

UseCase.0040 (1.0)

## Import of Measured Spectral Data to a Light Source

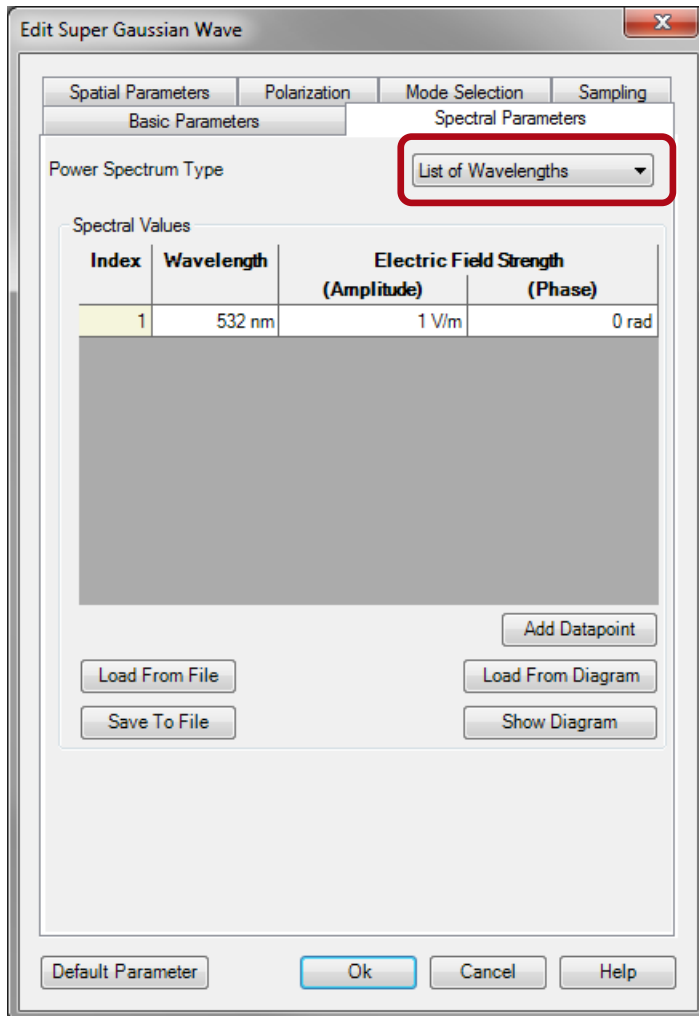
**Keywords:** sun spectrum, power, list of wavelengths, measurement

# Description

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- Simulating realistic light sources includes using realistic spectral power distributions.
- This use case explains how to import measured spectral data while configuring a light source in VirtualLab.
- The generation of an extended light distribution (of Super Gaussian type) with the spectrum of the sun will be demonstrated.

# Light Source Dialog: The Spectral Parameters

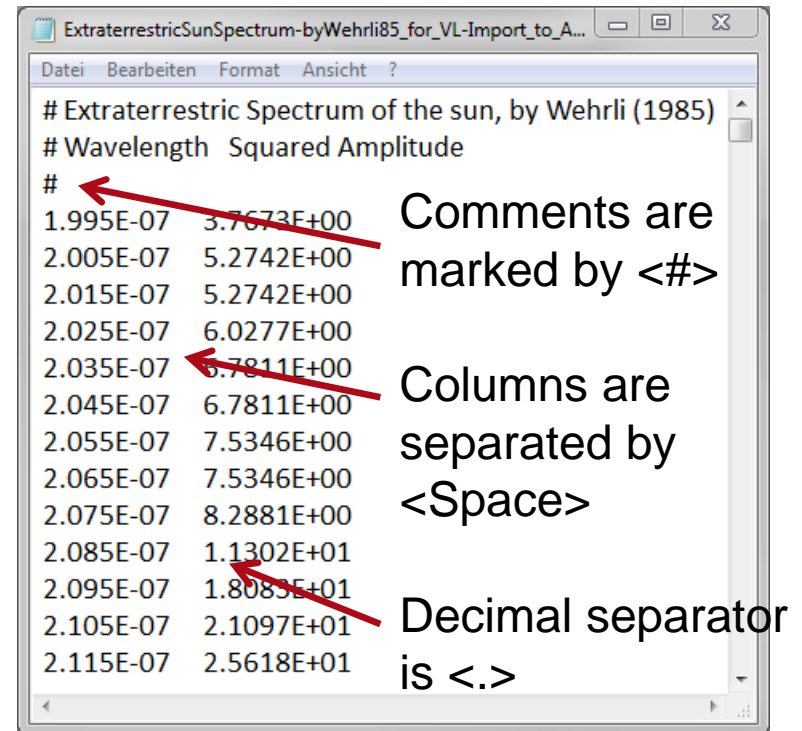


If neither monochromatic light nor a simple RGB source shall be simulated, the Power Spectrum Type has to be set to „List of Wavelengths“.

# The Data File

- The text file which contains the spectral data has to contain pairs of wavelength [m] and spectral weight in separate lines
- The weight may refer either to the amplitude [V/m] or the intensity [V<sup>2</sup>/m<sup>2</sup>]

- Furthermore, the file has to use a special format.



The screenshot shows a text editor window titled "ExtraterrestrialSunSpectrum-byWehrli85\_for\_VL-Import\_to\_A...". The window contains the following text:

```
# 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
2.105E-07 2.1097E+01
2.115E-07 2.5618E+01
```

Annotations with red arrows point to specific parts of the text:

- An arrow points to the '#' character in the header line, with the text "Comments are marked by <#>" to its right.
- An arrow points to the space between the wavelength and amplitude values in the first data row, with the text "Columns are separated by <Space>" to its right.
- An arrow points to the decimal separator '.' in the amplitude value '1.8083E+01' of the 11th data row, with the text "Decimal separator is <.>" to its right.

# Load Data from Text File I

Power Spectrum Type List of Wavelengths

Spectral Values

Index	Wavelength	Electric Field Strength	
		(Amplitude)	(Phase)
1	532 nm	1 V/m	0 rad

**Load From File** Add Datapoint Load From Diagram Save To File Show Diagram

Clicking „Load From File“ opens a file open dialog for ASCII files.



Load Spectrum from Text File

Computer > Data (D:) > UseCase.0040

Organisieren Neuer Ordner

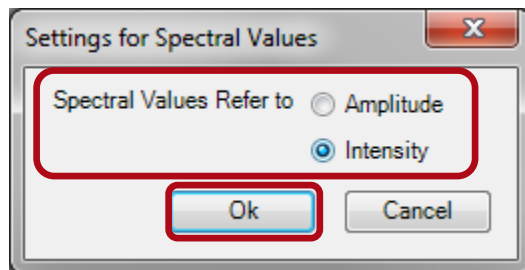
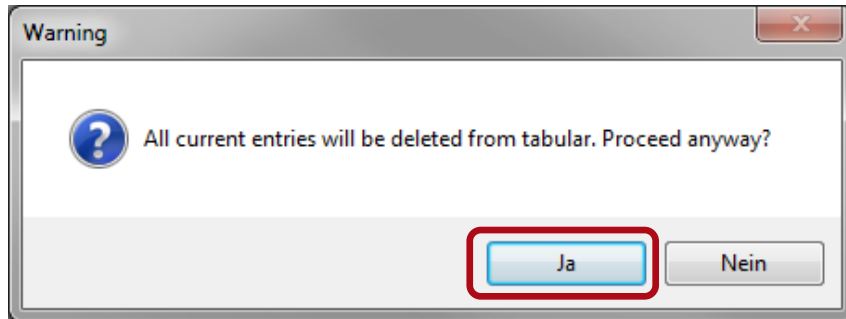
Name Änderu

ExtraterresticSunSpectrum-byWehri85\_for\_VL-Import\_to\_A-Square.txt 30.08.20

Dateiname: ExtraterresticSunSpectrum-byWehri85\_for\_VL-Imp ASCII Files (\*.txt, \*.csv)

Öffnen Abbrechen

# Load Data from Text File II



- After selecting a certain text file for load, a confirmation to discard all old table entries is needed.
- Another dialog asks for the interpretation of the spectral weight values.
- In case of the current sample file, we have to select „Intensity“ in order to let VirtualLab interpret the data correctly.

# Result of Import

Power Spectrum Type List of Wavelengths

Spectral Values

Index	Wavelength	Electric Field Strength	
		(Amplitude)	(Phase)
1	199.5 nm	1.941 V/m	0 rad
2	200.5 nm	2.2966 V/m	0 rad
3	201.5 nm	2.2966 V/m	0 rad
4	202.5 nm	2.4551 V/m	0 rad
5	203.5 nm	2.6041 V/m	0 rad
6	204.5 nm	2.6041 V/m	0 rad
7	205.5 nm	2.7449 V/m	0 rad
8	206.5 nm	2.7449 V/m	0 rad
9	207.5 nm	2.8789 V/m	0 rad
10	208.5 nm	3.3618 V/m	0 rad

Add Datapoint

Load From File Load From Diagram

Save To File Show Diagram

- The confirmation of importing the data as intensity values results in a table filled with spectral values.

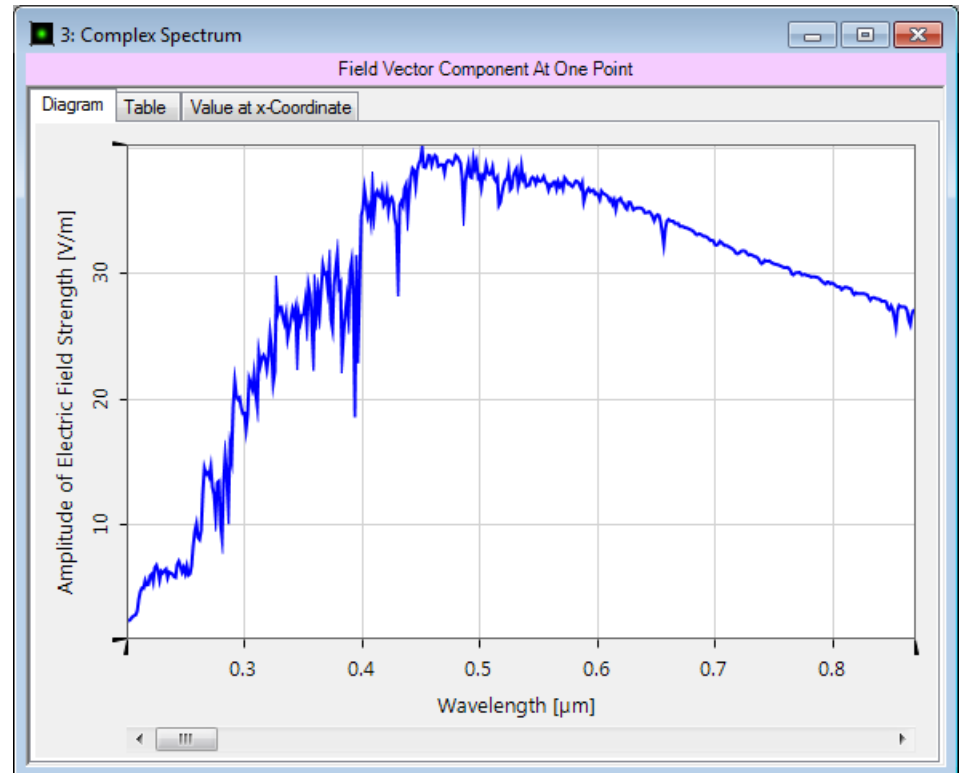
# Checking the Power Spectrum

By clicking 'Show Diagram', a diagram will open which allows to check the imported spectrum visually.

Spectral Values

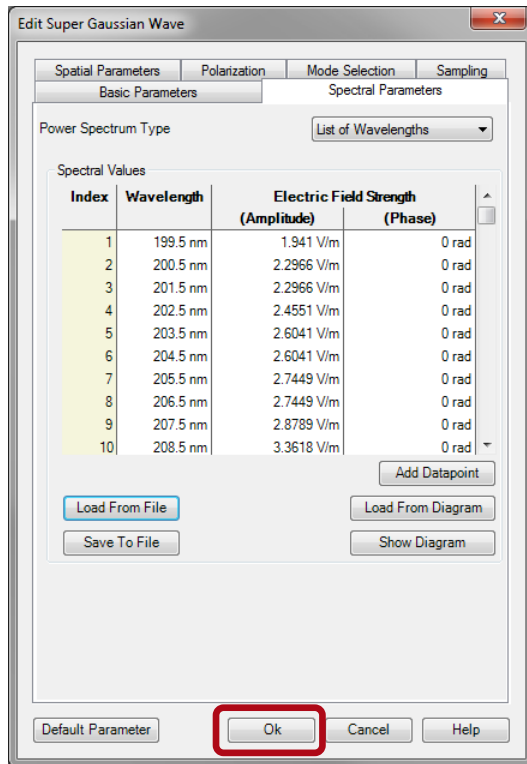
Index	Wavelength	Electric Field Strength	
		(Amplitude)	(Phase)
1	199.5 nm	1.941 V/m	0 rad
2	200.5 nm	2.2966 V/m	0 rad
3	201.5 nm	2.2966 V/m	0 rad
4	202.5 nm	2.4551 V/m	0 rad
5	203.5 nm	2.6041 V/m	0 rad
6	204.5 nm	2.6041 V/m	0 rad
7	205.5 nm	2.7449 V/m	0 rad
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9	207.5 nm	2.8789 V/m	0 rad
10	208.5 nm	3.3618 V/m	0 rad

Buttons: Load From File, Save To File, Add Datapoint, Load From Diagram, Show Diagram

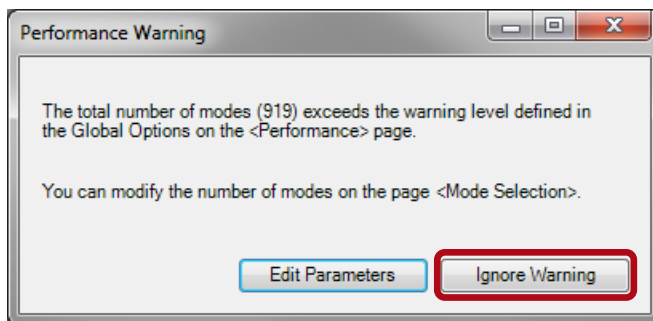




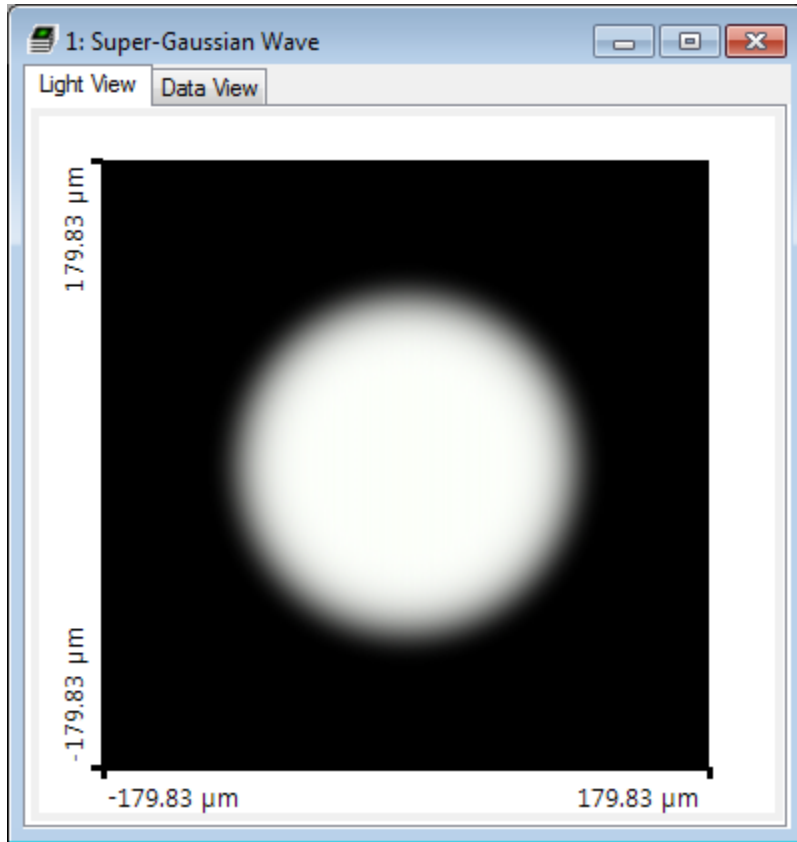
# Generating the Light Distribution



- Closing the edit dialog via „Ok“ may cause a warning message referring to the total resulting number of modes.
- So one has to decide whether this will be critical for the performance or not.
- In the sample case, we can ignore the warning



# The Resulting Light Distribution



- We will get an extended light distribution.
- Its Light View shows the color mixture which results from the spectrum of the sun.