
LuxPy Documentation

Release 1.9.9

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CHAPTER 1

License: GPLv3

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2.1 Install luxpy

1. Install miniconda

- download the installer from: <https://conda.io/miniconda.html> or <https://repo.continuum.io/miniconda/>)
- e.g. https://repo.continuum.io/miniconda/Miniconda3-latest-Windows-x86_64.exe
- Make sure 'conda.exe' can be found on the windows system path, if necessary do a manual add.

2. Create a virtual environment with full anaconda distribution by typing the following at the commandline:

```
>> conda create --name py36 python=3.6 anaconda
```

3. Activate the virtual environment:

```
>> activate py36
```

4. Install pip to virtual environment (just to ensure any packages to be installed with pip to this virt. env. will be installed here and not globally):

```
>> conda install -n py36 pip
```

5a. Install luxpy package from pypi:

```
>> pip install luxpy
```

5b. Install luxpy package from anaconda:

```
>> conda install -c ksmet1977 luxpy
```

Note If any errors show up, try and do a manual install of the dependencies: scipy, numpy, pandas, matplotlib and setuptools, either using e.g. `>> conda install scipy` or `>> pip install scipy`, and try and reinstall luxpy using pip.

2.2 Use of LuxPy package in Spyder IDE

6. Install spyder in py36 environment:

```
>> conda install -n py36 spyder
```

7. Run spyder

```
>> spyder
```

8. To import the luxpy package, on Spyder's commandline for the IPython kernel (or in script) type:

```
import luxpy as lx
```

2.3 Use of LuxPy package in Jupyter notebook

6. Install jupyter in py36 environment:

```
>> conda install -n py36 jupyter
```

7. Start jupyter notebook:

```
>> jupyter notebook
```

8. **Open an existing or new notebook:** e.g. open “luxpy_basic_usage.ipynb” for an overview of how to use the LuxPy package.

9. To import LuxPy package type:

```
import luxpy as lx
```

Imported (required) packages

3.1 Core

- `import os`
- `import warnings`
- `import pathlib`
- `import importlib`
- `from collections import OrderedDict as odict`
- `from mpl_toolkits.mplot3d import Axes3D`
- `import colorsys`
- `import itertools`
- `import copy`
- `import time`
- `import tkinter`
- `import ctypes`
- `import platform`
- `import subprocess`
- `import cProfile`
- `import pstats`
- `import io`

3.2 3e party dependencies (automatic install)

- `import numpy as np`
- `import pandas as pd`
- `import matplotlib.pyplot as plt`
- `import scipy as sp`
- `import imageio`

3.3 3e party dependencies (automatic install on import)

- `import pyswarms` (when importing `particleswarms` from `math`)
- `import pymoo` (when importing `pymoo_nsga_ii` from `math`)
- `import harfang as hg` (when importing `toolbox.stereoscopicviewer`)

3.4 3e party dependencies (requiring manual install)

To control Ocean Optics spectrometers with spectro toolbox:

- `import seabreeze` (conda install -c poehlmann python-seabreeze)
- `pip install pyusb` (for use with 'pyseabreeze' backend of python-seabreeze)

Luxpy package structure

4.1 Utils sub-package

```
py
  • __init__.py
  • utilities.py
  • folder_tree.py
namespace luxpy.utils
```

4.2 Math sub-package

```
py
  • __init__.py
  • basics.py
  • minimizebnd.py
  • mupolymodel.py
  • Pyswarms_particleswarm.py
  • pymoo_nsga_ii.py
namespace luxpy.math
```

4.2.1 vec3/

```
py
  • __init__.py
```

- vec3.py

namespace luxpy.math

4.2.2 DEMO/

py

- __init__.py
- DEMO.py
- demo_opt.py

namespace luxpy.math

4.3 Spectrum sub-package

py

- __init__.py
- spdx_ietm2714.py
- **basics/**
 - __init__.py
 - cmf.py
 - spectral.py
 - spectral_databases.py

namespace luxpy

4.3.1 SPD class

py

- SPD.py

namespace luxpy

4.4 Color sub-package

py

- __init__.py

namespace luxpy

4.4.1 utils/

py

- `__init__.py`
- `plotters.py`

namespace `luxpy`

4.4.2 ctf/

py

- `__init__.py`
- `colortransformations.py`
- `colortf.py`

namespace `luxpy`

4.4.3 cct/

py

- `__init__.py`
- `cct.py`
- `cct_legacy.py`
- `cctduv_ohno_CORM2011.py`

namespace `luxpy`

4.4.4 cct/robertson1968

py

- `__init__.py`
- `robertson1968.py`

namespace `luxpy.color.cct.robertson1968`

4.4.5 cat/

py

- `__init__.py`
- `chromaticadaptation.py`

namespace `luxpy.cat`

4.4.6 cam/

py

- `__init__.py`
- `colorappearancemodels.py`
- `helpers.py`
- `utils.py`
- `ciecam02.py`
- `cam02ucs.py`
- `ciecam16.py`
- `cam16ucs.py`
- `cam15u`
- `sww2016.py`
- `cam18sl.py`
- `camjabz.py`
- `zcam.py`
- `cmf_translator_sww2021`

namespace `luxpy.cam`

4.4.7 deltaE/

py

- `__init__.py`
- `colordifferences.py`
- `discriminationellipses.py`
- `frielellipses.py`
- `macadamellipses.py`

namespace `luxpy.deltaE`

4.4.8 whiteness/

py

- `__init__.py`
- `smet_white_loci.py`

namespace `luxpy`

4.4.9 cri/

py

- `__init__.py`
- `colorrendition.py`
- **/utils/**
 - `__init__.py`
 - `init_cri_defaults_database.py`
 - `DE_scalers.py`
 - `helpers.py`
 - `graphics.py`
- **/indices/**
 - `__init__.py`
 - `indices.py`
 - `cie_wrappers.py`
 - `iestm30_wrappers.py`
 - `cri2012.py`
 - `mcri.py`
 - `cqs.py`
 - `fci.py`
 - `thorntoncpi.py`
- **/iestm30/**
 - `__init__.py`
 - `metrics.py`
 - `graphics.py`
 - `metrics_fast.py`
- **/VFPX/**
 - `__inint__.py`
 - `vectorshiftmodel.py`
 - `pixelshiftmodel.py`
 - `VF_PX_models.py`

namespace luxpy.cri

4.4.10 cri/VFPX/

py

- `__init__.py`

- VF_PX_models.py
- vectorshiftmodel.py
- pixelshiftmodel.py

namespace luxpy.cri.VFPX

4.4.11 XYZ,LAB classes

py

- CDATA.py

namespace luxpy

4.5 Toolboxes

4.5.1 photbiochem/

py

- __init__.py
- cie_tn003_2015.py
- ASNZS_1680_2_5_1997_COI.py
- circadian_CS_CLa_lrc.py

namespace luxpy.photbiochem

4.5.2 indvcmf/

py

- __init__.py
- individual_observer_cmf_model.py

namespace luxpy.indvcmf

4.5.3 spdbuild/

py

- __init__.py
- spdbuilder.py
- spdbuilder2020.py
- spdoptimizer2020.py

namespace luxpy.spdbuild/

4.5.4 hypspcim/

py

- `__init__.py`
- `hyperspectral_img_simulator.py`

namespace `luxpy.hypspcim`

4.5.5 dispcal/

py

- `__init__.py`
- `displaycalibration.py`

namespace `luxpy.dispcal`

4.5.6 rgb2spec/

py

- `__init__.py`
- `smits_mitsuba.py`

namespace `luxpy.rgb2spec`

4.5.7 iolidfiles/

py

- `__init__.py`
- `io_lid_files.py`

namespace `luxpy.iolidfiles`

4.5.8 spectro/

py

- `__init__.py`
- `spectro.py`

namespace `luxpy.spectro`

4.5.9 sherbrooke_spectral_indices/

py

- `__init__.py`
- `sherbrooke_spectral_indices_2013.py`

namespace `luxpy.sherbrooke_spectral_indices`

4.5.10 spectral_mismatch_and_uncertainty/

py

- `__init__.py`
- `detector_spectral_mismatch.py`

namespace `luxpy.spectral_mismatch_and_uncertainty`

4.5.11 technoteamlmk/

py

- `__init__.py`
- `TechnoTeamLMK.py`

namespace `luxpy.technoteamlmk`

4.5.12 stereoscopicviewer/

py

- `__init__.py`
- `/harfang/`
- `harfang_viewer.py`

namespace `luxpy.stereoscopicviewer`

CHAPTER 5

Indices and tables

- `genindex`
- `modindex`
- `search`