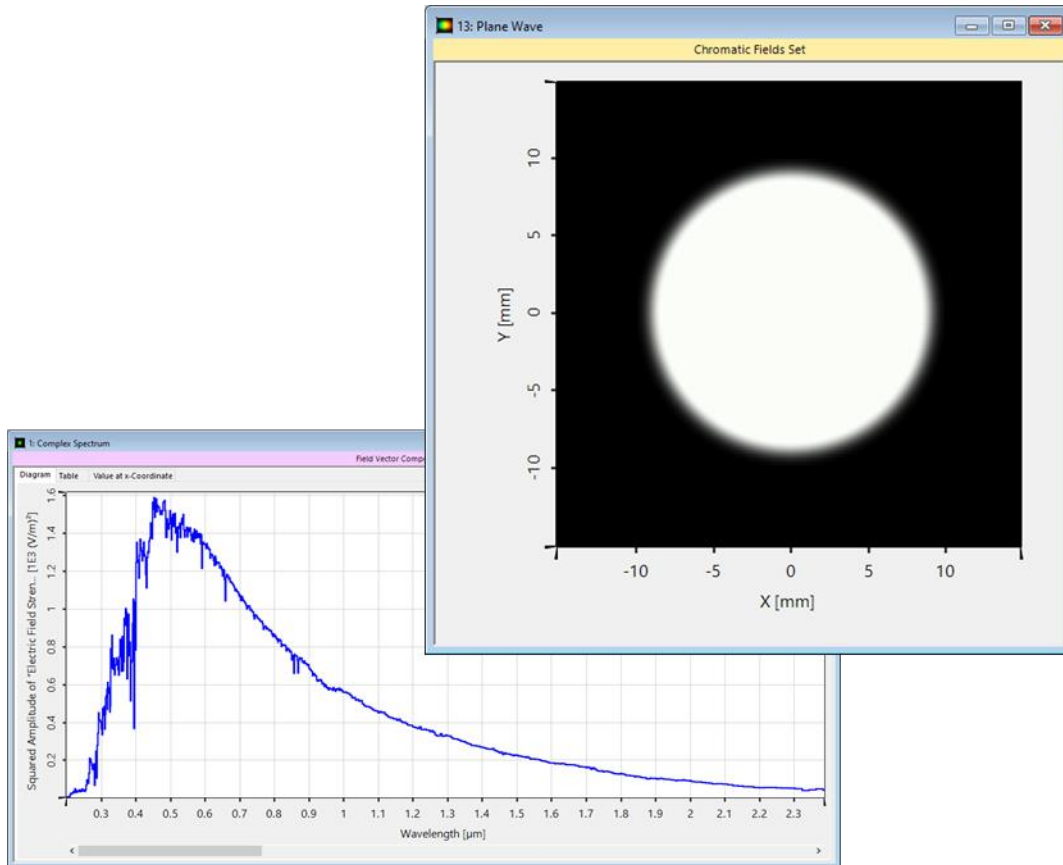


Importing Measured Sun Spectrum into VirtualLab Fusion

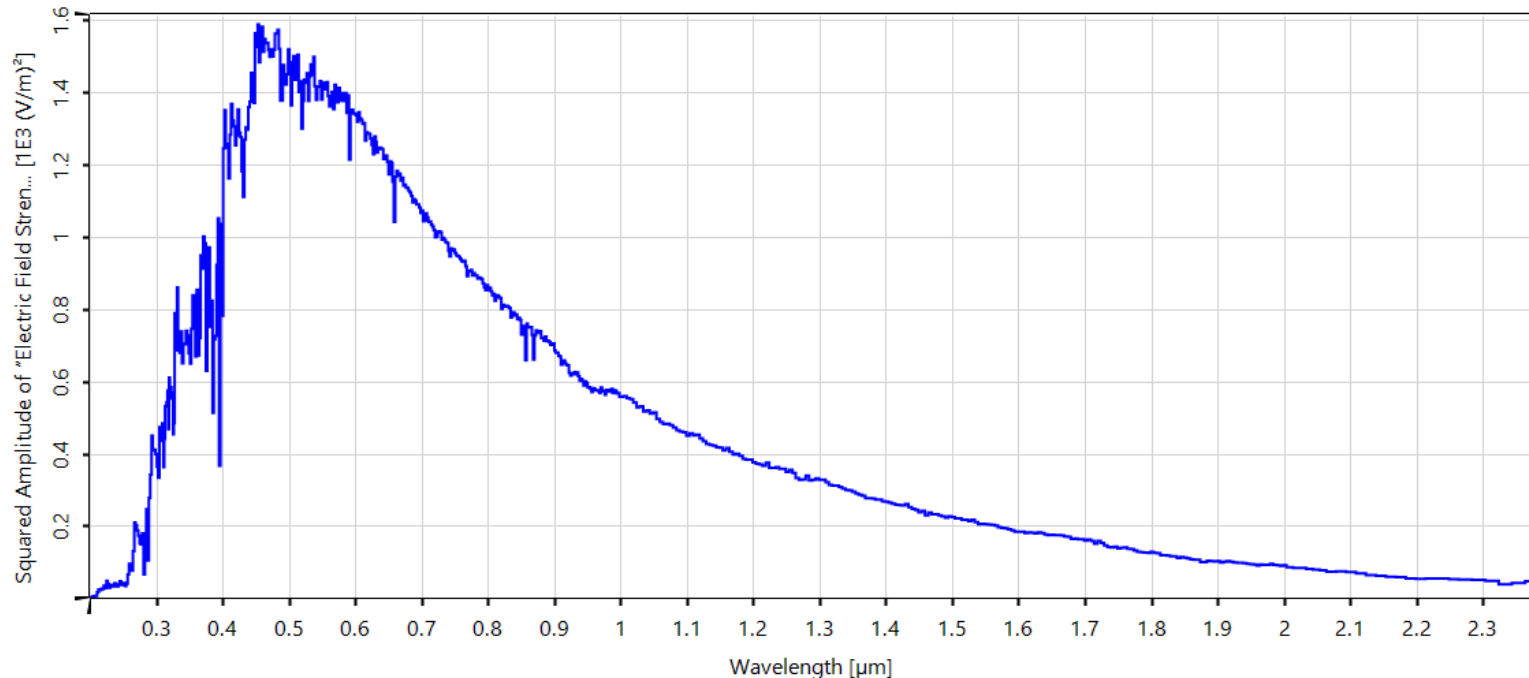
Abstract



The light source is a vital part of any optical system, and using a model that can replicate the most relevant physical properties of the source is fundamental for the success of any optical simulation. A very commonly used source is light emitted by the Sun, with its complex radiation spectrum being one of its most notable characteristics (black-body spectrum). In this use case we illustrate how to import a measured spectrum into VirtualLab Fusion, using sunlight as an example, and then cover how to employ said data as the spectral composition of a source in an optical system.

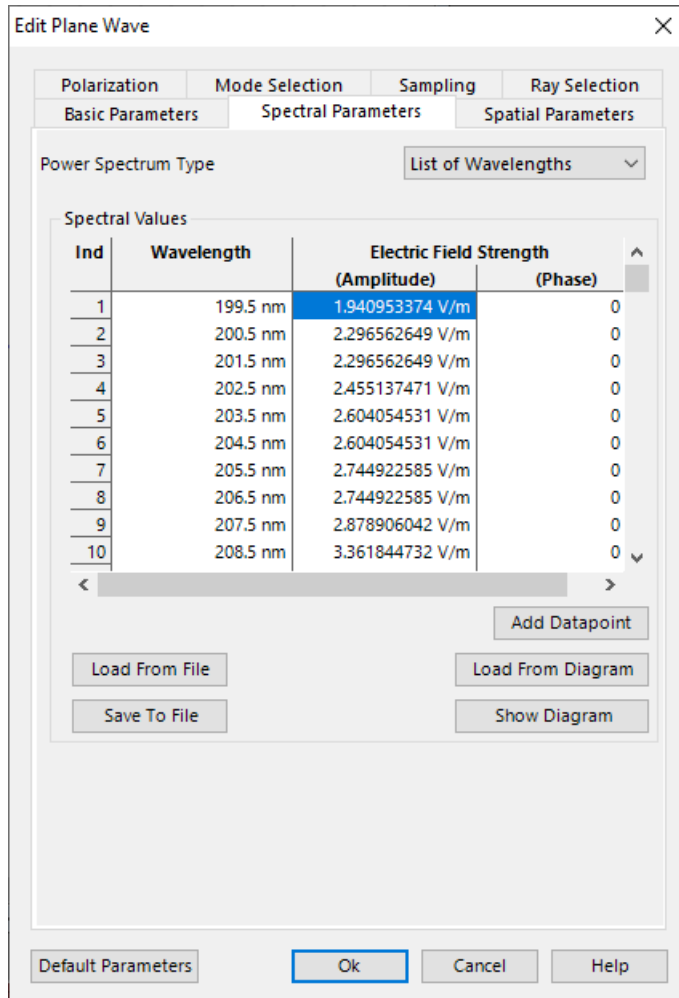
Modeling Task

How to import the measured spectrum of sunlight (see figure below) into VirtualLab Fusion, and how then to use it as the spectral composition of the source in a system?

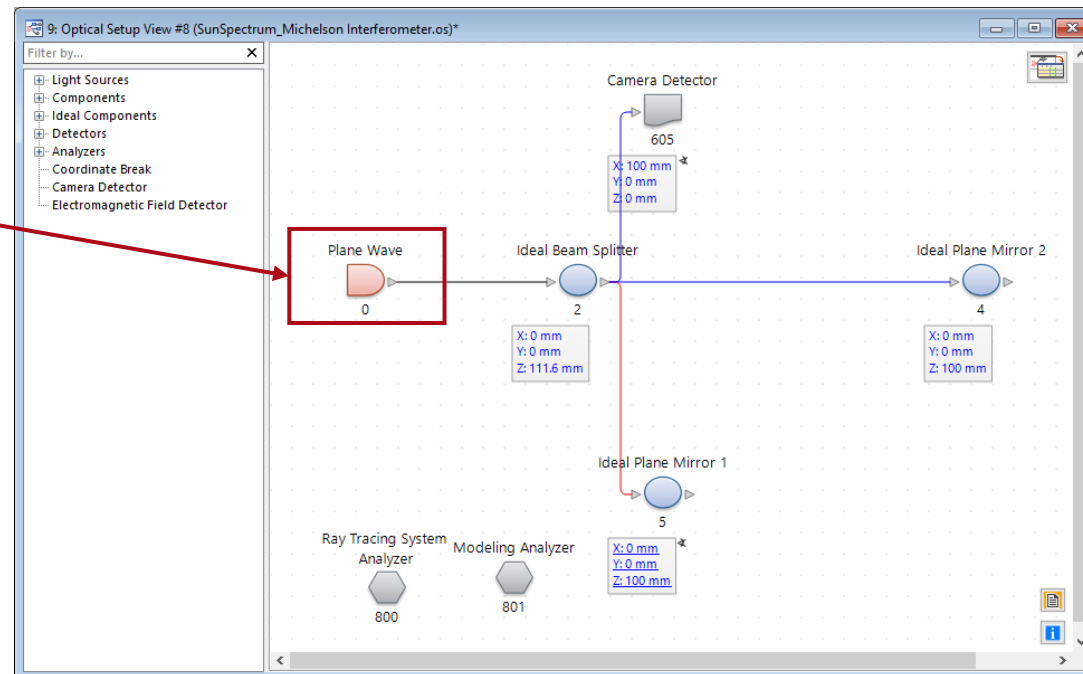


Data of the extraterrestrial sun spectrum from Wehrli, C. World Radiation Center (WRC), 615(1), 10-17, (1985).

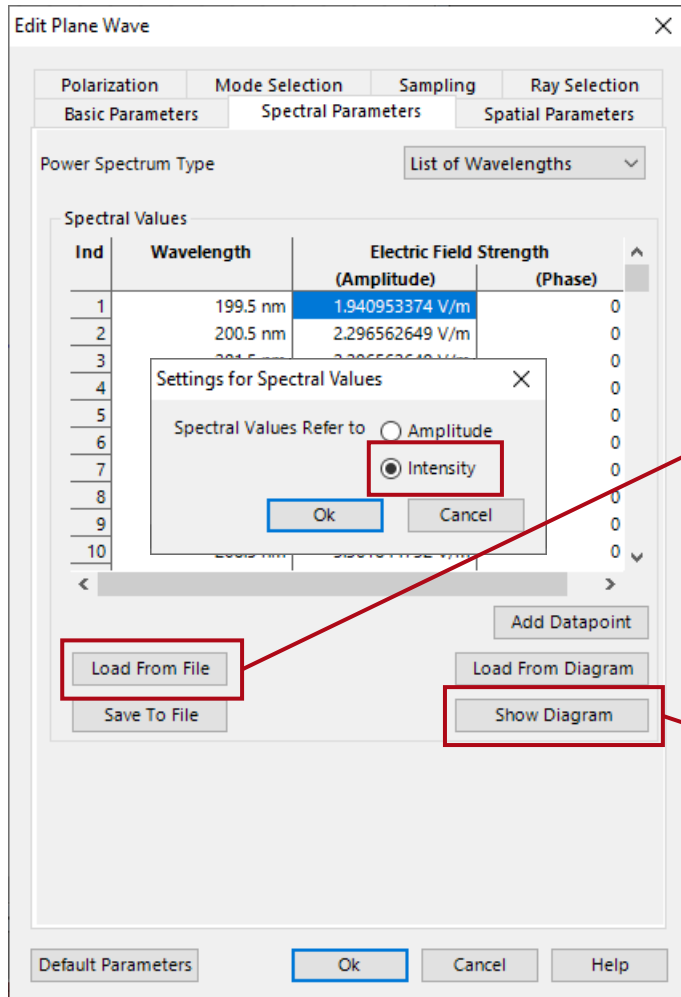
Use the Source in an Optical System



- Any spectrum can be read from text files directly into the edit dialog of a light source, if the given format is correct.
- The measured spectrum can be directly used in a source in an optical system. To illustrate this, we imported the sunlight spectrum into a Michelson interferometer setup. Since sunlight is usually considered to emanate at infinity, it is treated as a plane wave here.



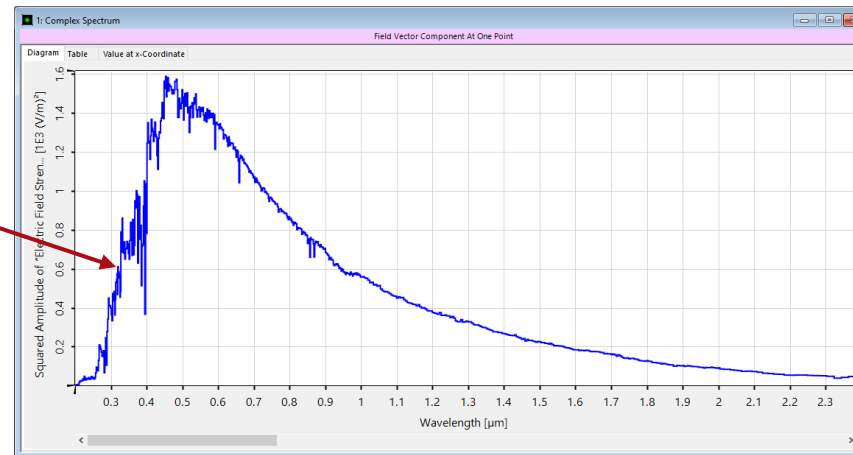
Import Spectrum into the Source



```
ExtraterrestrialSunSpectrum-byWehrli85_for_VL-Import_to_A-Square...
File Edit Format View Help
# Extraterrestrial Spectrum of the sun, by Wehrli (1985)
# Wavelength Squared Amplitude
#
1.995E-07 3.7673E+00
2.005E-07 5.2742E+00
2.015E-07 5.2742E+00
2.025E-07 6.0277E+00
2.035E-07 6.7811E+00
2.045E-07 6.7811E+00
2.055E-07 7.5346E+00
2.065E-07 7.5346E+00
2.075E-07 8.2881E+00
2.085E-07 1.1302E+01
2.095E-07 1.8083E+01
```

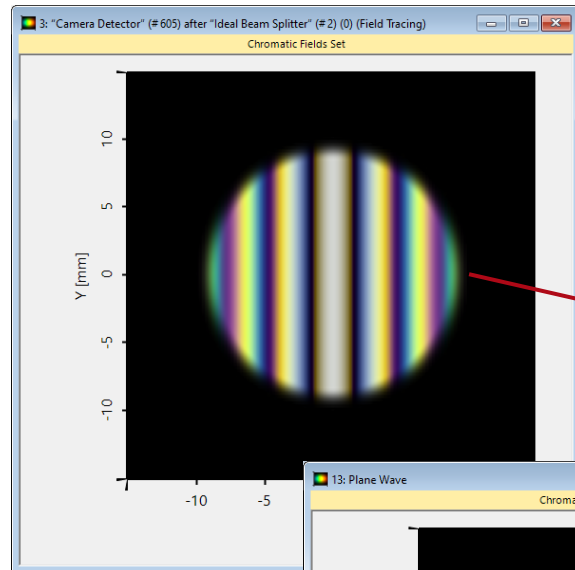
Example for the text format required for input of spectral data in the light source dialog (columns can be separated by an arbitrary number of spaces):

# Wavelength in m	Squared Amplitude in V ² /m ²
5.1E-07	1.1
5.5E-07	4.0
5.8E-7	2.3

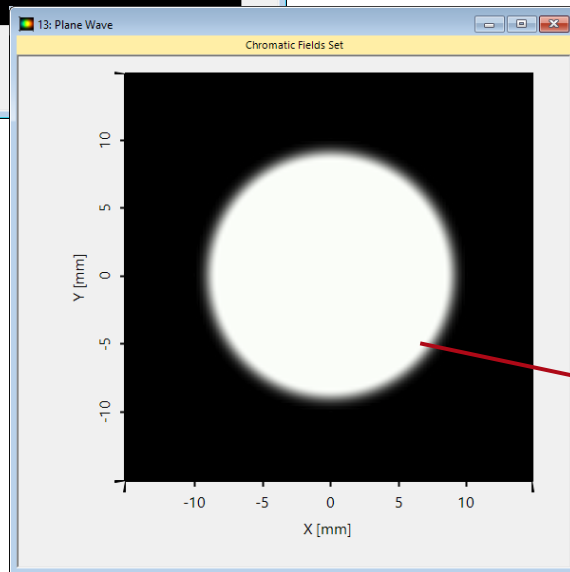


Load the data of the given sample file into the edit dialog of the light source (*List of Wavelengths*) and specify them as referring to *Intensity* when asked.

Michelson Interferometer Experiment

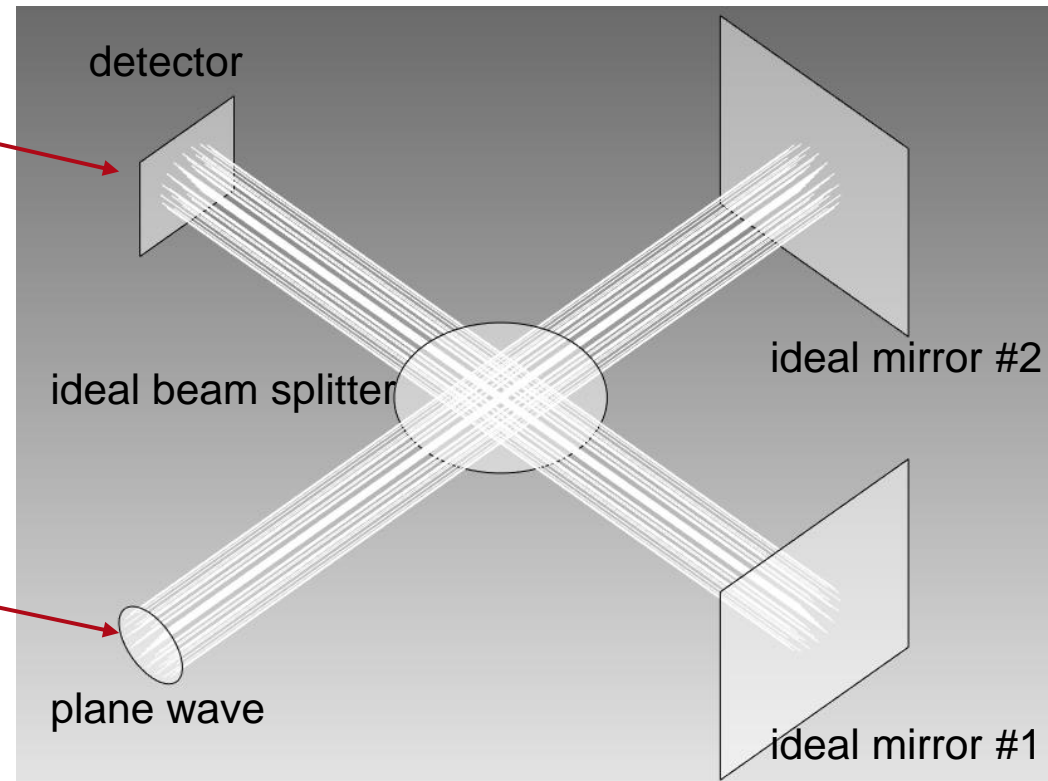


View on detector.



View of the Sun light source.

A Michelson interferometer, with the sunlight spectrum imported into a plane wave source. Dispersion can be observed in the result. A more detailed investigation of the system can be found here: [White-Light Michelson Interferometer](#).



3D system result.

Document Information

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software version	2021.1 (Build 1.180)
category	Feature Use Case
further reading	- <u>White-Light Michelson Interferometer</u>