



École doctorale de Physique en Île de France

ED564 : PSL – SU – USPC – UPSaclay

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INTRODUCTION TO IMAGE PROCESSING WITH PYTHON

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Production of scientific images is ubiquitous in many scientific disciplines as they can capture phenomena in a broad range of lengthscales, from the stars to the atom. Therefore, skills in image processing can be advantageous to perform and automate image analysis.

This lecture will have a tutorial/workshop format and will mainly focus on the library scikit-image [1,2]. This course will be taught in English in case of non French speaking attendees. The lecturer is one of the scikit-image developers.

Prerequisites: Even if a basic knowledge of Python and numpy is recommended, a reminder can be provided at the beginning of the session to ensure that attendees can step up easily. A laptop is necessary to follow the lectures.

Outline:

Generalities

- * Why Python and scikit-image?
- * Short reminder (Containers in Python, numpy, scipy, matplotlib)
- * Basics on the Jupyter notebook
- * Presentation of image-related libraries available in Python
- * More detailed presentation of scikit-image (documentation, source-code, etc.)

In depth

- * Read and write (IO) images
- * Representation of images and color manipulations
- * Histogram and thresholding
- * Contour finding
- * Feature detection and characterization (segmentation, labeling...)
- * Morphologies: lines and circles fitting
- * Filters and peak detection
- * Geometrical image transformation and image stitching
- * Image restoration (inpainting)
- * Example of the use of machine learning algorithm in image processing.

[1] <http://scikit-image.org/>

[2] <https://peerj.com/articles/453/>

-- 2 cours de 6h --

**Location: Laboratoire de Physique des Solides, bâtiment 510,
Université Paris-Sud, ORSAY - room 208a (2nd floor, South wing)**

Dates: January, 14th and 21th

Hours: 9:00-12:00 and 13:30-16:30

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