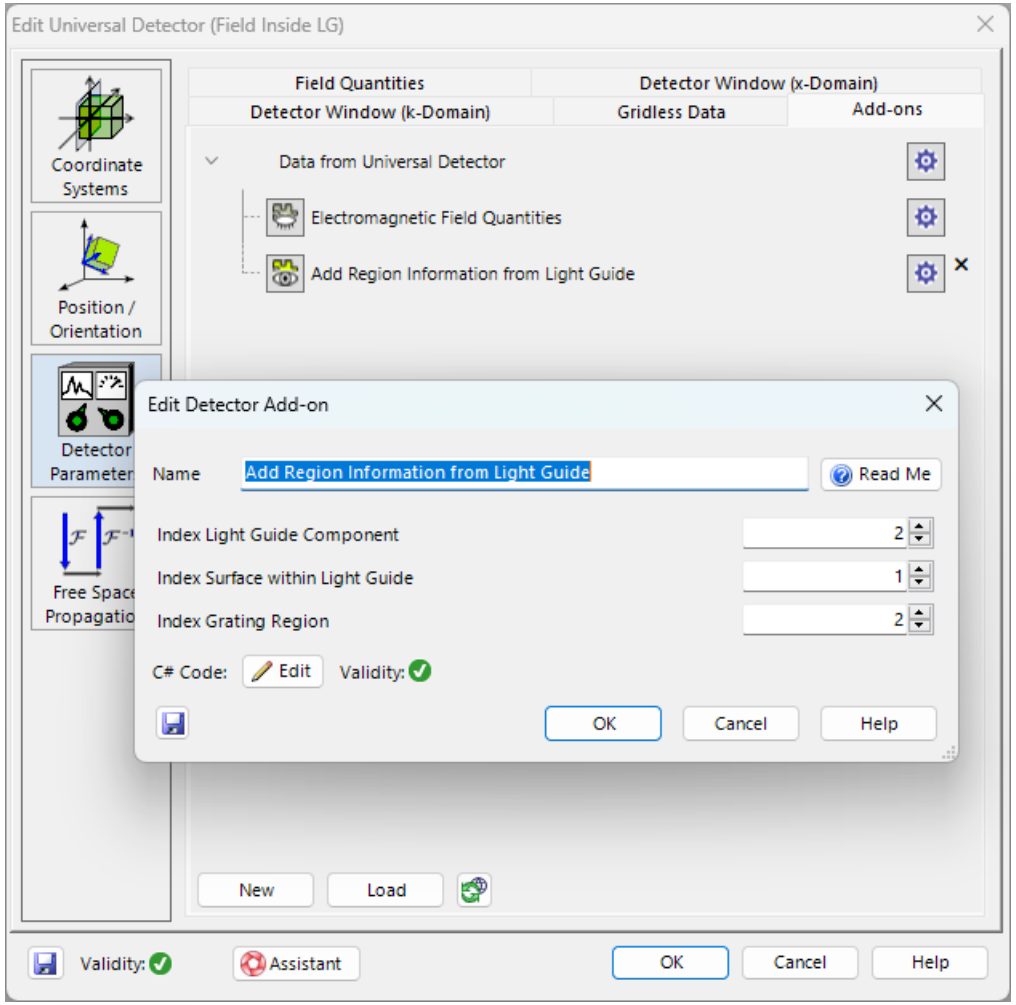
Split the lightguide into two *Light Guide Components* (each one incorporating one surface) and place a *Universal Detector* in between to elaborate the field inside the structure. Please note that the *Manual Configuration* must be active, and the medium of the detector needs to match the lightguide slab.

The *Split Component* tool (under *Layout Tools*) can be used to split any element containing multiple surfaces into individual components.



Universal Detector





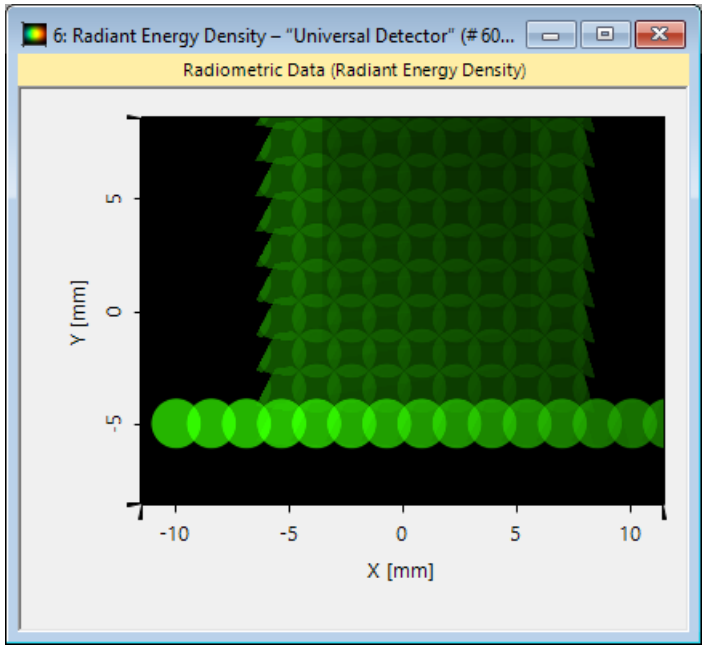
The *Universal Detector* outputs the electromagnetic field and allows the manipulation and further evaluation of the gathered data through customizable *Add-ons.* In this use case, we would like to highlight a special *Add-on* that adds information about the grating regions of the lightguide to the detected field.

More information about the *Universal Detector* under:

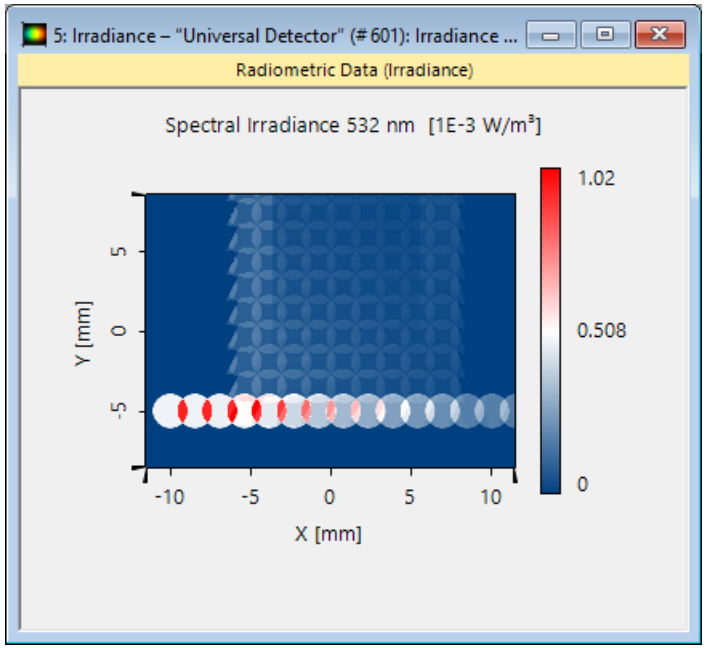
Universal Detector

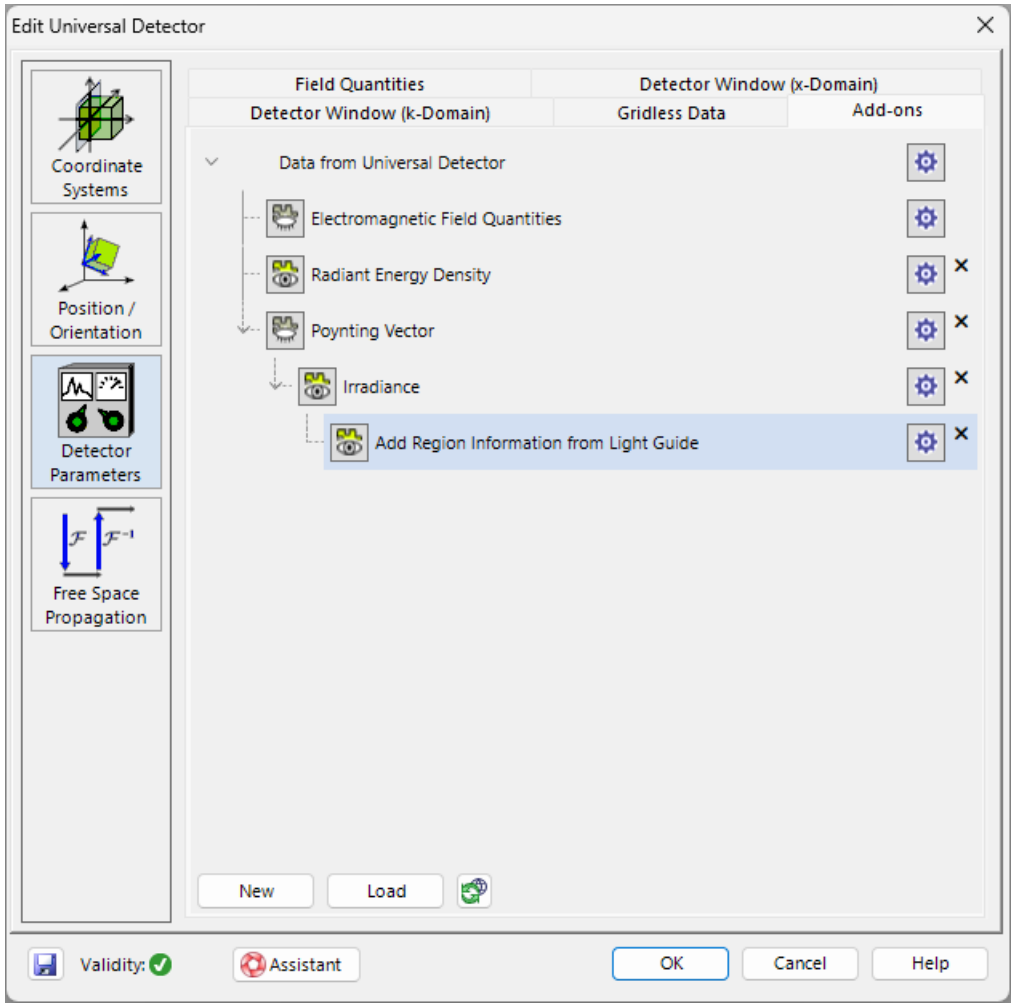
Universal Detector

radiant energy density



irradiance

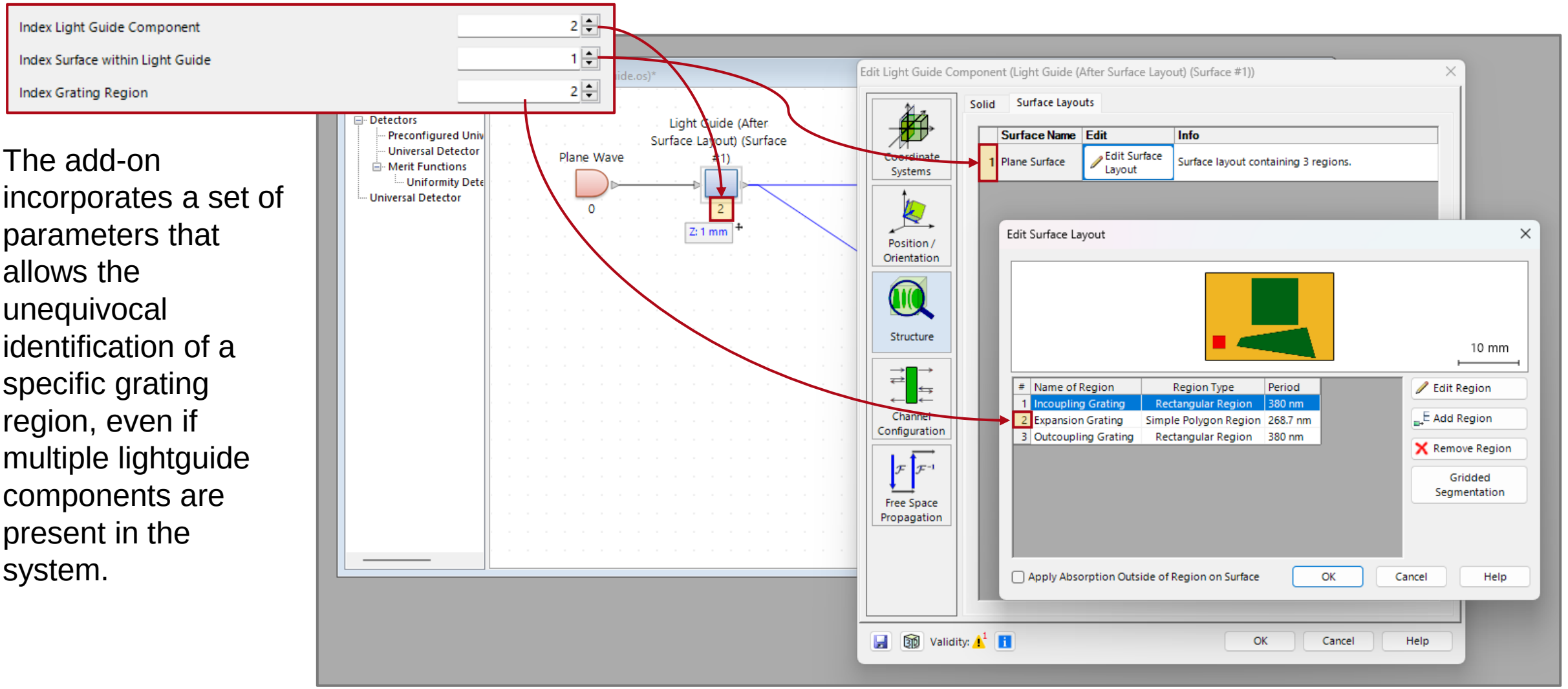




The *Universal Detector* can also be used to output different physical quantities, such as energy density or irradiance.

The *Add Region Information from Light Guide Add-on* can also be applied on those quantities.

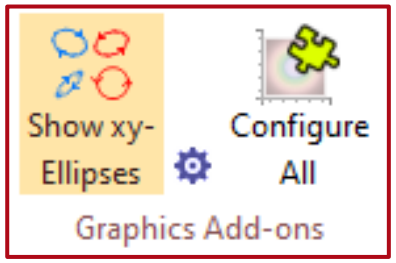
Identifying the Grating Region

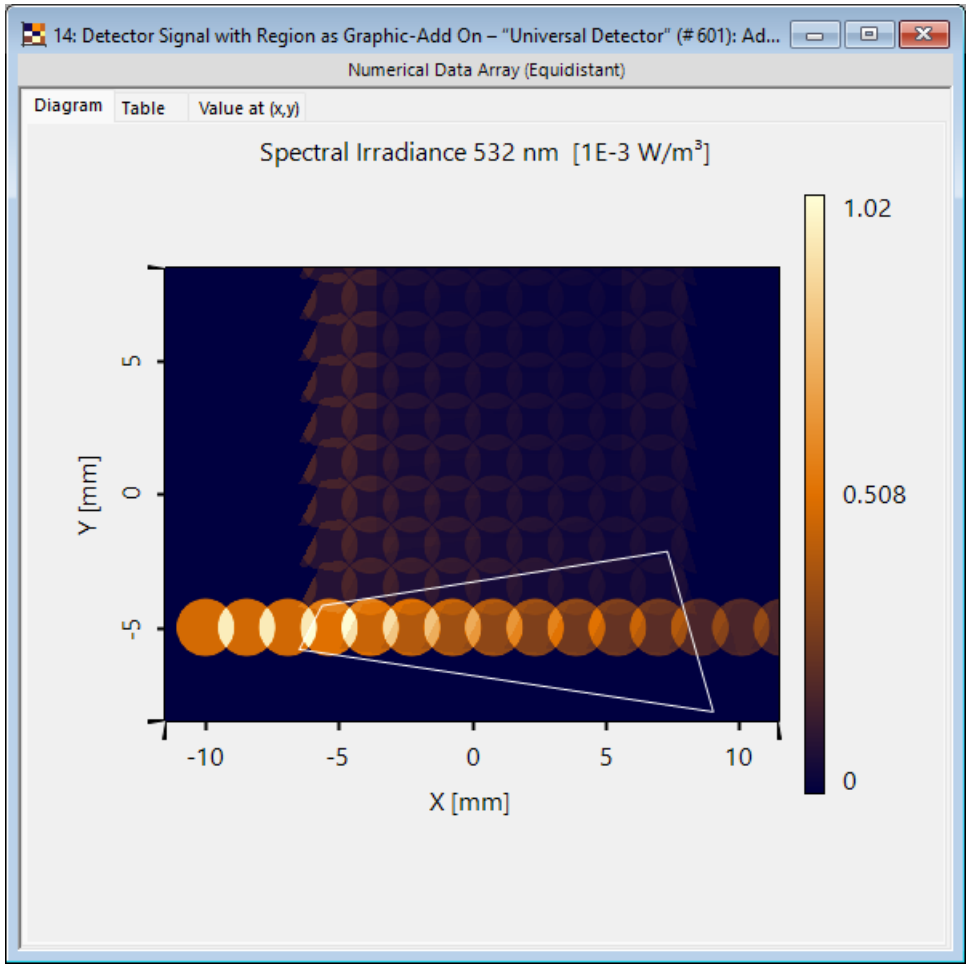


The add-on incorporates a set of parameters that allows the unequivocal identification of a specific grating region, even if multiple lightguide components are present in the system.

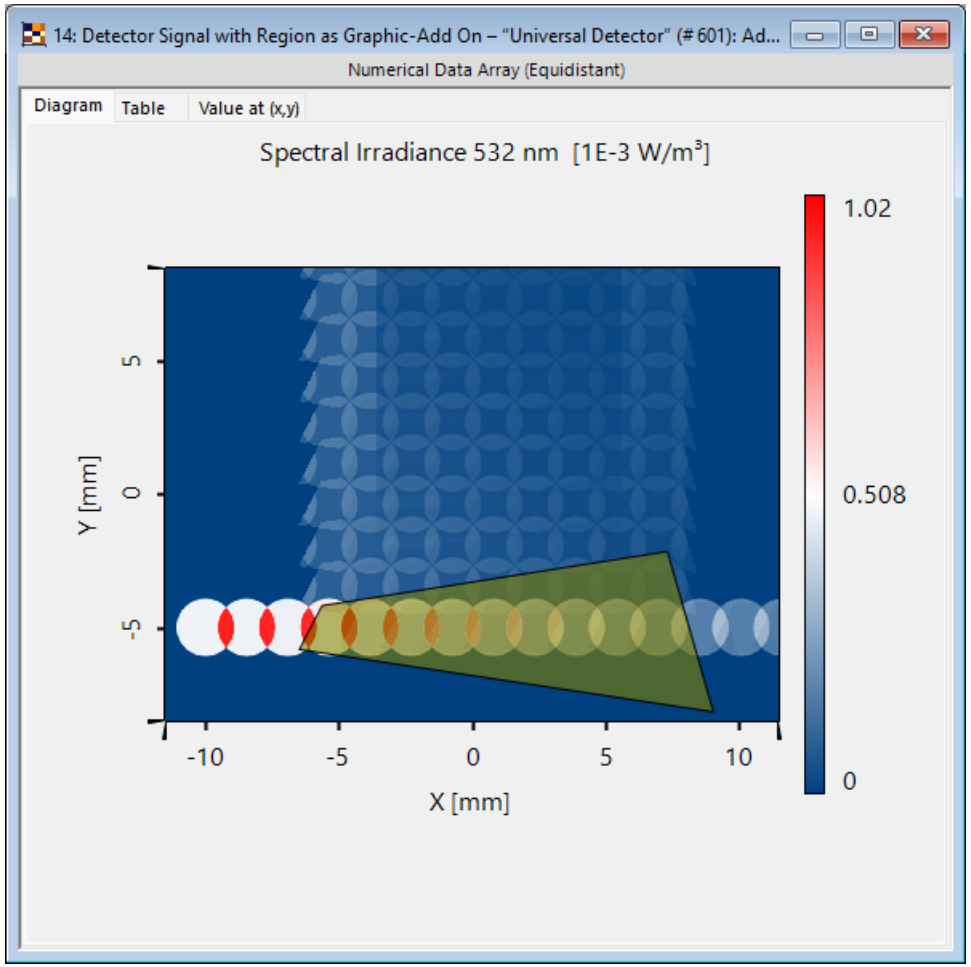
Graphics Add-ons

The indication of the region is added as a *Graphics Add-on* onto the data and can therefore be customized and displayed like any other *Graphics Add-on*.





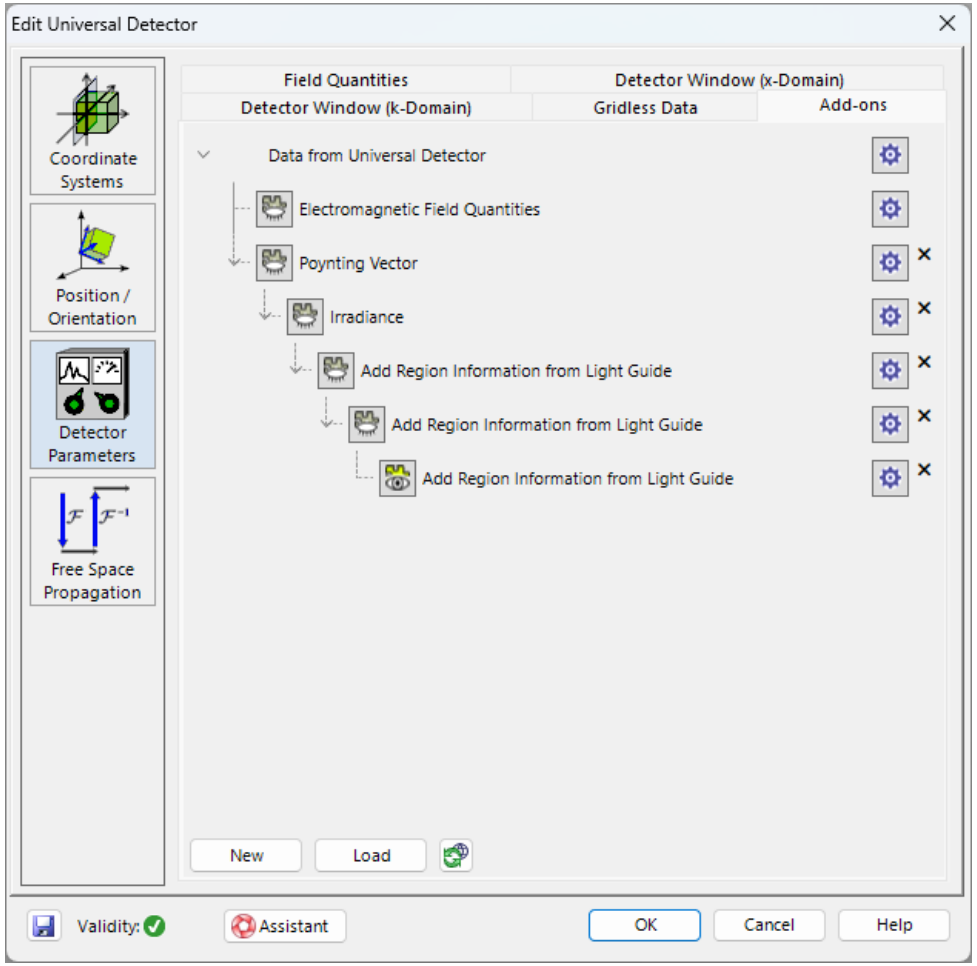
standard

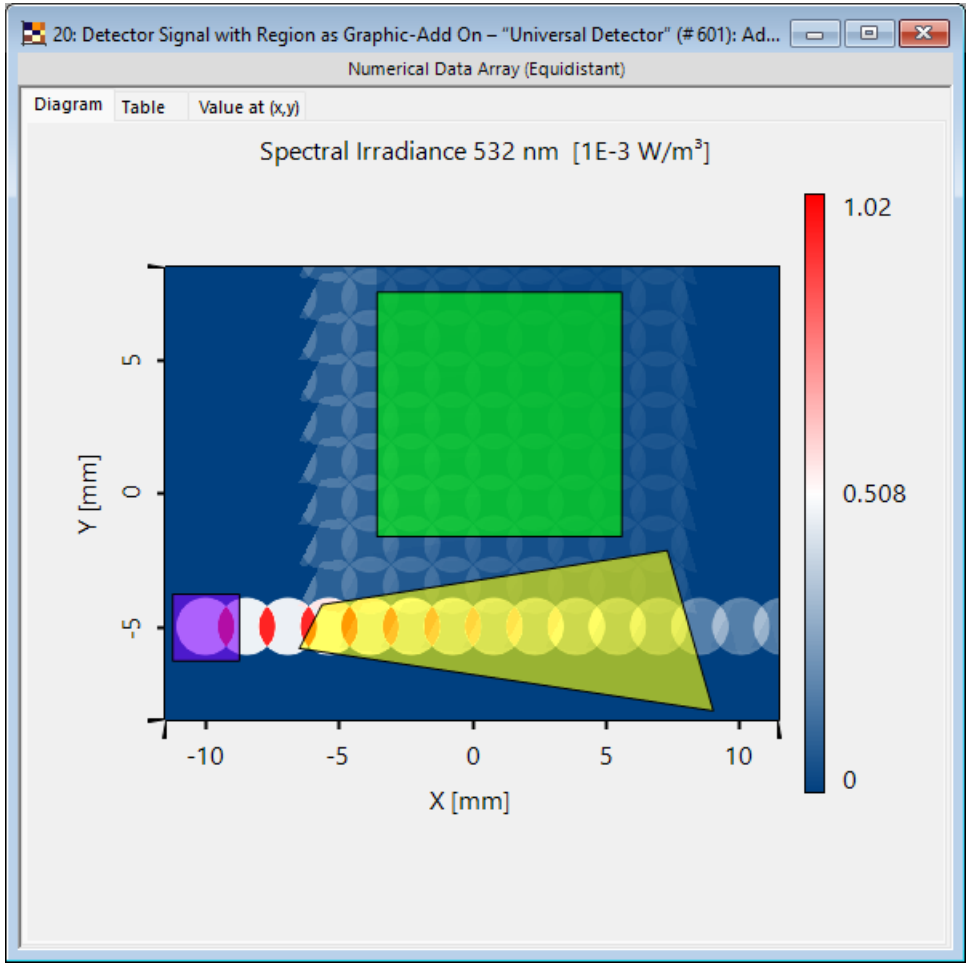


customized

Illustration Example

It is also possible to use multiple detector add-ons in a nested manner in order to display all the regions of the lightguide in a single document.





Document Information

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software version	2023.1 (Build 1.556)
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further reading	• Add Point Cloud Overlay to Data Array • Add Region Overlay to Data Array • Graphics Add-on • Universal Detector • Polarization Ellipses